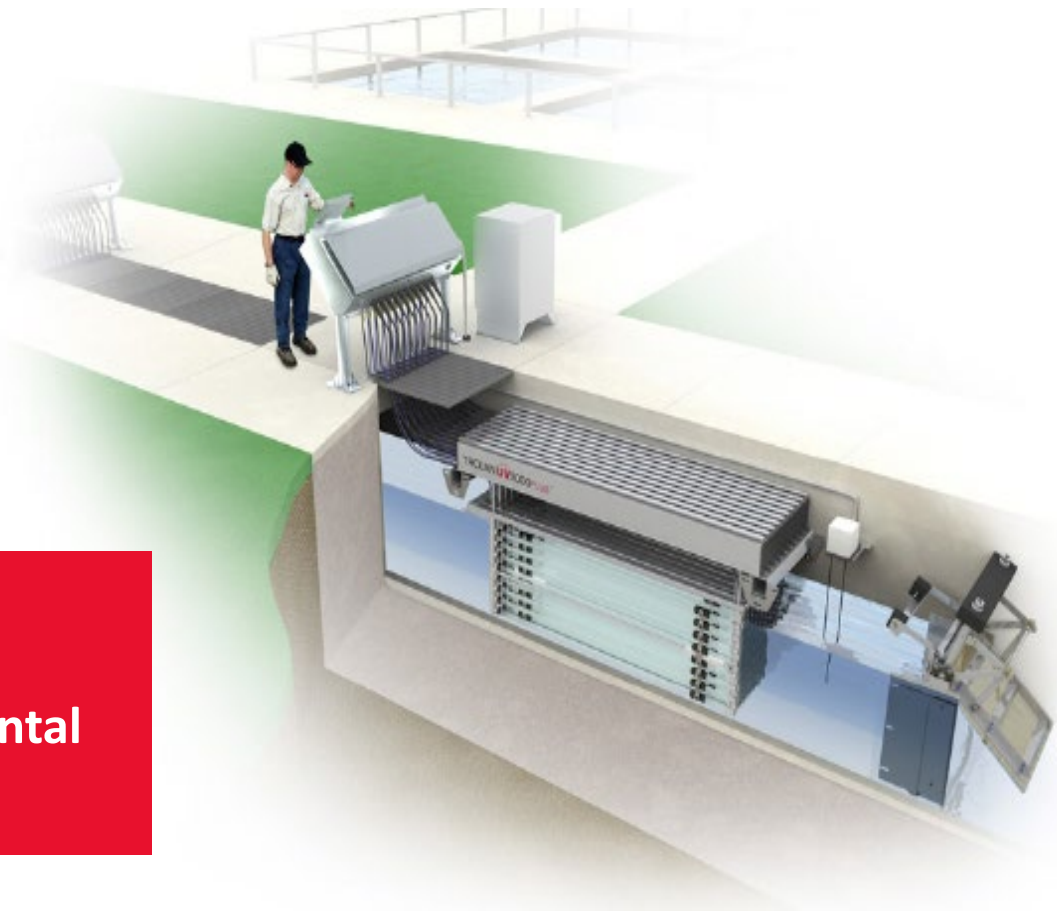


**WWOA
West Central Section
UV DISINFECTION
TROUBLESHOOTING**

**Presenter
Matt Fritze
Great Northern Environmental
mfritze@gnenv.com**



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

Serving MN, ND, SD, IA & Western WI


GNE GREAT NORTHERN ENVIRONMENTAL
WASTEWATER TREATMENT LINE CARD

LIQUID STORAGE & COVERS Engineering America- PermaStore Bolted Steel Tanks, Epoxy-Coated Bolted Steel Tanks, Stainless Steel Bolted Tanks, Shop-Welded Tanks CST Covers- Aluminum Domes, Flat Aluminum Covers MFG Water Treatment Products- Fiberglass Baffle Walls, Launder Covers SCREENING & HEADWORKS Huber Technology- Rotamat Screen, Stepscreen, Multi-Rake Screen, Vertical Fine Screen, MBR Screen, Wash & Press, Grit Washer Lakeside Equipment Corp- MicroStrainer, Fine Screen, Hydronic T Screen, Wash & Press, Vortex Grit Removal, Grit Classifier, Aerated Grit Removal Hayward Gordon- TORUS Recessed Impeller Grit Pump Spirac- Shaftless Screenings Conveyors BLOWERS Kaeser Compressors- Positive Displacement Blower Packages, DO Control Packages Lone Star Blower- High Speed Turbo, Multi-Stage Centrifugal, Integrally Geared Single Stage, Blower Service BIOLOGICAL TREATMENT Ovivo- Carrousel Oxidation Ditch, Enviroquip Membrane Bioreactor (MBR), Package MBR Plants, Rotary Distributors Xylem Sanitaire- Fine Bubble Aeration, Coarse Bubble Aeration, ICEAS SBR, BioLoop Oxidation Ditch, Package Plants, Air Lift Pumps Lakeside Equipment Corp- CLR Oxidation Ditch, Magna Rotor Aerator Nexum- SAGR Process for Amonia Removal, Lagoon Aeration Systems Entex Technologies- IFAS, Fixed Film, Lagoon Upgrades, MBBR GEA - Trickling Filter Media, Submerged Fixed Bed Media SPECIALIZED PUMPS Hayward Gordon- Recessed Impeller Pump, Screw Centrifugal Pump, Chopper Pump Lakeside Equipment Corp- Screw Pumps MIXING Mixtec- Slow Speed Mixers, In-Line Mixers Hayward Gordon- Mixers ODOR CONTROL Duall- Wet Scrubber, Activated Carbon Absorbers, Bio Filters