Wastewater Treatment Division Asset Management Condition Monitoring Programs

Presented to MWPAAC Subcommittees

April 1, 2021

Topics

- Wastewater Treatment Division (WTD) Condition Monitoring

  Program Overview

- Methods and Current Deployment

- Tracking and Future Development

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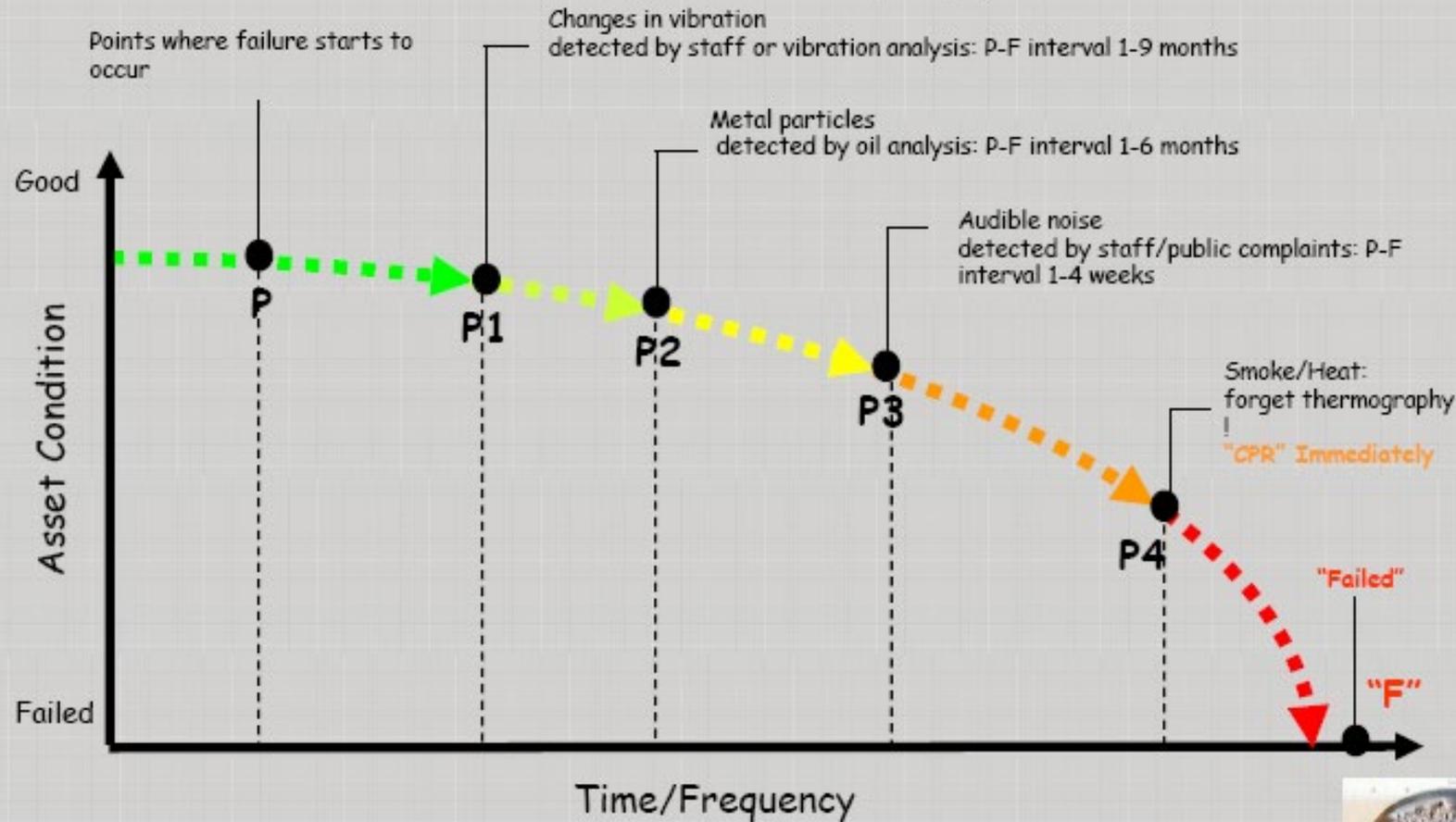**Wastewater Treatment Division**

Overview

- Uses non-invasive predictive technologies (i.e., analyzing data patterns to forecast likely future outcomes) and monitoring to determine current equipment condition.

