Best practices for Lift station maintenance...

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Safety is directly related to your level of professionalism which in turn is directly related to knowledge and ultimately certification. It is imperative that employees conduct all day-to-day activities safely through a combination of awareness and professionalism. Multiple hazards exist in the performance of the employee’s routine daily tasks and work assignments. Sewer lift stations are no exception.
Weekly maintenance checks

1 - Visually inspect the station for vandalism.
2 - Clean up any trash or debris material in and around the station.
3 - Record pump hours for each pump.
4 - Run each pump by hand control and watch level control go up and down to ensure pumps are operating properly.
5 - Wash down wet well.
6 - Remember to place pump controls back in auto before you leave the station.
7 - Visually inspect the generator for fuel and ability to operate properly.
8 - Test all panel lights and change as need to ensure proper operation.
9 - Lock up station, complete all paperwork.
The importance of maintenance records and log books.

- It is recommended that a Station Log Book be created based on the needs and specifics of the individual station. There is no universally accepted format for a Station Log Book and no pre-formatted forms for recording station data.
- The value of the Station Log is in consistently utilizing the book and noting all important information so it can be used for analysis and comparison.
- In reality at each visit you should record:
  - Date.
  - Name of operator.
  - Pump and generator hours.
  - Maintenance done on that station visit.
  - Additional comments if you noticed anything unusual or that needs attention.

<table>
<thead>
<tr>
<th>LIFT STATION: Generator:</th>
<th>Duncan way</th>
<th>Date: July 4, 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Level: full</td>
<td>Engine Belt: ok</td>
<td>Hose Condition: ok</td>
</tr>
<tr>
<td>Oil Level: ok</td>
<td>Battery Voltage: 13.2</td>
<td>Radiator Condition: ok</td>
</tr>
<tr>
<td>Coolant Level: ok</td>
<td>Batter Water: ok</td>
<td>Transfer switch on utility supply:</td>
</tr>
<tr>
<td>Coolant Temp (cel): 126</td>
<td>Charger on float: yes</td>
<td>Check kiosk door condition:</td>
</tr>
<tr>
<td>Hours of Operation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump #1: (hours)</td>
<td>Current: 4009.9</td>
<td>Previous: 4003.1</td>
</tr>
<tr>
<td>Pump #2: (hours)</td>
<td>Current: 7749.5</td>
<td>Previous: 7742.6</td>
</tr>
<tr>
<td>Mixer: (hours)</td>
<td>Current: 3062</td>
<td>Previous: 3057.5</td>
</tr>
<tr>
<td>Generator: (hour/mins)</td>
<td>Current: 55 hr 51 min</td>
<td>Previous: 55 hr 51 min</td>
</tr>
<tr>
<td>System Operation:</td>
<td>Ground Work and Appearance:</td>
<td></td>
</tr>
<tr>
<td>Miltonic: ok</td>
<td>Grass Cutting:</td>
<td>yes</td>
</tr>
<tr>
<td>Kiosk Light: ok</td>
<td>Blower:</td>
<td>yes</td>
</tr>
<tr>
<td>Well Fan: ok</td>
<td>Painting:</td>
<td>no</td>
</tr>
<tr>
<td>Heater: ok</td>
<td>Wet well cleaning:</td>
<td>yes</td>
</tr>
<tr>
<td>Pump #1: ok</td>
<td>Lubricate kiosk doors:</td>
<td></td>
</tr>
<tr>
<td>Pump #1: 24 Amps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump #2: ok</td>
<td>Comments:</td>
<td></td>
</tr>
<tr>
<td>Pump #2: 25 Amps</td>
<td>Generator battery charger not working properly.</td>
<td></td>
</tr>
<tr>
<td>Mixer: ok</td>
<td>possible issue with the electrical panel, Jesse working on the cause of the lack of power to battery charger.</td>
<td></td>
</tr>
<tr>
<td>Low Float: ok</td>
<td>Confined Space:</td>
<td></td>
</tr>
<tr>
<td>High Float: ok</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BC Hydro Voltage: 600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End of month maintenance:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run generator: ok</td>
<td>check emergency lights: ok</td>
<td>check float operation: ok</td>
</tr>
<tr>
<td>Clean kiosk: ok</td>
<td>Fuel generators: ok</td>
<td></td>
</tr>
</tbody>
</table>
What is required for the monthly check.

