



831 Park Ave Site A  
Murfreesboro, TN 37130

**June 14, 2024**

**TO:** Sean Lieske, Public Utilities Director, IRC  
Himanshu Mehta, PE., Managing Director, IRC - SWDD

**FROM:** Ram Natarajan, PE., Indian River Sustainability Center (IRSC)

**CC:** Ron Jones., BSCE, A.M. ASCE. – Asst. Managing Director, IRC – SWDD  
David Allworth & David Howard - Heartland Water Technology, Inc.  
Alain Castro & Craig Gontkovic

**SUBJECT:** IRSC Leachate Evaporation Project: 2024 CPI Adjustment & Chemical Cost Recovery

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Indian River Sustainability Center (IRSC) appreciates the opportunity to partner with Indian River County (District) in managing leachate at the District's Landfill. We are committed to continuing this collaboration and providing exceptional service to your residents.

In accordance with our Wastewater Treatment Services Agreement between IRSC and the District dated July 13, 2021, as amended (the "Contract"), IRSC is submitting this notice to address the following topics:

- 2024 annual CPI adjustment to reflect changes in the cost of doing business.
- Contract exceedances of leachate water quality and related treatment challenges that have materially impacted IRSC's operational costs.

### **CPI Adjustment - Background and Analysis**

The Contract specifies the South Urban Region, All Items-All Urban Consumers (CPI-U) index (Series ID = CUUR0300SA0) published by the U.S. Department of Labor for calculating annual inflation adjustments. The Contract further provides that the CPI/inflationary adjustment should be based on seventy-five percent (75%) of the change in the CPI between the prior year's January (CPI1) and the current year's January (CPI2), which equates to 2.58%, with a cap of 3%.

Throughout 2023 and into 2024, the U.S. economy has been experiencing the unexpected adverse impacts of inflation caused in large part by an economy re-emerging from COVID-19 but hampered by increasing supplies and material costs and supply chain constraints. These include, without limitation, increases in the cost of spares and shipping, higher operating costs, and significant expenses due to inflation and increased chemical costs. As just one example, the price of the chemicals needed to treat off spec leachate has increased more than 400% over the past 12 months. Since our last CPI adjustment, IRSC's operations have absorbed an Annual Inflation Impact of 3.44% (based on the change in CPI from January 2023 through January 2024) which is reflected in our Recommended Approach outlined below.

On a separate but related matter, the Contract currently allows for an annual rate adjustment to be calculated and applied starting on April 25th of each year going forward during the Operating Term. The District has submitted a request to IRSC that we amend the Contract in order to align the timing of the annual inflation adjustments with the beginning of the District’s fiscal year, which commences on October 1<sup>st</sup> each year. IRSC recognizes that this change would simplify the District's budgeting and rate adjustment processes.

### CPI Adjustment - Recommended Approach

**On Alignment of Timing of Annual Inflation Adjustment:** IRSC is willing to accommodate the District’s request to amend the Contract to provide for the annual inflation adjustments to begin at the beginning of the District’s fiscal year, notwithstanding the fact that it result in some financial strain on IRSC.

**On CPI:** Given the factors discussed above, IRSC is respectfully requesting the following tariff adjustments for each leachate treatment tier which would be applied starting as of October 2024 for the following 12 months:

Leachate Treatment Tariff	Current Contract	Adj. for Inflation	Adjusted for Impact of Inflation
Tier 1 - Up to 18,000 gpd	\$0.1446	3.44%	\$0.1496
Tier 2 - 18,001-24,000 gpd	\$0.1374	3.44%	\$0.1421
Tier 3 - 24,001+ - 30,000 gpd	\$0.1300	3.44%	\$0.1345

### Leachate Chemistry and Chemical Cost Compensation - Background and Analysis

The Wastewater Treatment Agreement entered into between IRSC and the District on or approximately July 13, 2021, as amended (the "Contract"), specifies the acceptable Wastewater Chemistry Operating Parameters (the “Operating Parameters”) of the District’s leachate (see Appendix E). The IRSC Evaporation Plant can cost-effectively process leachate that falls within the Operating Parameters (with a +/-20% tolerance range) to a minimum volume reduction of 95% (the “Volume Reduction Requirement”) as set forth in Section 2.2 of the Contract, resulting in approximately 5% residual waste.