- Used to determine Current Lifecycle Status, Maintenance Actions, Rebuild/Replace forecasting

- Efficient, Inexpensive and low risk

- Types of predictive technologies used by WTD:

  ❖ Oil Analysis (Machine & Transformer)
  ❖ Fuel Oil Analysis
  ❖ Vibration Protection & Analysis
  ❖ Thermal Imaging
  ❖ Ultrasonic
  ❖ E-logs

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Overview

Risk Assessment Potential to Failure Interval (P – F Curve)
"Typical Rotating Equipment"

Points where failure starts to occur

Changes in vibration detected by staff or vibration analysis: P-F interval 1-9 months

Metal particles detected by oil analysis: P-F interval 1-6 months

Audible noise detected by staff/public complaints: P-F interval 1-4 weeks

Smoke/Heat: forget thermography ! "CPR" Immediately

Good

Asset Condition

P   P1   P2   P3   P4   "Failed"   "F"

Failed

Time/Frequency

The potential to failure curve allows you to determine when the maintenance should take place – after the P but before the F
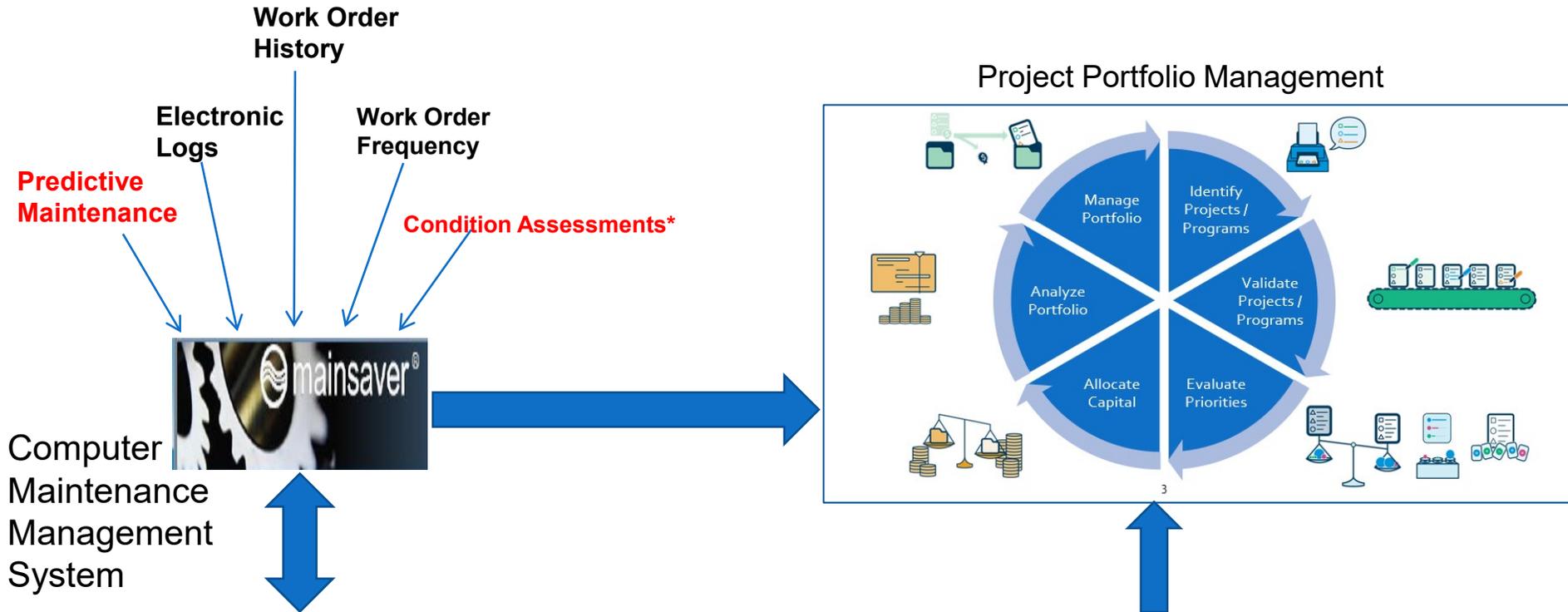
Why are we doing this?

