Asset Management and Criticality: Novato Facilities

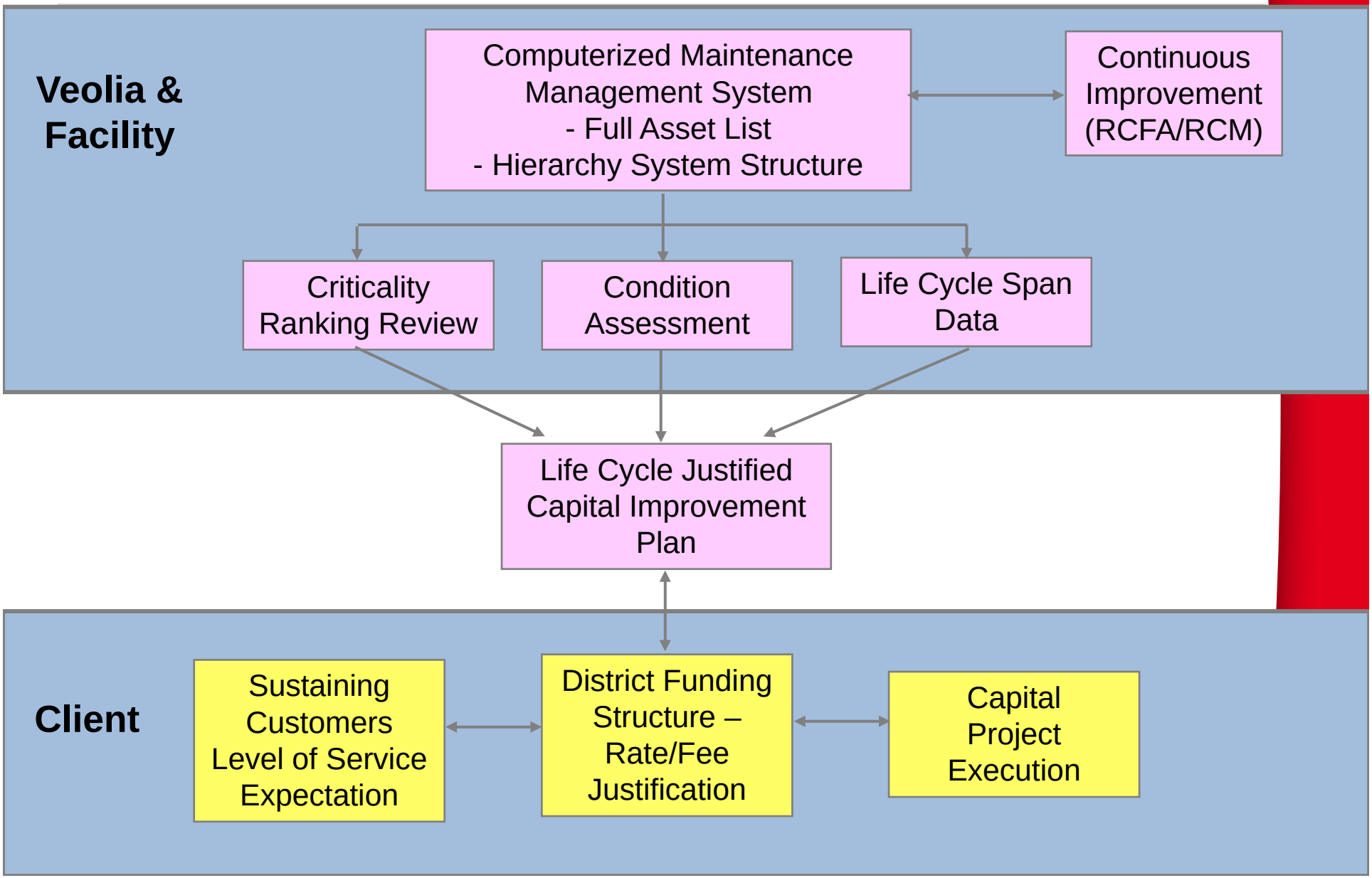
Veolia Water North America

October 27th, 2014

Mission for Asset Management

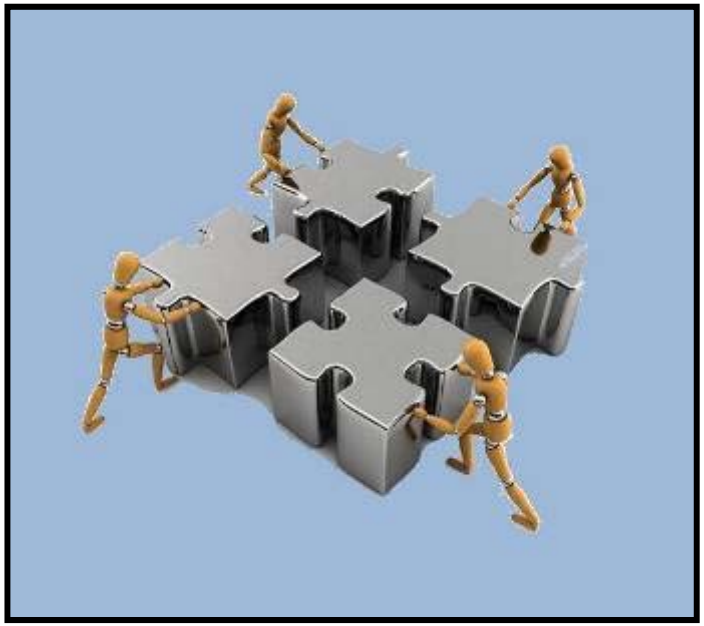
- Objective: Sustainable management of the "public trust" assets that preserve the nation's water quality for current and future customers.

The Asset Management Model



How Asset Management Fits In

- Key Areas Such As:
  - Protecting / Extending the Life of Assets
  - Lower Life Cycle Costs
  - Maintenance and Capital Planning
  - Reduce Risks (Public Health, Safety, Environment)