Since the inception of the Contract, the chemical composition of the District’s leachate has consistently deviated from the acceptable Operating Parameters in exceedance of the +/-20% tolerance range. Specifically: (1) The elevated ratio of high organic-based Total Suspended Solids (“TSS”) to inorganic solids directly impacts antifoam consumption, and (2) the leachate alkalinity consistently exceeds the Contract limits, adversely affecting acid consumption and leading to foam formation, which subsequently results in the increased use of antifoam.

IRSC has kept the District informed about the deviation of the leachate quality from the contacted Operating Parameters, and IRSC and the District have tried to address the issue. Together, IRSC and the District have explored solutions such as alternative antifoam trials, modifications to the evaporator models, additional pre-treatment evaluations, and temporarily reducing the volume reduction level below the 95% Volume Reduction Requirement to decrease chemical consumption closer to budgeted levels.

A detailed report of IRSC’s findings and efforts, including timelines, leachate data, results, and operational cost impacts, is provided in Appendix A. Appendix A also includes on-site and independent lab test results demonstrating the leachate quality variations.

#### **Leachate Chemistry and Chemical Cost Compensation - Financial Impact to IRSC**

The deviation in the leachate quality from the agreed-upon Operating Parameters has resulted in an upsurge in chemical usage, materially increasing IRSC’s operating costs beyond what was anticipated in the initial project budget. The cost of the chemicals required to treat the District’s off-spec leachate has increased more than 400% over 2023 (see Appendix A for details); IRSC is incurring an extra \$0.0252 per gallon of leachate treated, totaling approximately \$218,324 compared to the 2023 budget.

#### **Leachate Chemistry and Chemical Cost Compensation - Recommended Approach**

To address the increased ongoing operational costs associated with the deviation in leachate quality, IRSC proposes to implement a chemical consumption surcharge of \$0.009 / gallon at 95% volume reduction. Please note, this surcharge which will start in October 2024, does not resolve historical operating and testing costs that were incurred by IRSC in developing a solution to the leachate water quality deviations. IRSC plans to further discuss potential options for recovering chemical costs incurred during the current fiscal year (FY) and will also propose a revised wastewater quality spec based on empirical performance over the next three months utilizing the new Antifoam product.

The revised project tariff rate schedule, adjusted for inflation and the chemical consumption surcharge, is as follows:

Leachate Treatment Tariff	Current Contract	Adj. for Inflation	Adjusted for Impact of Inflation	Chemical Consumption Surcharge	Adjusted for Chemical Consumption
Tier 1 – Up to 18,000 gpd	\$0.1446	3.44%	\$0.1496	\$0.009	<b>\$0.1586</b>
Tier 2 – 18,001-24,000 gpd	\$0.1374	3.44%	\$0.1421	\$0.009	<b>\$0.1511</b>
Tier 3 – 24,001+ - 30,000 gpd	\$0.1300	3.44%	\$0.1345	\$0.009	<b>\$0.1435</b>

## **Conclusion**

IRSC values its partnership with the District and is committed to providing exceptional leachate treatment services. We have faced considerable financial challenges due to inflation and postponing CPI adjustments to October; and unforeseen financial challenges caused by the leachate quality deviations. We believe the requested adjustments are fair and reasonable in light of these extraordinary circumstances.

We welcome the opportunity to discuss any questions or concerns you may have regarding this request.

## Appendix A - Leachate Chemistry and Chemical Usage Review



Indian River County Landfill Concentrator

# Chemistry and Chemical Usage Review Update February 2024

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# Contents of this slide deck

- **Summary from July 2023** presented to Indian River County
- **Heartland Chemical Optimization Summary** of Work (Until Dec, 2023)
  - Overview & Schedule
  - Water Chemistry Testing & Chemical Usage
  - Chemical Optimization Testing Summary
  - Recommendations



