Great Northern Environmental, LLC.

- Local Trojan Distributor and Service Provider
- Located in Oakdale, MN
- Sell and service products from over 35 manufacturers of process equipment
- Have over 160 Installations of Trojan UV Equipment in Region
Murphy’s Law – Anything that can go wrong, will go wrong........
Agenda Today

• Component Overview
• General Maintenance Recap
• Common UV Issues
• What to Know Before You Call
• Troubleshooting Common Issues
General System Maintenance

- **Daily**
  - Check Operation & alarms
  - Inspect/clean low level sensors rods

- **Weekly**
  - Inspect 1 module per bank for fouling, debris build-up & sleeve nut tightness

- **Monthly**
  - Inspect electrical enclosures seals & clean outer surfaces
  - Inspect water level at low & high flows - must be slightly above top lamp

- **6 months**
  - Inject new cleaning solution into wiper canisters
  - Lubricate wiper drive cylinders

- **Yearly**
  - Inspect wiper seals for wear and replaced as required
  - Change Hydraulic Filter (drain and refill fluid in hydraulic fluid reservoir every 2 years)

- **12000hrs**
  - Change lamps & sleeve sealing o-rings
4 Common UV Issues

• Communication Faults
• Module Not Working
• Ballast (2 Lamps) not working when replaced
• Not Meeting FC or E Coli Permit
What to know before you call for service:

- Record Active Alarm History (Take pic of screen with phone)
- What is the UVT of the effluent?
- What are your FC or E Coli Counts? Historical and present
- What are the lamp hours?
- What are the plant flows?
- Are your sleeves clean?
- What are you using to clean your sleeves?
- Has anything in town changed? New Industry? Change in flows, etc.?
- When was the last time your channel was drained and cleaned?
Communication Fault OR Module Not Working

• Losing Communication from the PLC to a Module
  – Move Module to a new location and see if it follows or stays at the receptacle
  – If it follows the Module, most common causes are the actual power cord itself or the Module Control Board (MCB)
  – If it stays at the receptacle, most common causes are the plug itself or the wire harness from the plug to the MCB Board
Module Board

- Controls Ballast ON/OFF
- Communicates Ballast/Lamp status to CCB
- 220 – 277 VAC input voltage
- Connects to Ballast via ribbon cable

RS485 Communication Connection

Input Voltage Connection

Transceiver Chip

Ribbon Cable Connection
Ballast Not Working when Replaced

- Each ballast drives two lamps
- Warranty is Normally 5 Years
- Will Typically last 10 years or more
- Each Ballast requires the dip switch changed for its individual address, if replaced
- Take a picture of the address before you replace it

Note: White Indicates switch position
Not Meeting Permit???

- Are your sleeves clean?
Not Meeting Permit???

• Are your sleeves clean?

No

Kind of

Yes
Not Meeting Permit???

- **Tips for Keeping Your Sleeves Clean**
  - Use Trojan ActiClean ONLY. No Lime-away
  - Have you replaced Wiper Seals or Recharged Acticlean (3000PLUS or SIGNA Models ONLY)
  - No abrasive pads (Scotchbrite)
  - How often to clean? It depends........
    - Water Chemistry (like Fe in the groundwater)
    - Coagulants added like Ferric or Alum
    - Upstream Treatment Processes
    - Covered or Uncovered channels or clarifier effluent weirs
Not Meeting Permit???

What is the UVT?
- Is the percentage of UV light, at 254 nm, not absorbed after passing through 1 cm of water sample compared to distilled water

Examples:
- Drinking Water: 80 – 98%
- Treated Wastewater: 50 – 75%
Not Meeting Permit???

How to Measure UVT?
Not Meeting Permit???

- **Factors that effect UVT?**
  - TSS in the effluent
  - Upstream Coagulants Being Used (Ferric)
  - Particle Size
  - Industrial Waste Streams
  - Color

UV Lamp

- Complete penetration
- Incomplete penetration
- Particle shading
Not Meeting Permit???

- When was the channel last drained and cleaned?
  - Outdoors installations susceptible to Algae Growth
    - Cover areas before and after UV modules with solid decking
    - Leave areas above modules open for cooling
  - Uncovered final clarifiers can also send algae into the channel
    - Clean Final Clarifier effluent launders
Not Meeting Permit???

- **Sampling Methods and Locations**
  - Contaminated Samples?
  - Prevent regrowth in channel where samples are being taken
Still Not Meeting Permit???

- May be time for a Collimated Beam Test
Questions???

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UV Light

- UV Light is the portion of the electromagnetic spectrum where the wavelength is from 10 to 400 nanometers (nm)
- The germicidal wavelength is 200nm to 300nm
How does UV disinfect?

- UV Light penetrates the cell wall
- The UV energy permanently alters the DNA structure of the microorganism
- The microorganism is “inactivated” and unable to reproduce or infect
- Cell damage depends on the Dose of UV absorbed & the microorganisms resistance to UV
UV DOSE = Intensity × Retention Time

- **Lamp Output**:
  - Intensity decreases with age

- **Sleeve Fouling**:
  - Intensity decreases

- **Water Quality**:
  - UVT
  - NTU

- **Retention Time**:
  - Duration of exposure of a microorganism to UV light
    - High Flow = Low Retention Time
    - Low Flow = High Retention Time
Lamp & Sleeve

- Low Pressure High Output Amalgam Lamp
- End Of Lamp Life Rated for 12000 hours
- Amalgam deposit positioned to bottom of lamp
- Replace O-ring at every lamp change
- Use Cotton Gloves when handling lamps
Wiper Drive Assembly

- Wiper canister
- Locking Plate
- Hydraulic Cylinder
- Lubrication Fitting
- Grease Bleeder Screw
- Drive Bar
- Grease Gun
- Locking Bracket
- Food Grade Grease
Wiper Assembly

- Wiper Seal
- Filler Plug
- Canister
- Canister O-ring
- Cap Tool
- Cap
- Canister Cap
- Spacer
Filling Cleaning Solution

• Connect fill nozzle to bottom canister
• Connect overflow hose to top canister
• Pinch overflow clamp
• Pressurize Injector & inject cleaning solution into wiper canisters
• When full, open the overflow clamp to relieve pressure
Power Distribution Center - PDC

- **ON** – Turns Bank ON @ 100% Power
- **REMOTE** – Allows SCC to operate banks operation

![Diagram of Power Distribution Center](image_url)

- **Operational Selector Switch**
- **Incoming Power**
- **Module Receptacles**
- **Communication Control Board**
- **Processor Board**
- **UV Sensor Receptacle**
- **Module Hydraulic Connectors**
- **Relays for Module Power**
- **Fuses**

**Daughter Board**
Hydraulic System Center - HSC

- Fluid Type = Shell Tellus T15 or WG200R
- Filter = SPE 15-BTA -10 Micron

Remote - SCC initiates wipe sequence
Local - enables bottom switch for local wipe control
EXT - Extends wipers
RET - Retracts wipers
SEQ - performs extend & retract of wipers