  - Increase Safety & Reliability
  - Training
  - Less Surprises



Criticality

How important is it?

Condition Assessment

What shape is it in?

Life Cycle Costing

How much life is left?

What is the replacement Cost?

Capital Plan

Criticality Analysis

- Key to Planning is Knowing What is Important!

- Criticality as a Function of:
  - Consequence of Failure
  - Likelihood of Failure

- Ranked in Relativity to Other Plant Systems/Assets

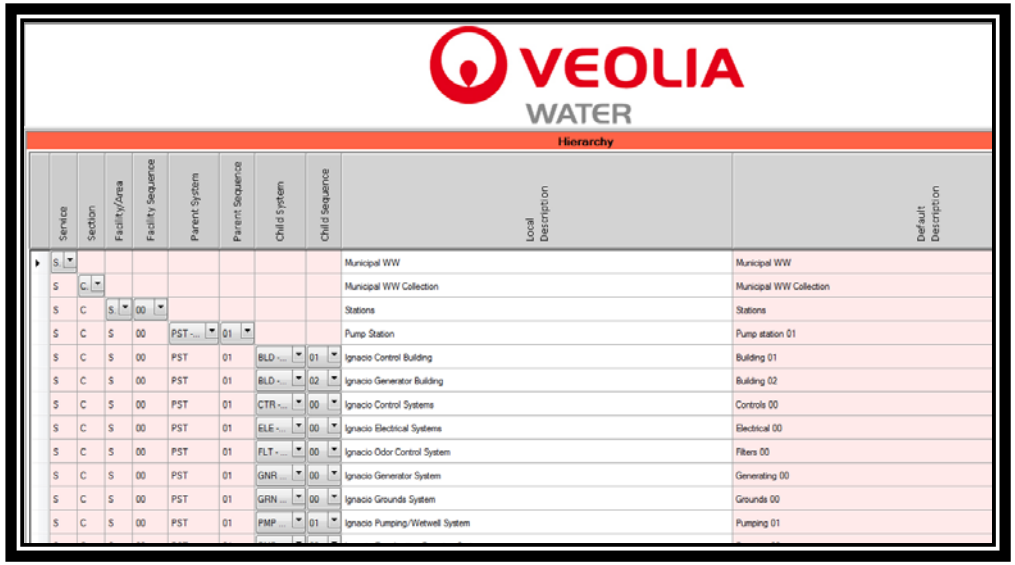
- Areas of Impact such as:
  - Safety, Capacity, Environmental & Water Quality, Operating Costs, Stakeholder, Collateral Damages