# Overview & Short-Term Game Plan - As presented in July 2023

## Overview

- Background
  - Issue – Influent leachate chemistry has changed and as a result exceeds contract limits. This results in excessive chemical consumption
  - Average Leachate Flows from April thru mid-July are trending at ~20K GPD; Flow is increasing
  - Two chemicals utilized at site: Antifoam & Acid
- Primary Factors Impacting Chemical Consumption
  - Feed Water Chemistry
  - System Volume Reduction (Concentration factor)
- Measures Taken to Date to understand scope of issue
  - Conducted System Feed Water Sampling
    - 3<sup>rd</sup> Party Analysis - Series of 10 samples collected
    - Onsite Analysis – Daily samples for limited parameters including Alkalinity
  - Trials to Optimize Chemicals
    - Volume reduction trials
    - Acid optimization trials

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## Short Term Game Plan

- Operate between 90% - 95% volume reduction to minimize chemical usage per table below

System Volume Reduction	95%	94%	93%	92%	91%	90%
Net cost increase due to increase residual cost and reduction in NG consumption	\$0.000 per gal	\$0.001 per gal	\$0.002 per gal	\$0.003 per gal	\$0.004 per gal	\$0.004 per gal
Cost increase due to increase chemical cost	\$0.030 per gal	\$0.017 per gal	\$0.008 per gal	\$0.003 per gal	\$0.0002 per gal	-\$0.001 per gal
The above estimates are based on plant operational data from Start up thru mid July 2023						
All Cost estimates are preliminary in nature and do not account for cost of debt services, inflation or project margins						

- Continue work to further optimize chemical consumption to reach a consistent 95% or greater volume reduction with the given water chemistry
  - Alternative antifoam trials
  - Modes of operation
  - Additional pre-treatment evaluation
- Anticipated Duration of Short-term Measures – 3 to 6 months
- We are also exploring long term options including additional pre-treatment options & process equipment additions supported by economic analysis

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# Heartland Summary of Chemical Optimization Work

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August 2023 to Dec 2023

# Overview

- **Background**

- **Issue** – Chemical usage at the IRC Concentrator facility was significantly higher than planned in 2023. Feed water chemistry exceeds anticipated ranges (i.e., > the +20% range in the Wastewater Treatment Agreement).
- Two chemicals are utilized at site: Antifoam & Acid (HCl)

- **Measures taken in 2023 by Heartland to understand scope of issue and optimize chemical consumption**

- Water Chemistry Testing – Onsite and 3<sup>rd</sup> Party
- pH (acid injection) Optimization
- Alternative antifoams evaluated (multiple vendors and products)
- System Volume Reduction (Concentration factor) Testing
- Operating parameters and modes optimized
- Pretreatment evaluated



## Overall Schedule – Chemical Optimization

Overall Schedule - Chemical Optimization Trials	
Dates	Description
July	Acid Reduction Trials
Aug.	Residuals Concentration Trials (90 - 95% VR)
Sep. - Nov.	Alternative Antifoam Trials
December	Residuals Concentration Trial (90% VR Focus)
December	Mode of Operation (Batch cycleup)



## Parameters Impacting Antifoam Usage

Parameters Impacting Antifoam Usage (PPM)	
Large Impact	Minor Impact
<ul style="list-style-type: none"><li>· Feed Chemistry</li><li>· Residuals Concentration (% Vol. Reduction)</li><li>· Type of Antifoam</li><li>· pH of System (acid dosing)</li></ul>	<ul style="list-style-type: none"><li>· System operational settings such as fan speed, venturi DP, etc.</li></ul>



## Chemical Usage Overview – Planned vs Actual

CHEMICAL USAGE - PROJECT BASIS				
	Antifoam		Acid	
	PPM	GAL/DAY	PPM	GAL/DAY
<b>Average</b>	<b>400</b>	<b>10</b>	<b>3,050</b>	<b>73</b>

2023 OPERATIONS				
	Antifoam		Acid	
	PPM	GAL/DAY	PPM	GAL/DAY
April	2,343	56	2,761	66
May	1,729	41	1,288	31
June	1,632	39	1,564	38
July	1,271	31	530	13
August	1,513	36	2,626	63
September	1,713	41	2,765	66
October	1,866	45	2,707	65
November	2,018	48	2,929	70
December	2,090	50	2,950	71
<b>Average</b>	<b>1,797</b>	<b>43</b>	<b>2,236</b>	<b>54</b>

