



Bel Aire Wastewater Analysis Review

December 31, 2024

Agenda

- Program Goal Review
- Parameter Assessment
- Lift Station Sample Results
- Wastewater Meter Update
- Recommendations

Bel Aire Program Goals

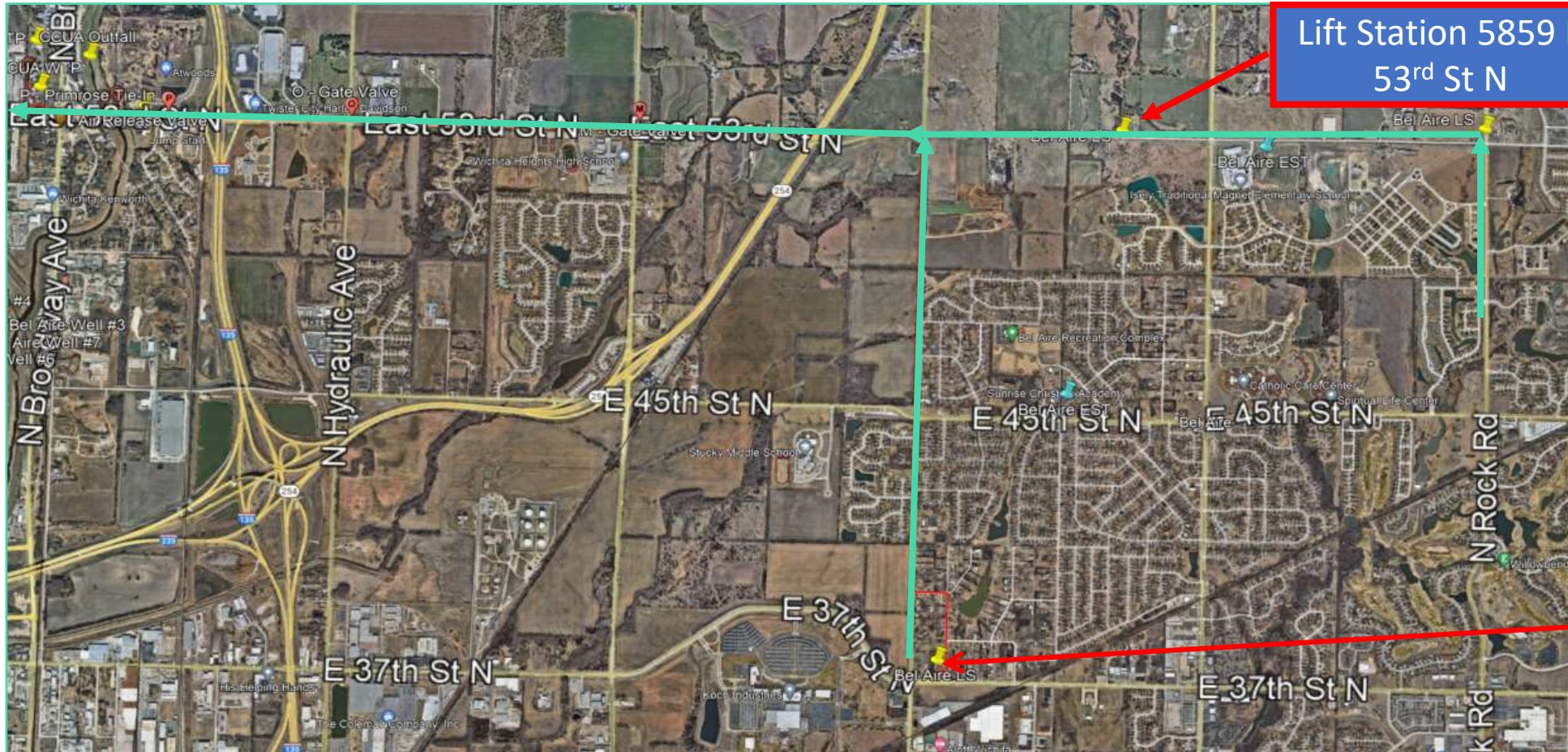
- Meet City's responsibilities for pretreatment under Consent Order
- Develop mechanism to control discharges from non-domestic sources in the form of a Sewer Use Ordinance which establishes that authority
- Measure and document Bel Aire sewer use contributions to CCUA