Criticality Uses and Benefits

- Prioritize Preventative and Corrective Work Orders
- Select Between Preventative and Condition-Based Services (Higher Criticality = More Condition-Based Monitoring)
- Prioritize Condition Assessment (And How In-Depth to Evaluate)
- Prioritize Capital Projects
- For Use in Training and Planning

Process for a Criticality Analysis

- Define the List of Systems that Provide 100% Asset Coverage through Hierarchy Coding
- Group Workshop Setting (Operations, Maintenance and Management)
- For Each System Prepare a List of Worst Case Failure Scenario Descriptions
- For Each Scenario Provide Rankings on a Standardized Scale to Quantify Consequence and Likelihood



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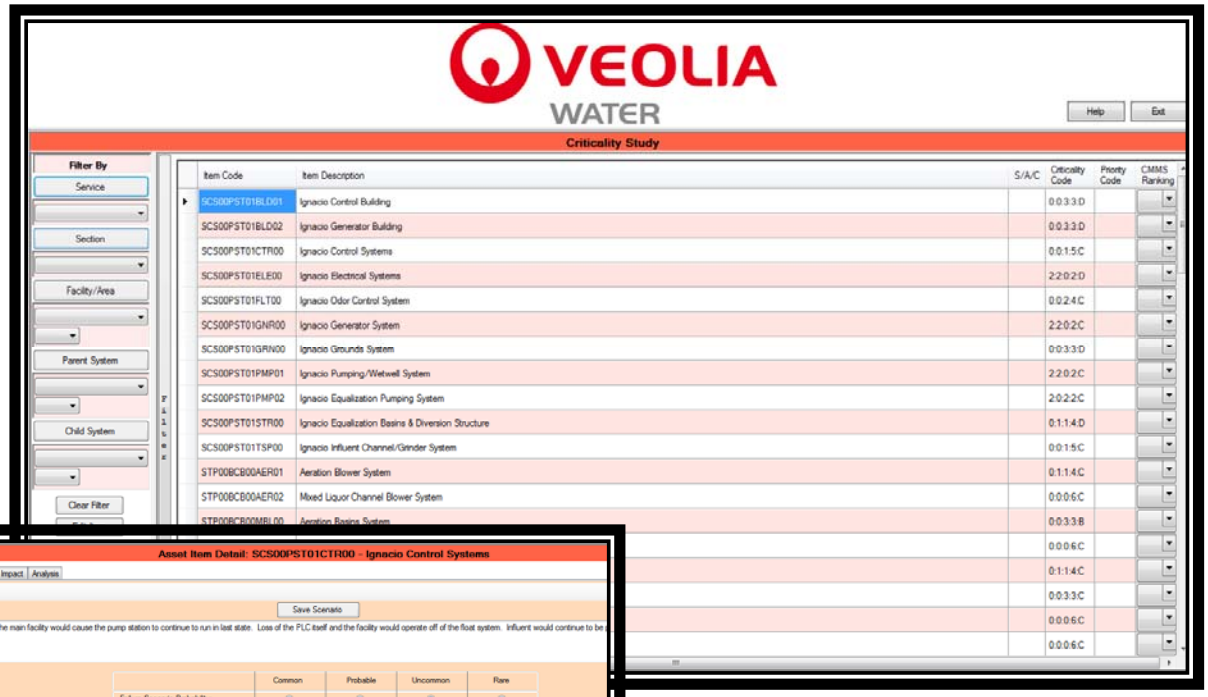
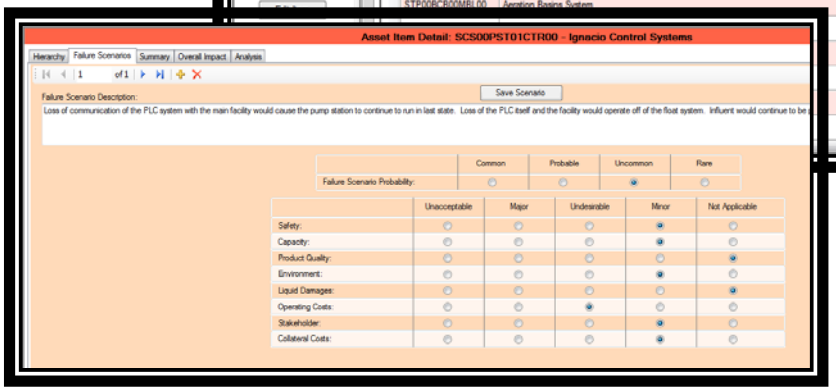
Hierarchy