- Antifoam Usage > 400% of Budgeted
- Late June through July, minimal acid was used (lightening strike)
- July and August operated at volume reduction less than 95% for testing purposes (~93%)



# Water Chemistry Testing & Chemical Usage

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**April 2023 – December 2023**

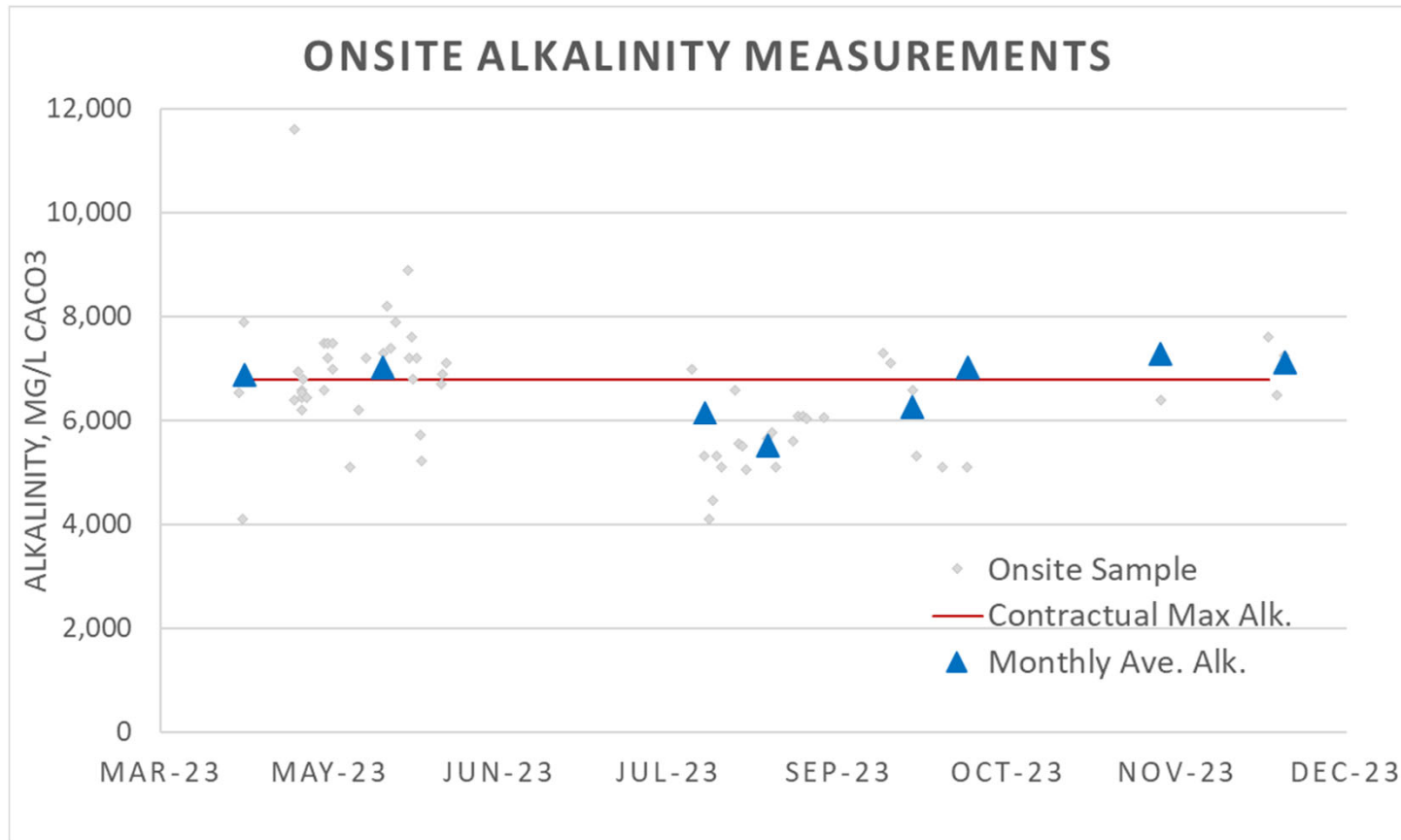
## Feed Chemistry – 3<sup>rd</sup> Party Sampling Summary