Collection System Sampling & Support



Sampling Locations

Sanitary Sewer Line



Sampling Activities

- Refrigerated Autosamplers located at each lift station are programmed to collect a sample every 30 minutes and composited over a 24-hour period in a single sample collection bottle once per week.
- City staff pour composited sample into designated sample containers provided by the laboratory, place in a cooler with ice, and ship to the laboratory for analysis.
- EPA Standard Methods require that samples be maintained at a temperature of 4 degrees Celsius (39 degrees Fahrenheit)



Sampling Parameter Descriptions: BOD & TSS

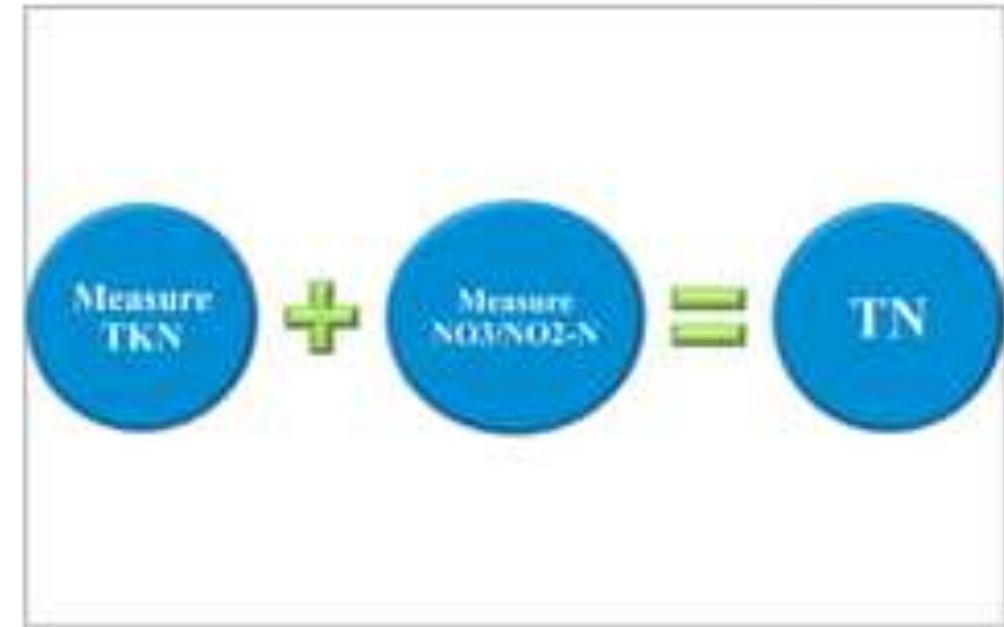
- **BOD - Biochemical Oxygen Demand:**
amount of dissolved oxygen needed by aerobic microorganisms to break down organic matter present in a water sample over a specific time period
- **TSS - Total Suspended Solids:**
measurement of the solid particles suspended in water that are larger than 2 microns in size
 - **Inorganic:** Sand, sediment, silt, and clay
 - **Organic:** Algae and bacteria



Sampling Parameter Description: Total Nitrogen

- **NH₃-N Ammonia Nitrogen:**
nitrogen present in the form of ammonia and ammonium ions which originates from the decomposition of organic matter containing nitrogen in sewage.
(human waste, ammonia cleaners)
- **TKN – Total Kjeldahl Nitrogen:**
measurement of both the organic and inorganic nitrogen in a sample

