MAINTENANCE AUDIT: ASSESSING THE PERFORMANCE OF CMMS AT A WRRF

JOINT EXPO 2018

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PRESENTATION SUMMARY

- Background (How it came to be)
- Audit Scope (Basic Questions)
- Findings
- Recommendations
- What does all this mean to you?
“Somewhere at a WRRF, …

…far, far away….”
SOMETHINGS WRONG

- But NPDES Permit conditions were met (No red flags)
- New Authority Manager
SUM TING WONG

- But NPDES Permit conditions were met (No red flags)
- New Authority Manager
STARTED WITH BASIC QUESTIONS:

- What is considered an Asset?
- Are all assets in the CMMS?
- Are the PM Steps in the CMMS adequate?
- Are the PM measures being properly performed on a timely basis?
- How are calendar and run times squared away?
- What are Critical Assets and should Predictive or Proactive Maintenance procedures be in place?
WHAT IS CONSIDERED AN ASSET?
(What is the definition of an Asset?)

- No formal definition
- Q: “How do you handle valves?”
- Left to “Wing it”
ARE THE ASSETS IN THE CMMS?

- Vast majority of assets were in the CMMS
- 1050 assets in 109 (!) process areas
- Valves lumped together in process areas
- Gates and Actuators not included
- Electrical equipment not included or lumped together in process areas
- Emergency Generators not included
- Building envelope assets not included
- New / replacement assets not changed in a timely manner
SYSTEM

400 Gallon Fuel Tank
ARE THE MAINTENANCE STEPS IN THE CMMS ADEQUATE?

- No
- New CMMS Software purchased
- O&M procedures were not migrated into new CMMS Software
- O&M Manuals not considered with re-writing maintenance steps, But many maintenance step were VERY detailed.

- Some assets did not identify any PM instructions

- 20% of collection system inspected annually
ARE THE MAINTENANCE STEPS IN THE CMMS ADEQUATE?

- No
- New CMMS Software purchased
- O&M procedures were not migrated into new CMMS Software
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But many maintenance step were VERY detailed.

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- 20% of collection system inspected annually
O&M MANUALS

- Need to be annotated, customized, specific
- Ex. “… if applicable”
- Manual not always consistent with training
- Obtain calendar days if you don’t have eETM or run times
ARE THE PM MEASURES BEING PROPERLY PERFORMED ON A TIMELY BASIS?

- Generally yes, when CMMS instructions were sufficient
- Lubrication very inconsistent
- Leaking oil obvious
- Lack of
  - Electrical Maintenance
  - Slide Gate Maintenance
  - Actuator Maintenance
ARE THE CORRECTIVE MAINTENANCE MEASURES BEING PROPERLY PERFORMED ON A TIMELY BASIS?

- No
- 7 of 8 Odor Control Chemical pumps off-line
- Aerated Grit tanks off-line for ~15 – 20 years
- Aerated Channel diffusers off (blower failures)
- Numerous exhaust fans off-line (impacting safety and creating corrosion issues)
- All SFE automatic backflush strainers failed (no manual backflush initiated)
- On-line analyzers not functional
- Essential zero redundant equipment
- CMMS could not list off-line equipment
WARNING
ARC FLASH AND SHOCK HAZARDS ARE PRESENT!
APPROPRIATE PPE REQUIRED!
FAILURE TO COMPLY MAY RESULT IN INJURY OR DEATH!
Fault Clearing Time: 0.010 sec
Voltage: 480 VAC
Barricade Boundary: 42 in

NOTICE!
Incident Energy: 0.01 cal/cm^2 @ 18 in

Required PPE: Refer to Company Safety Policy
Equip. Name: DISC P5-A4
Prot. Device: PD-P5-A4
Available Fault Current 0.54 kA

DANGER
This energy source has been LOCKED OUT.
Unauthorized removal of this lock/tag may result in immediate discharge.
Remarks:
ARC FLASH AND SHOCK HAZARDS ARE PRESENT!
APPROPRIATE PPE REQUIRED

FAILURES TO COMPLY MAY RESULT IN INJURY OR DEATH

DANGER
This energy source has been LOCKED OUT!

Unauthorized removal of this lock/tag may result in immediate discharge.

Remarks:

NOTICE! Changes to equipment settings, use of a meter or
configuration will invalidate the calculated incident energy

Incident Energy: 0.01 cal/cm² @ 15 in

Voltage: 480 VAC
Fault Clearing Time: 62 ms

Date: 2/20/2018

Signature: [Signatures]

Notice to: [Notice to: ]

Date: [Date]

[Company Name]

[Position]

[Location]
4 TBS per day until end of year that should make it.
4 lbs per day until end of year that should make it
ASSESS MAINTENANCE OPERATIONS

- Assessed NO. of Work Orders open, No. of Staff, Time to complete WOs, etc.

- Staff: 1 Technician 3, 1 Technician 2, 1 Technician 1

- Approx. 1,000 WO /yr. (20 / week)

- Average Time WO Open: 2 to 3 weeks

- Very little corrective work orders generated
HOW ARE CALENDAR AND RUN TIMES SQUARED AWAY?

- Disabled eETM run times due to security concerns (???)
- Calendar time only, but no consideration for redundancy or actual run times
RECOMMENDATIONS:

- List of 100+ Recommendations
  - Fully Align CMMS with Assets
  - Identify and Perform Corrective Maintenance
  - Critical Assets / Condition Assessment / Predictive Maintenance
- Implementation Plan
- Staff:
  - Maintenance Manager to focus on Maintenance
  - Add 2 additional Staff Members until caught up
  - Shift in PM tasks to Operators
- Aerated Grit and Process Renovations CIP
HOW DOES THIS RELATE TO YOU?

- You have some of these issues
- Yes you do
- Define and Identify All Assets including Critical Assets (if you don’t have a formal definition)
- Take another look at CMMS procedures
  - Update CMMS procedure with new(er) measures/technologies
  - Consider predictive maintenance
- Be cognizant of unintended consequences
- Are you using your CMMS to make decisions? (Are you able to?)
PRIVATIZED OPERATIONS: ISSUES AND QUESTIONS

- What are their financial incentives?
  - Know your contract, they do
  - Their incentives may not align with your incentives
- Who pays for consumables, energy, etc.
- Did they commit to a set number of operators, mechanics, electricians, instrument techs?
- Are they handling capital improvement projects?
- Meeting MPDES Permit conditions is NOT an indication that all is well
THANK YOU

If you have questions about the presentation, please contact me:

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