Wastewater Treatment Service Agreement				Summary of 3rd Party Sampling Data				
Feed Parameter	Unit	Contract Value	Max Limit (+ 20% of Contract)	No. of Samples Collected	No. of Exceedances	Ave.	Min	Max
pH	S.U.	7.9	9.5	15	0	7.79	7.6	8.0
COD	mg/l	5,565	6,678	15	2	5,442	3,580	10,200
BOD	mg/l	1,390	1,668	10	0	564	233	1,011
Alkalinity	mg/l CaCO <sub>3</sub>	5,663	6,796	12	3	6,381	5,070	8,030
Ammonia as N	mg/l	1,170	1,404	15	7	1,390	1,080	1,690
Iron	mg/l	3.0	3.6	11	9	6.8	2.8	18.1
Manganese	mg/l	0.10	0.12	11	11	0.30	0.14	1.0
Potassium	mg/l	1,055	1,266	11	2	1,074	830	1,560
Sodium	mg/l	2,113	2,536	11	0	1,763	1,360	2,410
Magnesium	mg/l	70	84	11	1	64	46.6	94
Calcium	mg/l	125	150	11	7	172	105	262
Strontium	mg/l	1.0	1.2	11	9	1.6	1.1	3
Chloride	mg/l	2,547	3,056	10	1	2,570	1,950	4,260
Sulfate	mg/l	60	72.0	10	8	279.6	52.4	462
TDS	mg/l	10,550	12,660	15	2	11,175	7,270	25,700
TSS	mg/l	24.0	28.8	15	11	85.7	15.7	396