Current EPA Definition for Total Nitrogen
Requires Two Methods



Sampling Parameter

Description: Total Phosphorus

- **TP - Total Phosphorus:**
measurement of all phosphorus found in a sample, whether that phosphorus is dissolved or particulate. Due to impacts to streams, KDHE is in the process of issuing more stringent limits





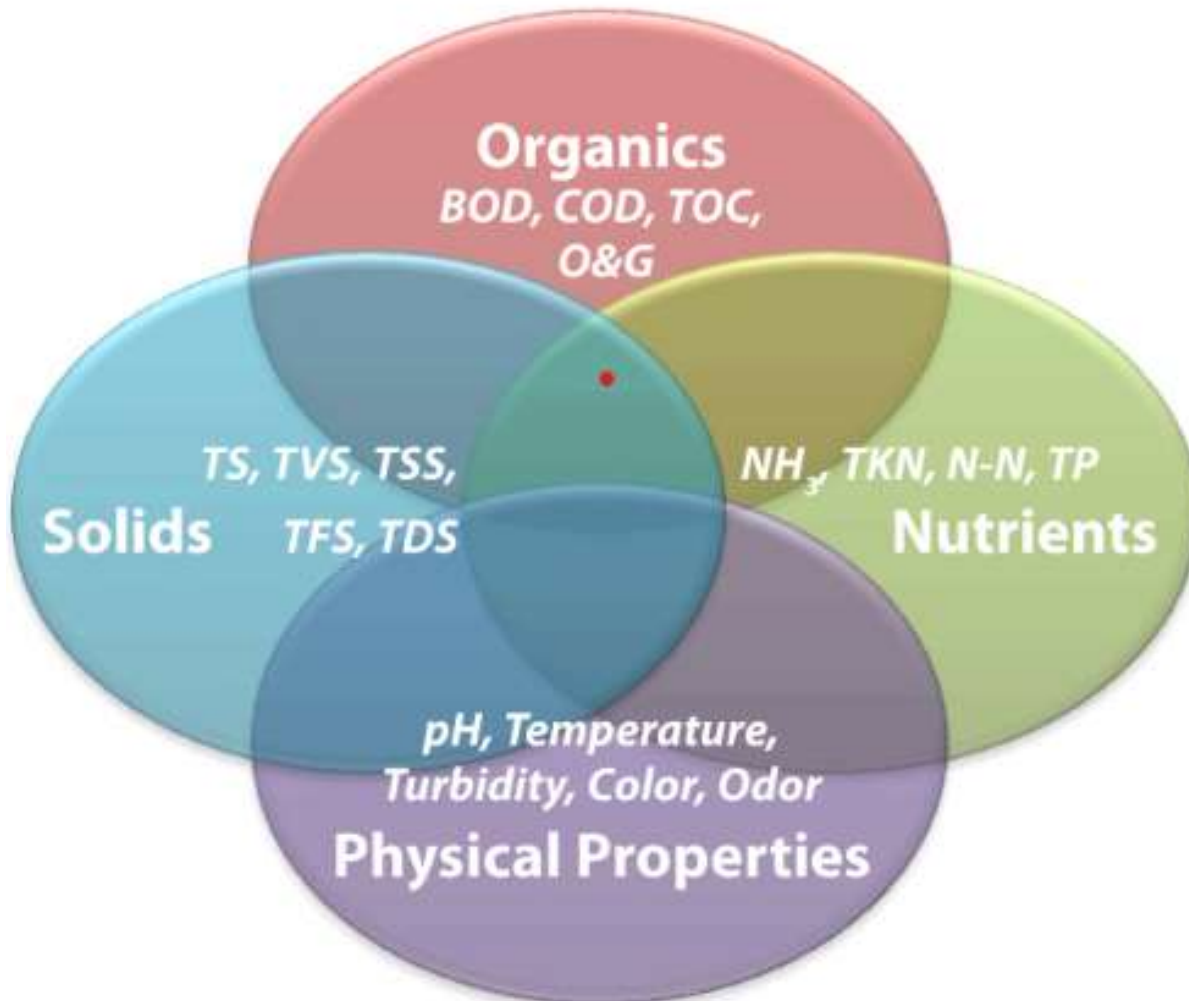
Oil and Grease

- Parameter not regulated in NPDES Permit, and not part of the City's sampling program
- Oil and Grease has the largest impact in the Collection System
- Control is through effective Best Management Program – Fats Oils and Grease (FOG) manages grease through installation and maintenance of grease interceptors at food service facilities