Bioreem- Biofilters and Biotrickling Filters DISINFECTION Trojan Technologies- UV Disinfection	CLARIFICATION Ovivo- Spiral Blade Clarifiers, Suction Header Clarifier, Flocculating Clarifier, Traveling Bridge Clarifier Salsnes- Salsnes MicroScreen for Solids Reduction MFG Water Treatment Products- Weirs, Baffles Density Current Baffles, Launder Covers AEROBIC DIGESTION & THICKENING Ovivo- Enviroquip Class "B" Aerobic Digestion, ECO-MAT Membrane Thickener, PAD-G & PAD-M Aerobic Digestion, Enviroquip TransMAX Diffusers, Enviroquip Airbeam Cover, Gravity Thickener Huber Technology- Disc Thickener, Screw Thickener BDP Industries- Gravity Belt Thickener Centrisys- THK Thickening Centrifuge Spirac- Shaftless Conveyors, Sludge Handling Systems Fluid Dynamics- Liquid & Dry Polymer Feed Systems GE Power & Water - Morsal Advanced Digestion Processes, Class "A" Biosolids DEWATERING & DRYING Huber Technology- Screw Press, Belt Dryer, Solar Dryer BDP Industries- Belt Filter Press Centrisys- Centrifuge Spirac- Shaftless Conveyors, Sludge Handling Systems Fluid Dynamics- Liquid & Dry Polymer Feed Systems ANAEROBIC DIGESTION Ovivo- Steel Digester Cover, Ultrastore Membrane Cover, LM Mixer, Sludge Sonolyzer, Draft Tube Mixers Shand & Jurs- Gas Safety Equipment, Waste Burners, Gas Scrubbers CNP Technologies- Struvite Removal and Recovery TERTIARY FILTRATION Tonka Water- Gravity Filter Xylem Sanitaire- Drum Filter Nexum- Disc Filter Lakeside Equipment - Star Filter GE Water - Ultrafiltration Membranes CHEMICAL FEED & INSTRUMENTATION Milton Roy- Metering Pumps Acrison- Dry Chemical Feeders MFG Water Treatment Products- Parshall Flumes Fluid Dynamics- Liquid & Dry Polymer Feed Systems Xylem YSI - DO Control, TSS, Nitrate Monitoring, Phosphorus Analyzers
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 PHONE: (651)289-9100 • WWW.GNEENV.COM
 YOUR TRUSTED AND RELIABLE RESOURCE FOR WATER & WASTEWATER TREATMENT EQUIPMENT

Murphy's Law – Anything that can go wrong, will go wrong.....