**Red Values** exceed max concentration limits of the Wastewater Treatment Agreement



## Feed Chemistry – Onsite Sampling

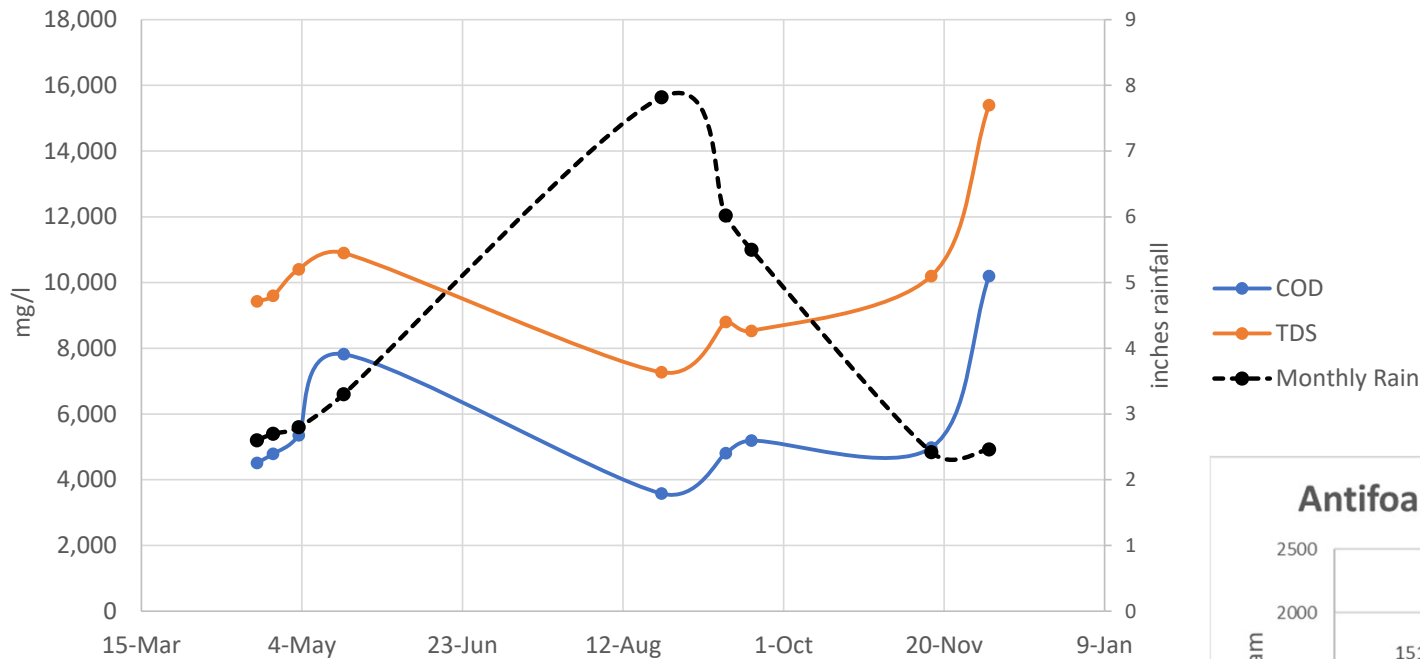


High alkalinity = high  
acid usage and  
antifoam usage



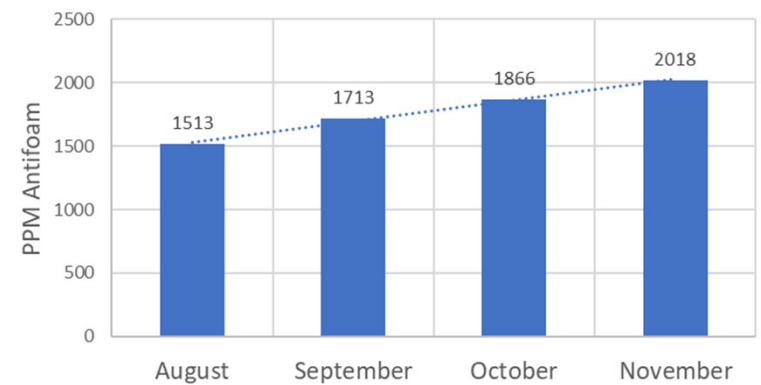
# Feed Chemistry – Correlation to Rainfall