- 1 - Open up wet well and visually inspect the pumping cycles.
- 2 - Completely pump down the wet well to its lowest point and make a visual inspection.
- 3 - Hose the wet well down during the pump down process.
- 4 - Inspect wet well for excessive grease build up on surface, clean when needed.
- 5 - Check wet well floats for rag build up, clean as needed.
- 6 - Pumps and piping are checked visually for defects.
- 7 - Power up generator test the transfer switch during this process, run pumps while the generator is running.
Pump maintenance plays a major role.

- Inspection of submersible pumps should be performed annually. Inspection of the impeller should be performed at that time. A proper impeller gap should be ensured and should be adjusted to the clearance within the manufacturer's design specifications.
- A pump megger reading should be recorded at this time.
- In addition to your annual maintenance, when pump hours are not within 10% of each other, an inspection is recommended. This inspection will assure that the impeller is free of debris.
- Another key is to monitor the pump amperage; the control panels should have an amperage gauge or dial to refer to and your pump information tag will show the amperage specs for the pump.
The manufacturer of the pump can do your annual pump maintenance.

Flygt offers training days at their shop, very useful if you want to expand your knowledge of pump maintenance.
Air valves.

- Should be serviced annually.
- Little maintenance required especially for the newer versions.
- Releases air pressure built up after each pumping cycle.
- Proven to be a very beneficial over the long haul for the lifespan of your pumps.
- Sometimes are a confined space issue for access and removal.
Electrical PM.

- A semi-annual inspection of all electrical motor control equipment to find poor connections and worn parts should be performed.
- Components are subject to vibrations that cause loose connections and relays.
- Continuous duty fans will shake the inside of your kiosk.
- The pump starter unit is subject to wear and the contacts and components of this should be checked during the annual PM.
- Pump megger reading should be taken at this time as well.
- Thermal camera that takes an infrared image that will show higher temperatures if there are any loose connections or other electrical problems.
Megger reads are best used as a trend analysis tool. To accomplish this, a test procedure should be established and used consistently over time. The above variables should be controlled as much as possible to promote accurate insulation resistance measurement data. After a benchmark is established, periodic measurements should be taken and recorded along with notation of temperature, humidity and duration of the Megger test. This procedure must be continued for subsequent tests to accurately determine if the rate of insulation breakdown is occurring at an abnormal rate. This determination is also very subjective and should be based on sound judgment and experience.
Wet well cleaning and inspection.

- Wet wells should be pumped out and cleaned at least once a year, even twice if necessary to prevent solids and grease build-up.
- Build-up of solids can create odors and damage pumps.
- Cleaning out the well allows for a more thorough inspection of the piping and other well components.
- We have the ability to completely isolate our wells and the inspection is usually completed in less than ½ an hour.

Flange gasket blown out.
Inspection of the check valves should be performed at least twice a year to insure proper working order and to prevent backflow from the force main to the wet well.

Check valve maintenance usually requires confined space entry, because of this some municipalities relocate these valves to above ground chambers.

Debris on a check valve can cause increased operating hours.
Monitoring your stations performance.

- Keeping a close eye on your SCADA trending will help you as well.

- Some SCADA programing allows for detailed pump information, and other diagnostic features.

- Don’t just rely on alarms to tell you when something is wrong.
Infiltration upstream from your pump stations is a key factor in controlling your pump usage and overall pump health and station performance.

- Yearly manhole inspections should be performed and documented, an easy way to stop unnecessary infiltration is through manhole inspections.
- Grouting inside sewer manholes can prevent heavy rainfall infiltration.
- Also CCTV review of piping upstream will also help reduce infiltration.
- Water tight manhole lids have helped reduce inflow in areas where manholes are underwater during heavy rain events.
Preventative Landfill wet well maintenance.

- This access valve was installed to clean and flush the force main at a landfill lift station.
- It is used every 3 months to keep the line clear of iron oxide build up in the force main.
- This ongoing preventative maintenance will help maintain pump durability and lessen the frequency of pump failures.
• Iron oxide build up will begin almost immediately after you have cleaned the reinstalled pump.

• Pumps are pulled every 6 months to clean and inspect, but you could almost do this every 2 months.
Other items that could help your stations overall performance.

- Mixers
- Flush valves
- Degreasers
- Smart pump VFD drives
- odor control
- Pump flow meters.
- Trash rack rag collector.
- Emergency plan.
Questions...