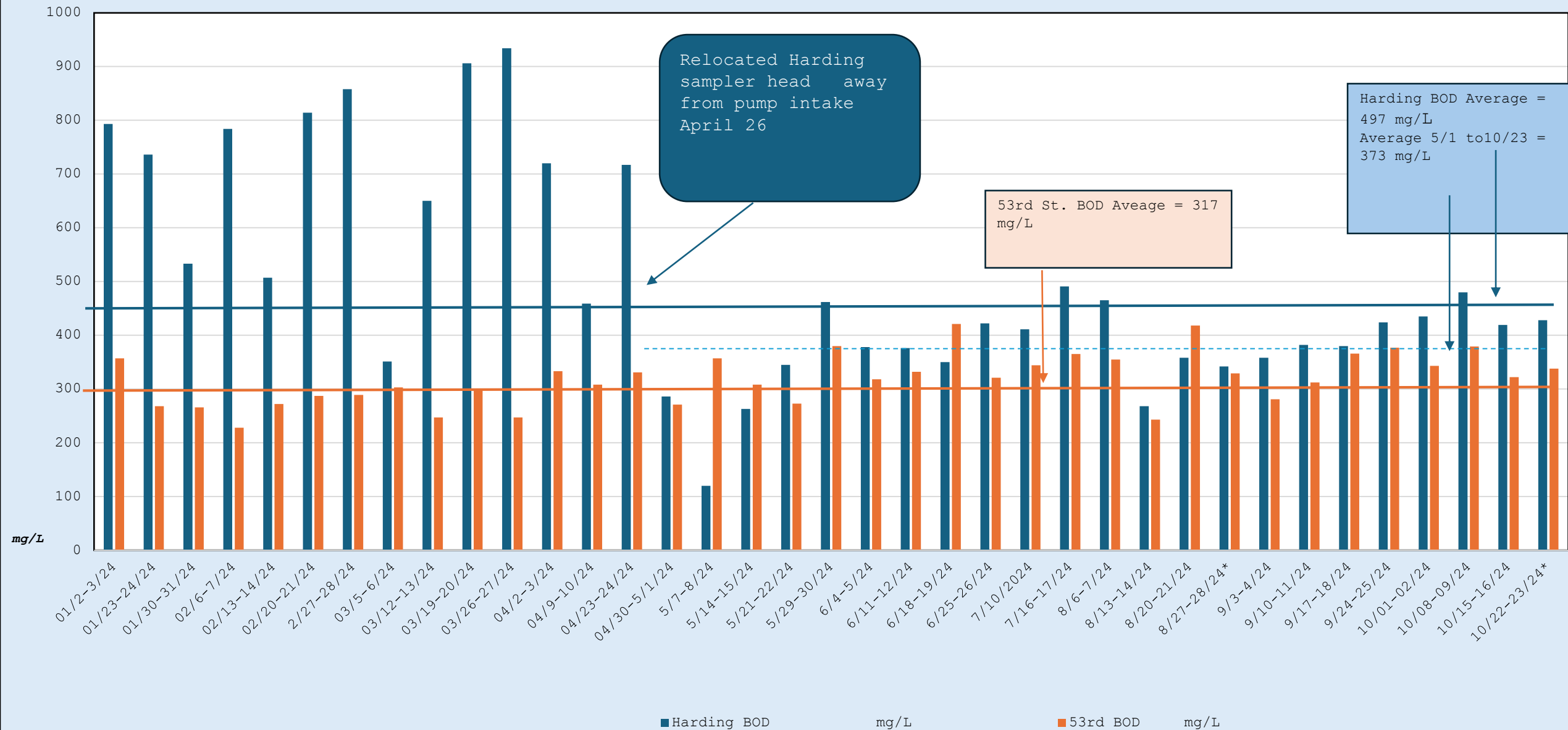
Floating Grease Layer in Lift Station Wetwell