## Monthly Rainfall vs Feed Concentration

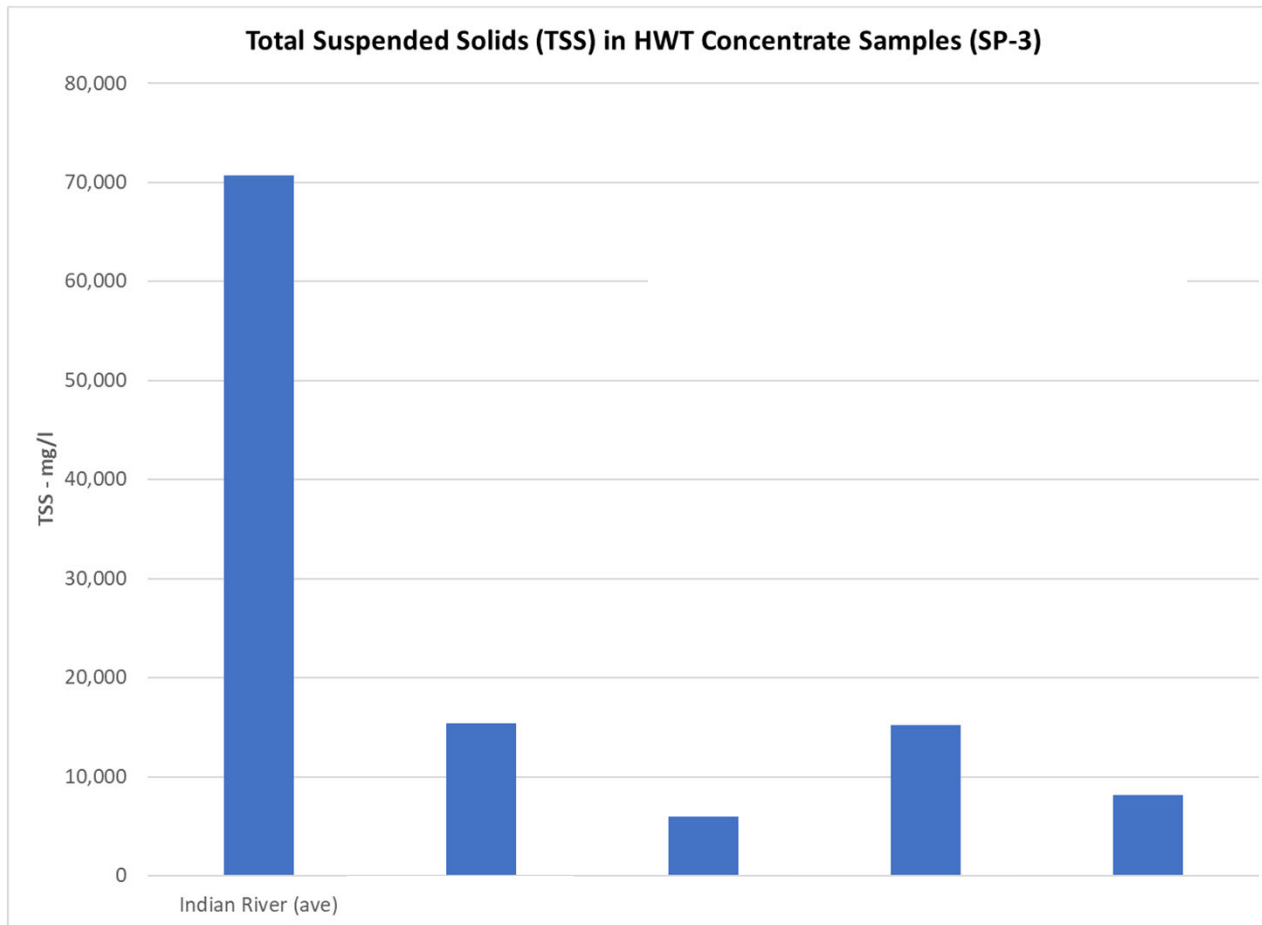


Leachate feed concentrations vary seasonally, significantly impacting month to month chemical usage. Drier seasons = higher feed concentrations and higher chemical consumption.

## Antifoam PPM - Dry Season Increases



## Feed Chemistry – Comparison to other HWT Sites



Chemistry factors impacting AF usage:

1. **High organic based susp. solids (TSS)** in concentrate relative to other sites (tends to stabilizing foam).
2. Ind. River has highest ratio of organic : inorganic of any HWT site



# Chemical Optimization Testing Summary

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**August 2023 – December 2023**

# Antifoam Trials

## Implemented

- **4** Antifoam Vendors Engaged
- Screened (bench test) **14** antifoams
- **7** Alternative Antifoams tested full scale
  - Multiple “types”, oil based, silicone, etc.
  - Each Antifoam tested for 1 to 4 days



## Results

- All products tested to date had higher cost to treat than existing antifoam
- Concentrator could not be operated at all using 4 of 6 products
- **Feb 2022 update** - (ESP) developed custom formula. Positive initial trial. Additional trialing planned Feb/March 2024