Service	Section	Facility/Area	Facility Sequence	Parent System	Parent Sequence	Child System	Child Sequence	Local Description	Default Description
S								Municipal WW	Municipal WW
S	C							Municipal WW Collection	Municipal WW Collection
S	C	S	00					Stations	Stations
S	C	S	00	PST -	01			Pump Station	Pump station 01
S	C	S	00	PST	01	BLD -	01	Ignacio Control Building	Building 01
S	C	S	00	PST	01	BLD -	02	Ignacio Generator Building	Building 02
S	C	S	00	PST	01	CTR -	00	Ignacio Control Systems	Controls 00
S	C	S	00	PST	01	ELE -	00	Ignacio Electrical Systems	Electrical 00
S	C	S	00	PST	01	FLT -	00	Ignacio Odor Control System	Filters 00
S	C	S	00	PST	01	GNR	00	Ignacio Generator System	Generating 00
S	C	S	00	PST	01	GRN	00	Ignacio Grounds System	Grounds 00
S	C	S	00	PST	01	PMP	01	Ignacio Pumping/Wetwell System	Pumping 01

Criticality Analysis Ranking

- Consequence Areas Ranked for Each System's Failure Scenarios
  - Safety
  - Capacity
  - Environmental/Water Quality
  - Operating Costs
  - Stakeholder
  - Collateral Damages
- Ranked As:
  - Unacceptable
  - Major
  - Undesirable
  - Minor





Criticality Analysis Ranking

- Example System – Influent Pump System Stops Pumping and Sewage Backs Up in Basements