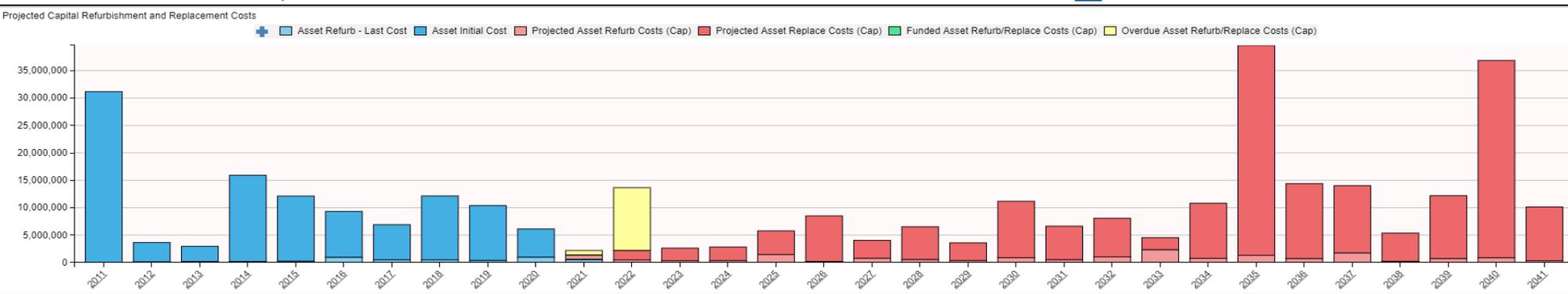**King County**
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Overview

Work Order History

Electronic Logs

Work Order Frequency

Predictive Maintenance

Condition Assessments*

Computer Maintenance Management System

Project Portfolio Management

*Strategic Asset Management Plan Directed

Capital Replacement Forecast*

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Current Predictive Methods

Oil Analysis: All critical oil lubricated equipment and all Medium Voltage Oil Filled Transformers

- Standard frequency based on historical data
- Independent Lab Analyzed (CAC, SD Myers)
- Results sent electronically to Plant Reliability Engineer for records / action / CMMS Input

Vibration: Alert/Alarm Protection on all large equipment. Analysis on specific critical equipment and as required.

- Standard frequency based on historical data
- Independent Lab Analyzed (CAC, SD Myers)
- Results sent electronically to Plant Reliability Engineer for records / action / CMMS Input

Fuel Oil: Analysis and Renewal performed on all Stand-by generators

- Standard frequency based on historical data
- Independent lab analyzed and renewed (Dessert)
- Results sent electronically to Plant Reliability Engineer for records / action / CMMS Input

Thermography: Analysis on Medium Voltage electrical and mechanical as required / troubleshooting.

- Used as required for troubleshooting / data gathering
- 2 handheld units at each of the major plant sites
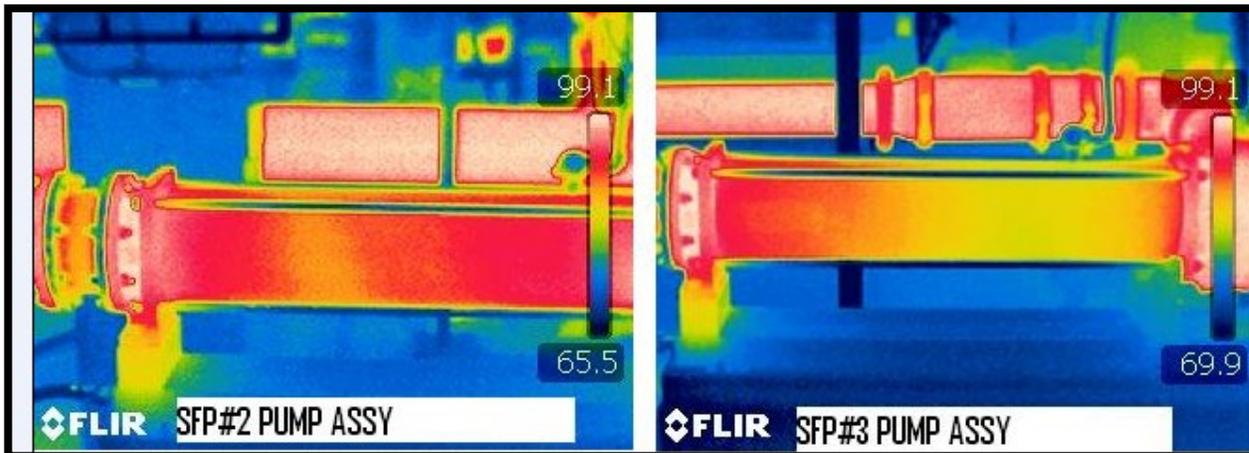- Images loaded on CMMS for reference/records