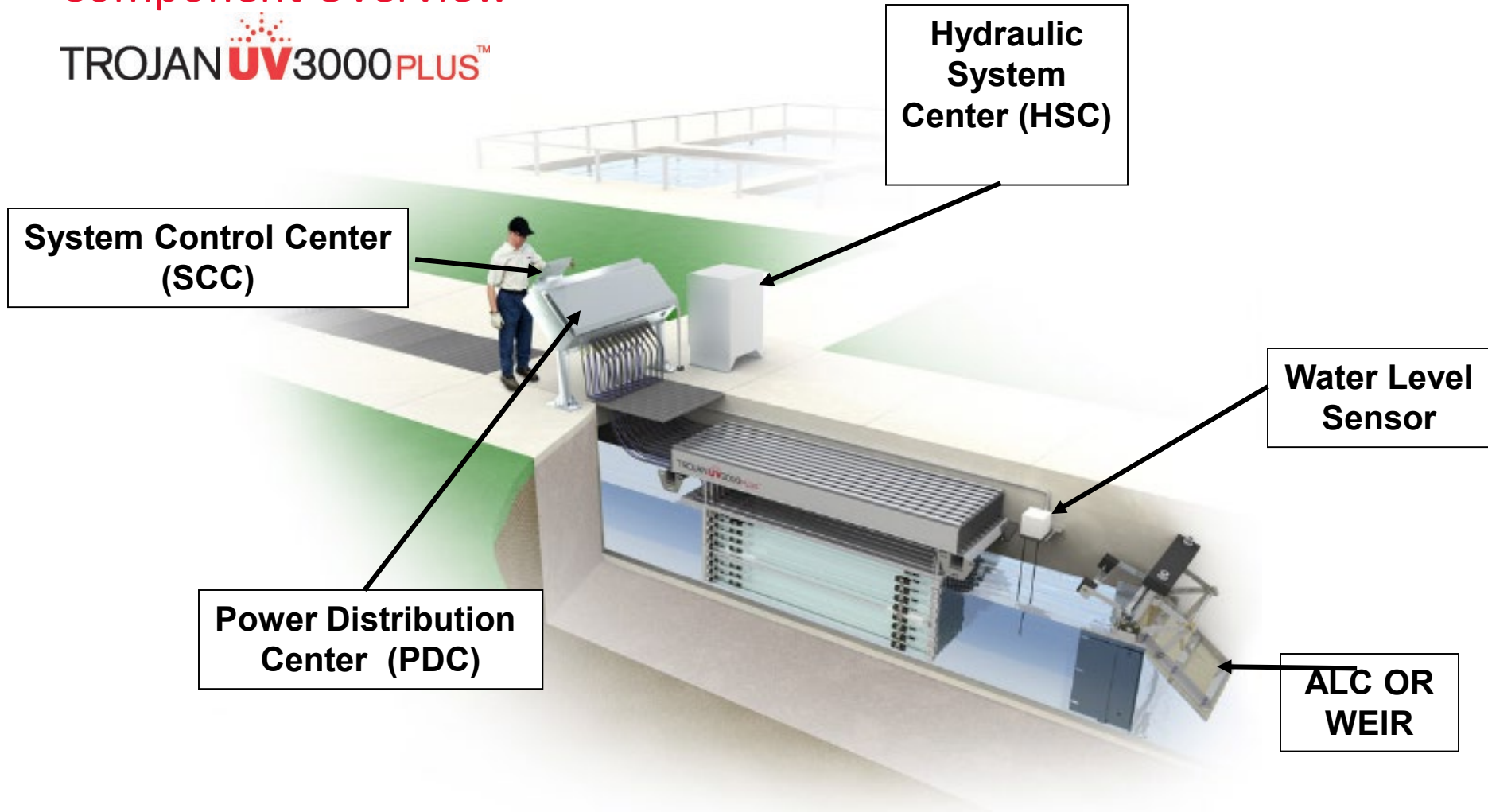
Agenda Today

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

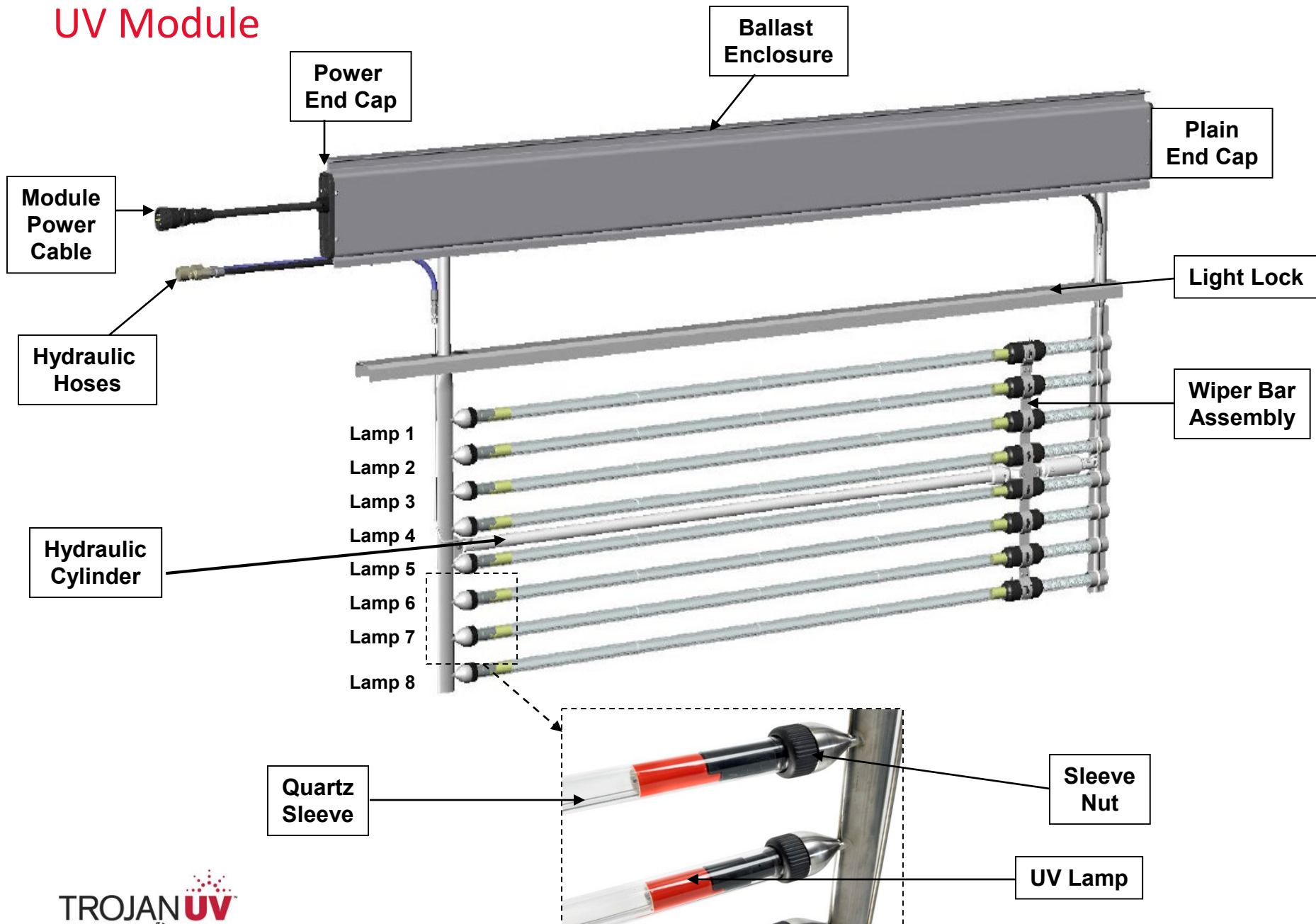


Component Overview

TROJAN **UV** 3000 **PLUS**™



UV Module



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:

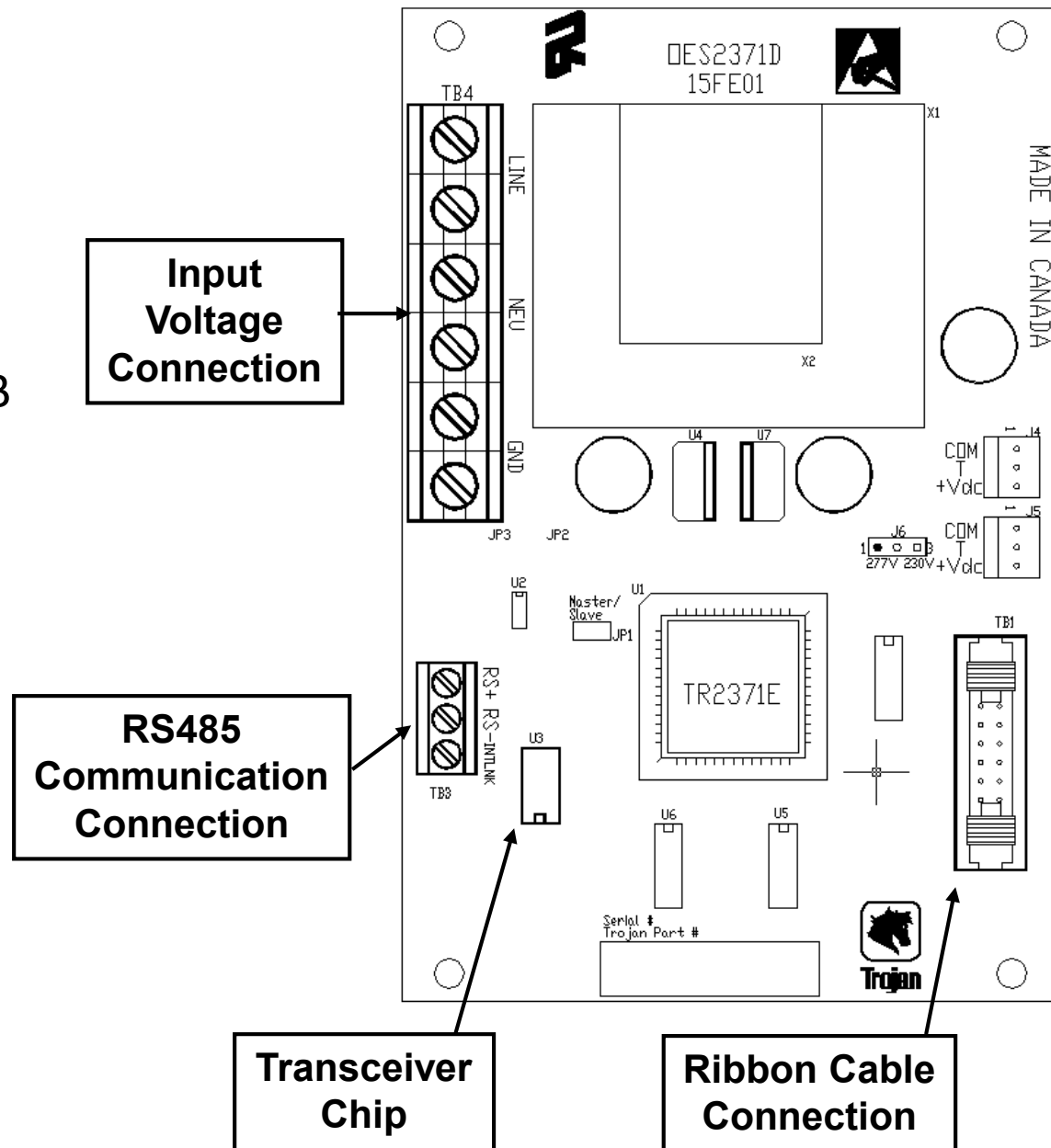
- Record Active Alarm History (Take pic of screen with phone)
- What is the UVT of the effluent?
- What are your FC or E Coli Counts? Historical and present
- What are the lamp hours?
- What are the plant flows?
- Are your sleeves clean?
- What are you using to clean your sleeves?
- Has anything in town 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