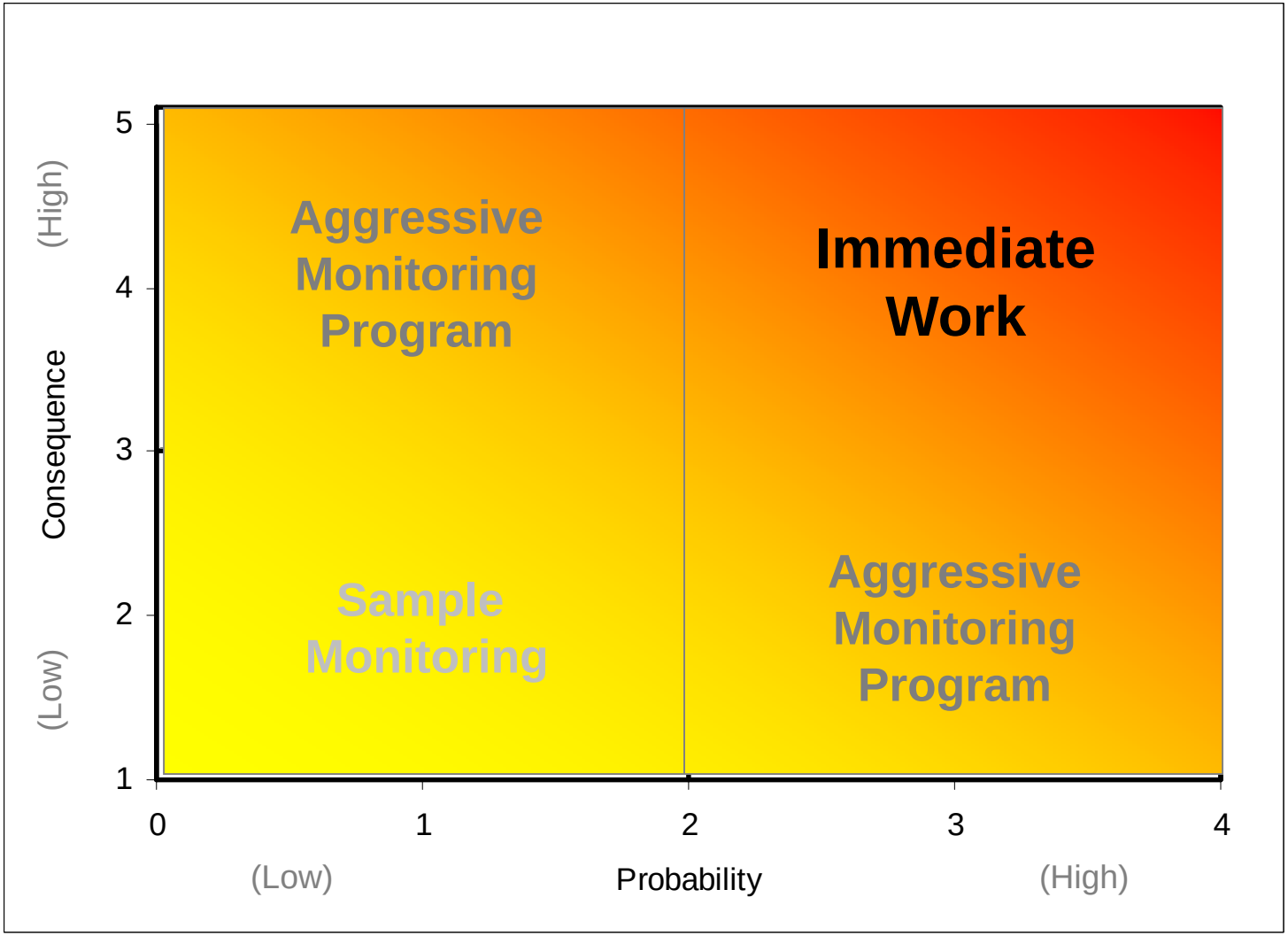
  - Safety - Undesirable
  - Capacity - Unacceptable
  - Environmental - Unacceptable
  - Operating Costs - Minor
  - Stakeholder - Unacceptable
  - Collateral Damages – Minor

  - Probability - Rare

Sampling of Novato's 89 Systems (16 Critical)