Interaction of wastewater analytes



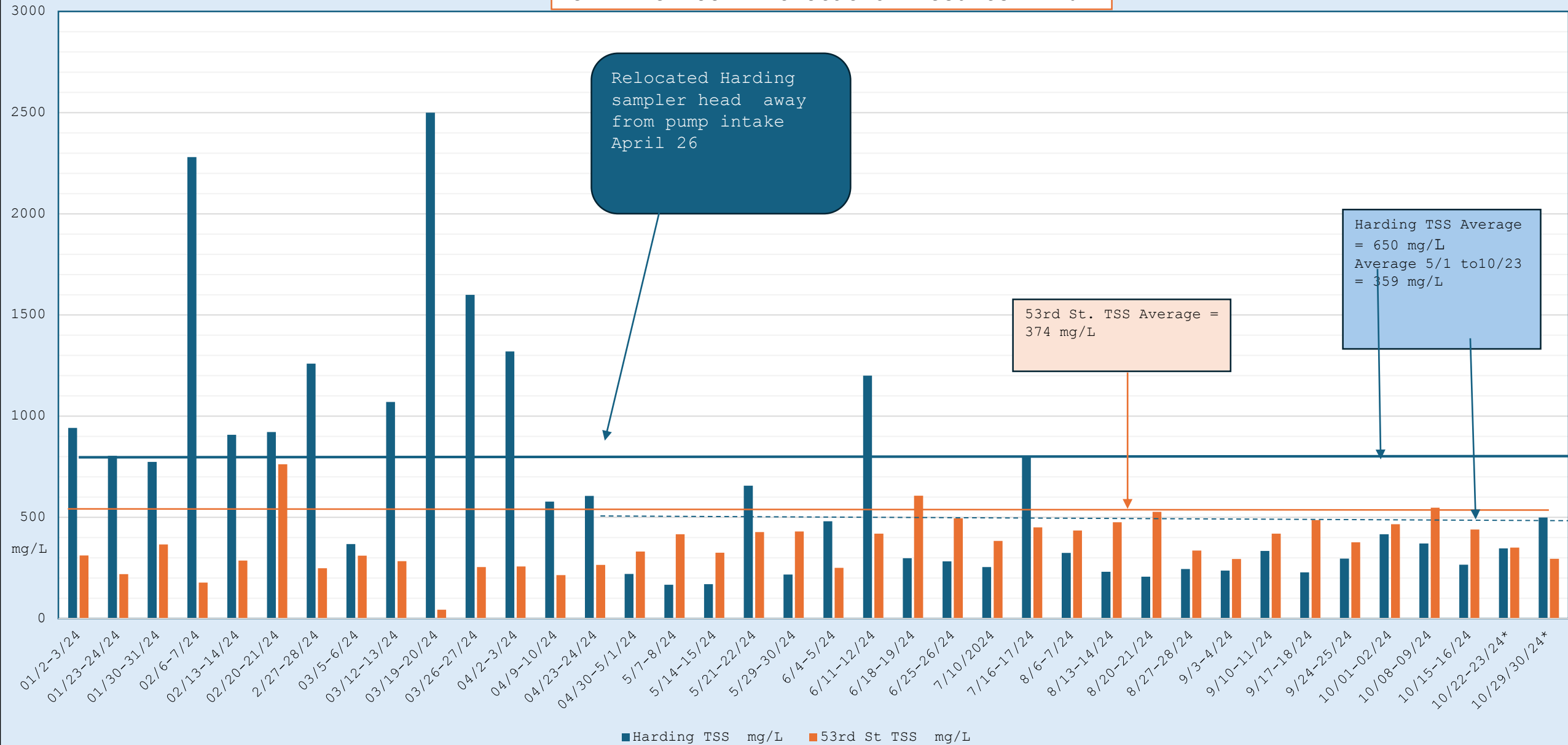
City Lift Stations Analytical History

Bel Aire BOD Lift Station Results - 2024



City Lift Stations Analytical History

Bel Aire TSS Lift Station Results - 2024



City Lift Stations Analytical Nutrient History

- Please refer to graphs in document appendix
- Nutrient Analytical data not used in COSA
- Total Nitrogen and Total Phosphorus limits included in CCUA NPDES Discharge Permit
- Harding Lift results show occasional spikes
- 53rd Street LS results more consistent

Historical Result Concentration Comparison

Raw Wastewater Characteristics*				2024 Averages	
Parameter	Low	Moderate	High	Harding Average	53 rd Street Average
BOD	110 mg/L	220 mg/L	500 mg/L	373 mg/L	317 mg/L
TSS	250 mg/L	500 mg/L	850 mg/L	359 mg/L	374 mg/L
NH3-N	12 mg/L	30 mg/L	50 mg/L	46 mg/L	41 mg/L
TKN	20 mg/L	40 mg/L	85 mg/L	56 mg/L	52 mg/L
TP	4 mg/L	8 mg/L	15 mg/L	8 mg/L	7 mg/L