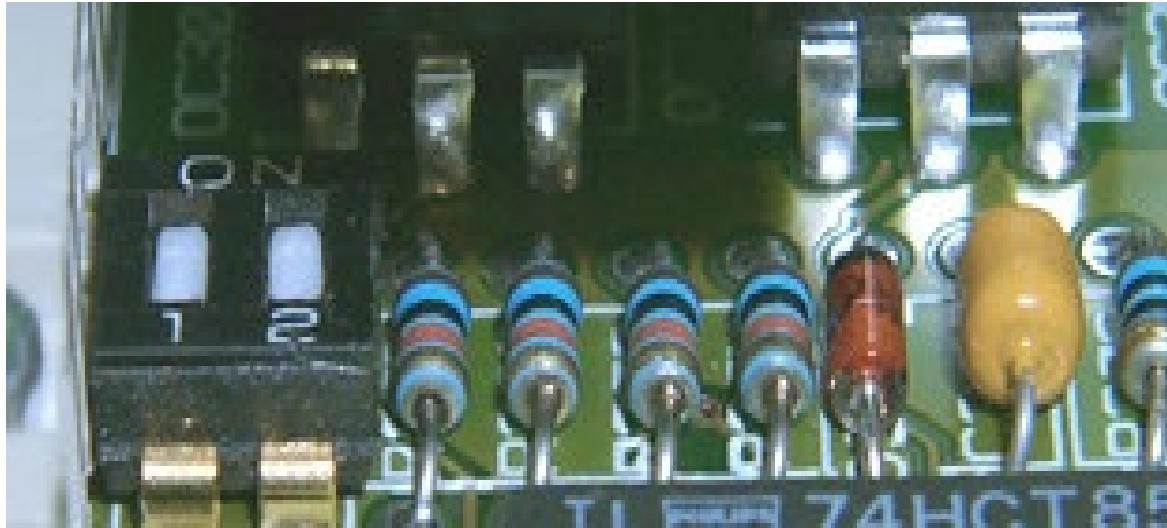
Module Board

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



Ballast Not Working when Replaced

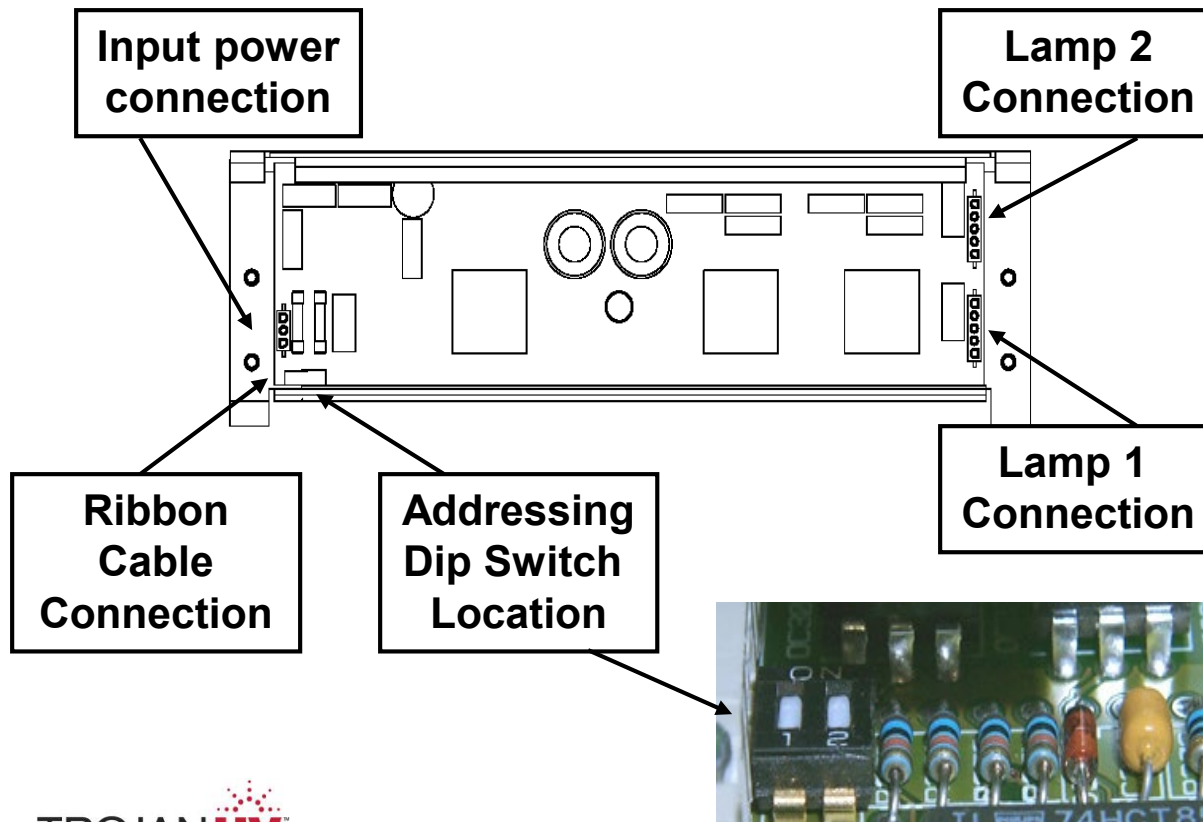
- Each ballast drives two lamps
- Warranty is Normally 5 Years
- Will Typically last 10 years or more