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Current Predictive Methods

Ultrasound: Analysis on MV electrical and mechanical

- Used as required for troubleshooting / data gathering
- Two handheld units at each of the major plant sites

E-Logs: Used by all Onsite and Offsite Operations Teams

- Uses iPad App and cellular data
- Links to master database for senior review
- Event alert supervisors/leads for out of spec items
- Uploads selected data to Hach Water Information Management Solution (Hach Wims) software for Main Control access
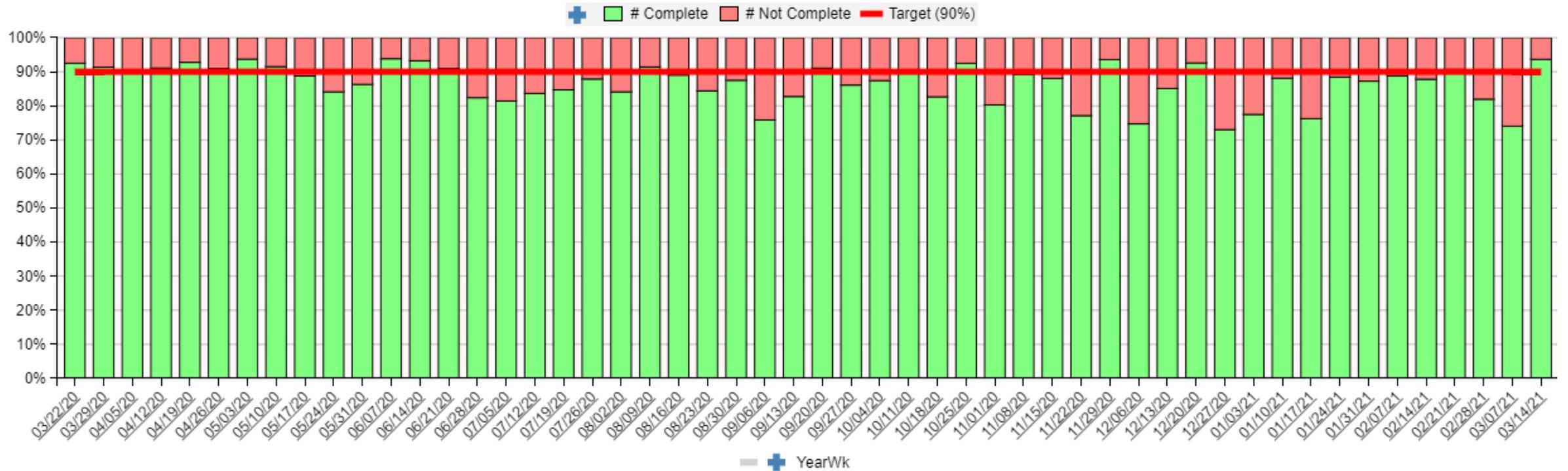
Management Level Metrics Tracking

- Reviewed weekly
- Missed items carried over to follow-on week
- Trended overall & by plant-plant comparison

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Management Level Metrics Tracking

Vibration Monitoring (in-plant) – Machine Health Monitoring (MHM) Project
- ❖ Integrates 24/7 vibration monitoring / alert into the plant control system
- ❖ South Plant (Raw Sewage Pumps, Effluent Transfer Station Pumps, Centrifuges) / West Point (Centrifuges, Raw Sewage Pumps) / Brightwater (Influent Pump Station Pumps)

Vibration Monitoring (offsite) – Remote 24/7 monitoring at offsite facilities
- ❖ Integration w/ SCADA data feed to plant Main Control
- ❖ Upgrading offsite telemetry to support (DSL/Cable/Fiber)

Dedicated Predictive Method Metrics – Specifically trends Predictive Maintenance / Condition Monitoring Attainment
- ❖ Integrated with the CMMS
- ❖ Future inclusion w/ Management Metrics

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Questions?

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