# Acid Optimization

- Lower acid usage = lower antifoam usage but increased scaling potential

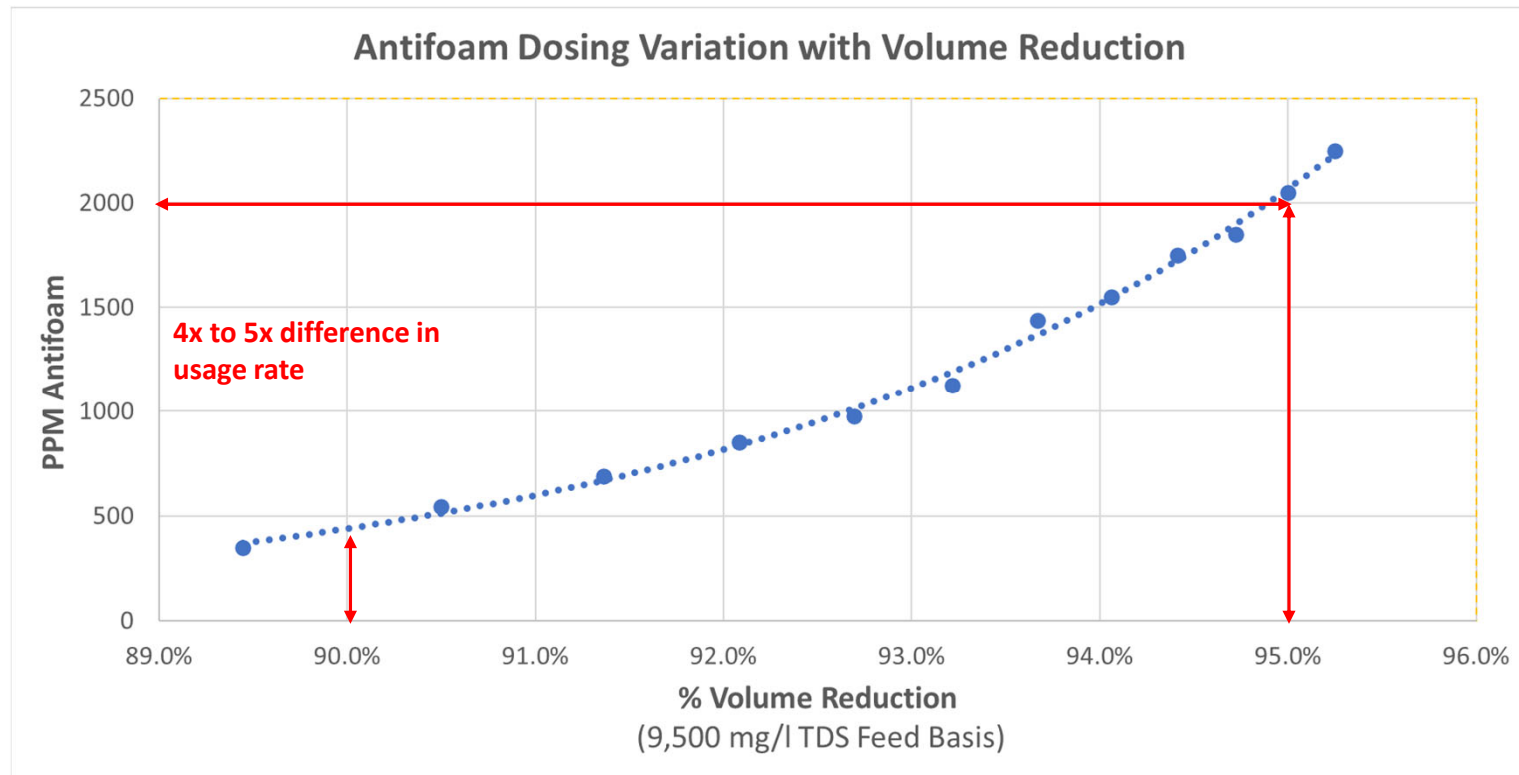


## Summary

- **Heartland has operated in a pH range of 6.8 to 8.1 to optimize chemical consumption**
  - Acid Dosing of 0 PPM (8.1 pH) to 4,000 PPM (6.8 pH)
- **Acid consumption is impacted by fluctuating and increased alkalinity**
- **Higher acid usage results in increased foaming and antifoam consumption**

# Volume Reduction vs Antifoam Usage

- Antifoam Usage as a Function of Volume Reduction (based on average feed water TDS of 9,500 mg/l)



# Chemical Optimization Testing – Summary of Results

1. Acid injection / pH control was optimized to balance chemical consumption with O&M labor.
2. Influent water chemistry exceeding contract specifications resulting in increased chemical consumption
  - Alkalinity & related Acid Consumption
  - Organic Suspended solids (TSS) - Tends to stabilizing foam
  - Other parameters & impact on Antifoam consumption
3. Operation at a system volume reduction of ~90% (average) is an effective method to lower chemical consumption to levels budgeted for the project.
  - **There is a sharp increase in antifoam usage at 95% vs 90% (4 to 5X difference)**
  - For a given feed rate (GPD), lower system V.R. generates more residuals but decreases gas consumption
4. Additional pre-treatment options & equipment additions were reviewed. Based on economic analysis, these options were determined to be less effective at reducing antifoam than adjusting the system volume reduction.
5. IRSC recently identified an alternative Antifoam product which look very promising. Additional testing will continue over the next 90 days