** National Institute of Health Literature Values – February 2012*

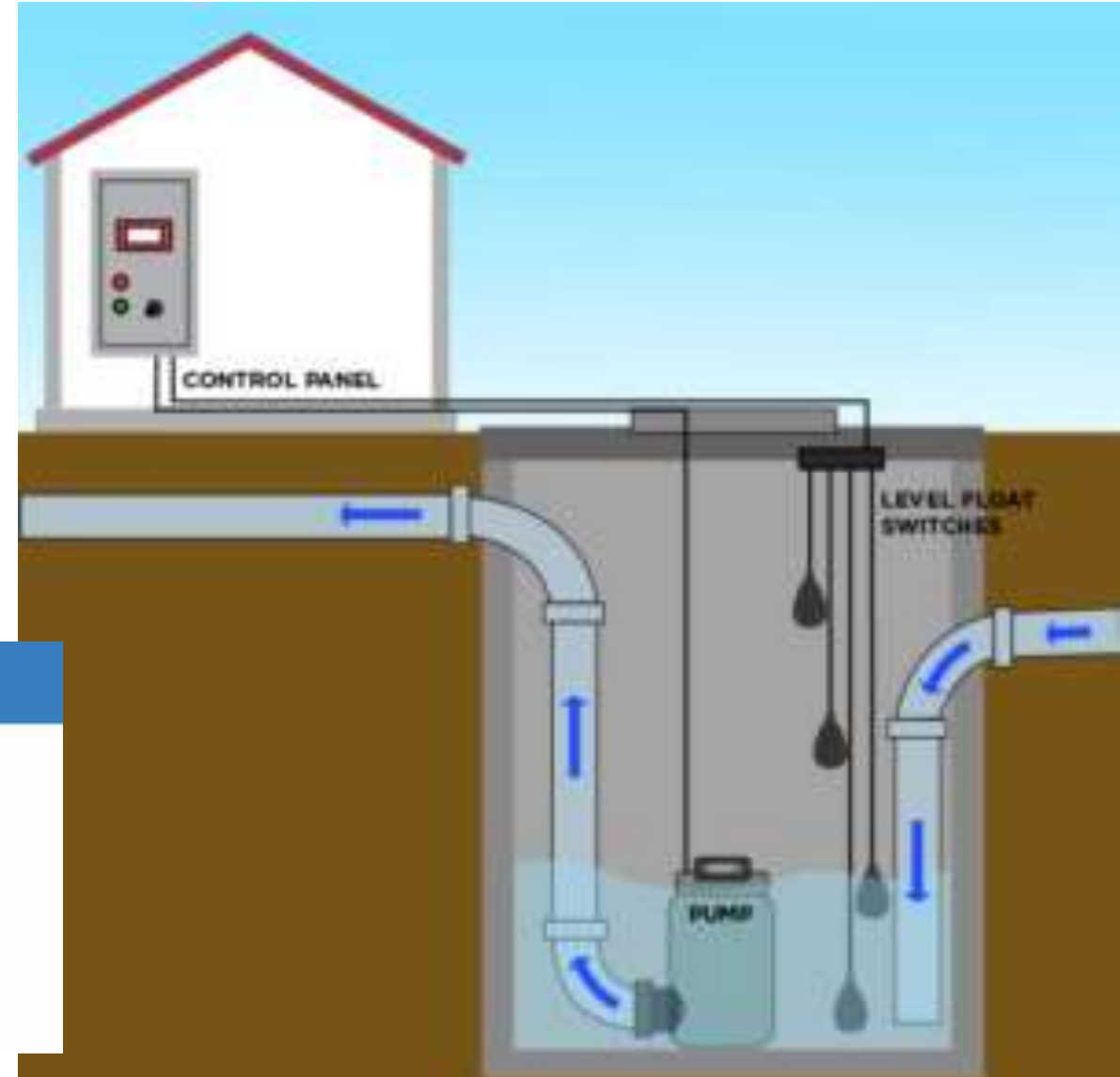
Program Analytical Costs

Monitoring Frequency	Parameters Analyzed	2024 Annual Lab Analytical Cost	2025 Annual Lab Analytical Cost
Weekly	BOD and TSS	\$3,036.80	\$3,120.00
Weekly	BOD, TSS, NH3-N, TKN, TP	\$7675.20	\$7,280.00
Monthly	BOD and TSS	\$700.80	\$720.00
Monthly	BOD, TSS, NH3-N, TKN, TP	\$1771.20	\$1,680.00
Quarterly	BOD and TSS	\$233.60	\$240.00
Quarterly	BOD, TSS, NH3-N, TKN, TP	\$590.40	\$560.00
Quarterly	NH3-N, TKN, TP	\$356.80	\$360.00

Wastewater Meters - Electro-magnetic meters installed on Lift Station discharge pipe

Operates by measuring the voltage induced in a conductive fluid as it flows through a magnetic field, using the principle of Faraday's Law of Electromagnetic Induction; the strength of this induced voltage is directly proportional to the fluid's velocity, allowing for accurate calculation of the wastewater flow rate through a pipe.

Electromagnetic Flowmeter



Flow Used to Calculate Strength Loading

- Total monthly or annual flow values are multiplied by the BOD and TSS monthly or annual average concentration to calculate wastewater strength in pounds.
- This strength loading will be used in the CCUA Cost of Service Agreement calculation.

Loading(lb/day (or month or year)) = concentration (mg/L) x flow (million gallons/day (or month or year)) x 8.34 lb/gallon.

Recommendations

- Initiate collecting total discharge wastewater measurements at Lift Stations in total gallons (currently collecting daily pump run times)
- CCUA plans to collect and maintain wastewater meter measurements
- Due to consistency of analytical results, reducing monitoring frequencies could be considered

Long-Term Program Management

A plan for long-term sewer use program management sets the City up for success

- Provides important data criteria for Wastewater Master Planning, including future wastewater treatment plant design
- Accuracy in data used for Cost-Of-Service Agreement and Annual True-up



Thank-You!

Questions?



Becky Lewis
Burns & McDonnell
blewis@burnsmcd.com
316-393-0785