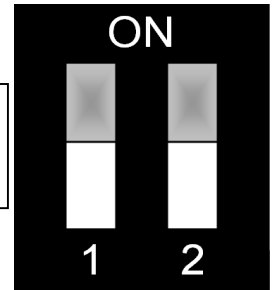
Ballast

Note: White Indicates switch position

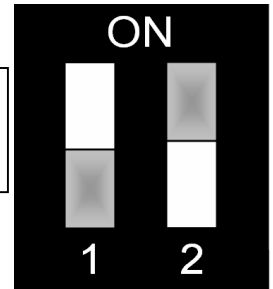
- Each Ballast requires the dip switch changed for its individual address, if replaced
- Take a picture of the address before you replace it



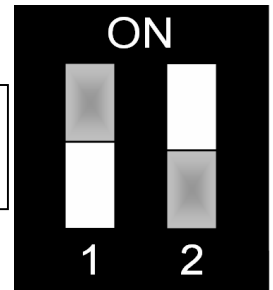
Ballast 1
address 0



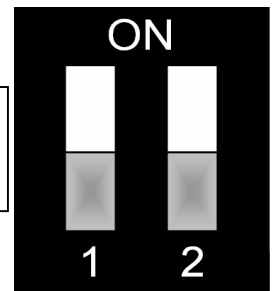
Ballast 2
address 1



Ballast 3
address 2



Ballast 4
address 3



Not Meeting Permit???

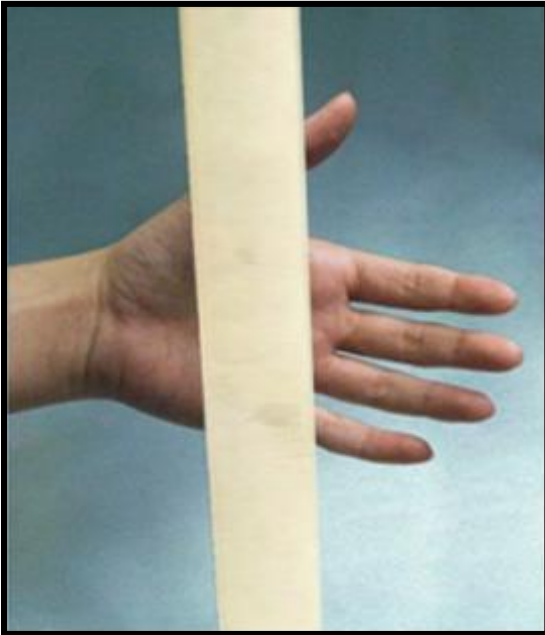
- Are your sleeves clean?



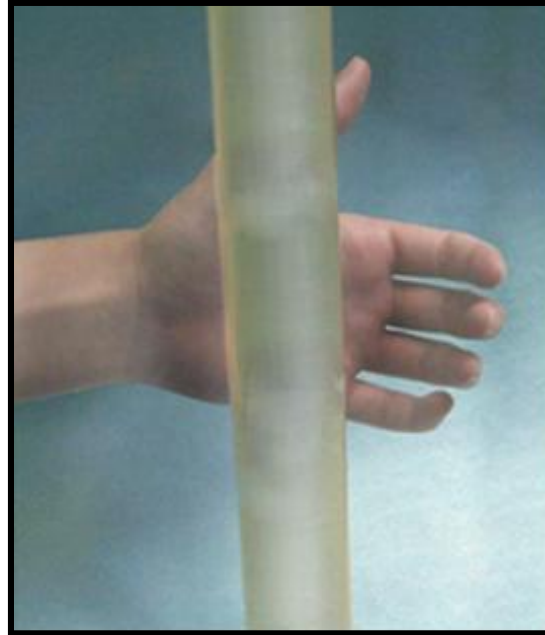
Not Meeting Permit???