Description	Consequence	Probability	CMMS Ranking
STP00PWR00GNR01 - Standby Generators 1 & 2 System	4:1:1:0	B	5
STP00PRE00PMP00 - Influent Raw Sewage Pumping System	2:2:1:1	C	5
STP00PEF00PMP03 - Plant Effluent Wet Weather Pumping System	2:2:1:1	D	5
SCS00PST01GNR00 - Ignacio Generator System	2:2:0:2	C	5
SCS00PST01PMP01 - Ignacio Pumping/Wetwell System	2:2:0:2	C	5
STP00CST00SCA00 - SCADA and Network System	0:2:2:2	B	3
STP00CST00CTR00 - PLC and Remote I/O System	0:2:2:2	C	3
STP00SED00STL01 - Primary Settling System	0:2:2:2	C	3
STP00BCB00TSP01 - Aeration Splitter Box System	0:2:1:3	C	3
STP00BCB00TSP02 - Secondary Clarifier Splitter Box System	0:2:1:3	C	3
STP00BGR00GRN00 - Facility Site System - Grounds	0:0:4:2	D	2
STP00PEF00STR00 - Flow Equalization Pond System	0:0:4:2	D	2
STP00PWR00GNR03 - Admin Building Generator System	0:0:4:2	D	2
STP00BCB00MBL00 - Aeration Basins System	0:0:3:3	B	2
STP00SLC00PMP02 - Sludge Storage Lagoon Decant Pumping System	0:0:3:3	B	2
STP00FLT00CHL01 - Reclaimed Chlorine Contact Tank System	0:0:2:4	A	1
STP00CHM00CHF03 - Polymer Dosing System	0:0:2:4	B	1
SCS00PST01FLT00 - Ignacio Odor Control System	0:0:2:4	C	1
STP00PRE00GRT00 - Grit Removal System	0:0:2:4	C	1
STP00PWR00GNR04 - Micro Turbine System	0:0:2:4	C	1

Criticality Analysis Results



Operational Controls & Redesign Recommendations

Systems	Criticality	Operational Controls Suggestions
Biological - Carbonaceous		
Aeration Basins System	0:0:3:3:B	Recommend 5 year concrete inspection PM.
RAS Pumping System	0:1:1:4:C	Recommend investigating spare RAS pump stock.
Digestion		
Digested Sludge Pumping System	0:0:3:3:C	Investigate contingency plan for solids hauling. Options for sludge trucking - location to open and ability to get solids into a truck and truck companies.
Filtration		
Reclaimed Clearwell Tank System	0:0:3:3:C	1) Install a level indicator on the Clearwell. 2) Install the Clearwell Drain Pump on SCADA to operate remotely.

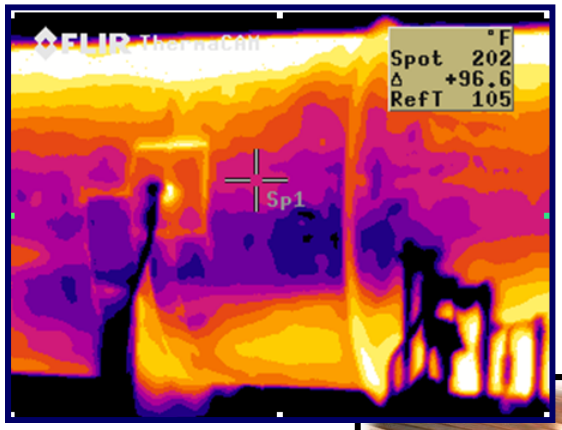
Systems	Criticality	Redesign Considerations
Cake Sludge		
Sludge Storage Lagoon Decant Pumping System	0:0:3:3:B	System is aged and potentially corroded from weather/H2S. Recommend condition assessment review of system and capital plan development (guide rails, pumps, valves).
Filtration		
Reclaimed Chlorine Contact Tank System	0:0:2:4:A	Consider a better method of chlorine mixing using a mechanical mixer.

Next Steps Forward

- Criticality Ranking Input into CMMS System
  - Used to Prioritize Preventative and Corrective Maintenance Work Orders
- Provide Priority Ranking for Condition Assessment
  - Assessment of the Condition of Assets for Repair/Refurbishment or Capital Replacement
- Development of a Capital Plan

Condition-Based Maintenance

- Use predictive tools to drive maintenance tasks
- Allow for planned maintenance prior to loss of functionality
- Predictive Technologies:
  - Vibration Analysis
  - Shock Pulse
  - Oil / Wear Particle Analysis
  - Ultrasonic Testing
  - Electrical Testing
    - Amp/Volt/Megger
    - Motor Circuit Analysis
  - Thermography
  - Metal Thickness
  - Precision Alignment
  - Flow Monitoring



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Thank you for your time!

Questions?