- **Are your sleeves clean?**

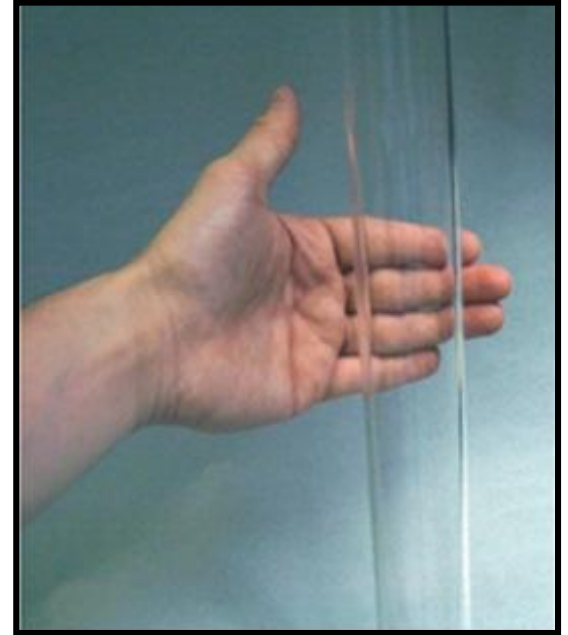
No



Kind of



Yes



Not Meeting Permit???

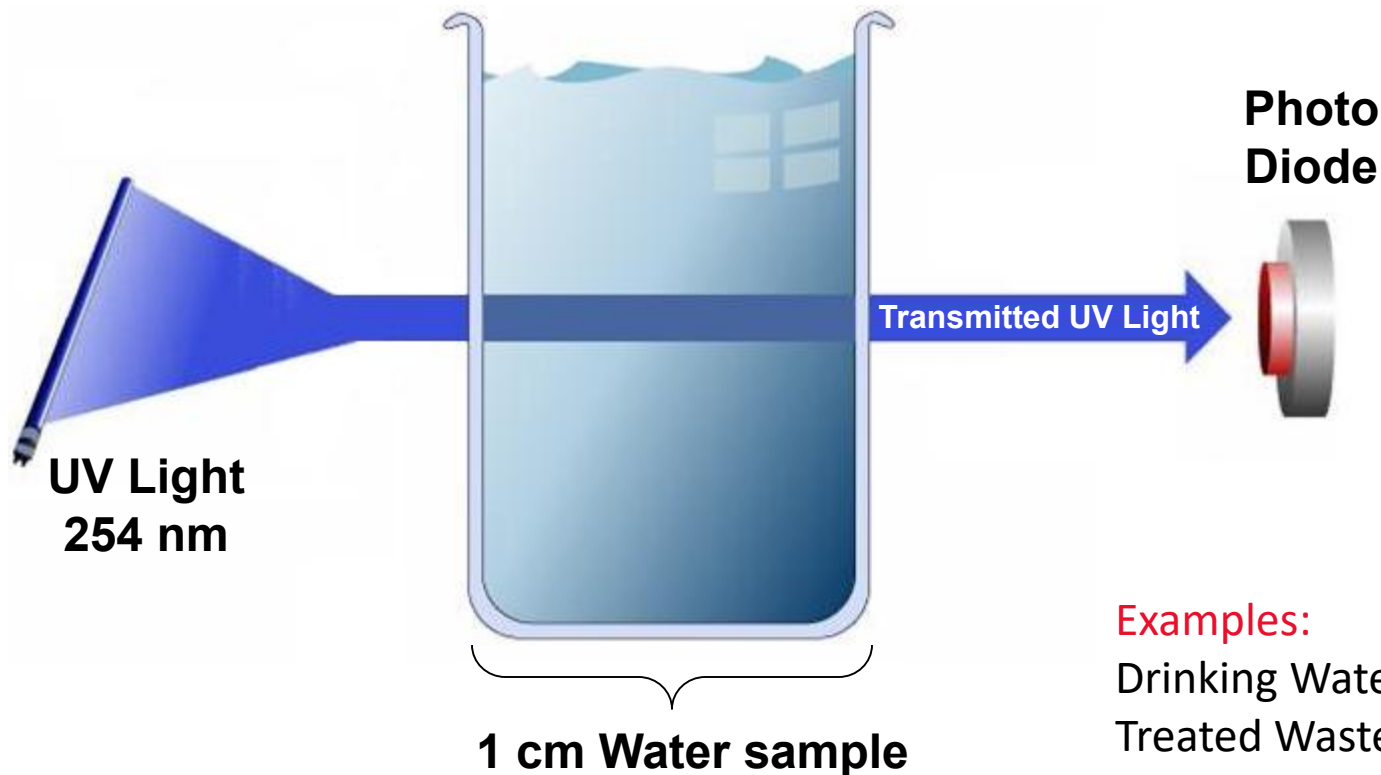
- **Tips for Keeping Your Sleeves Clean**

- 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???

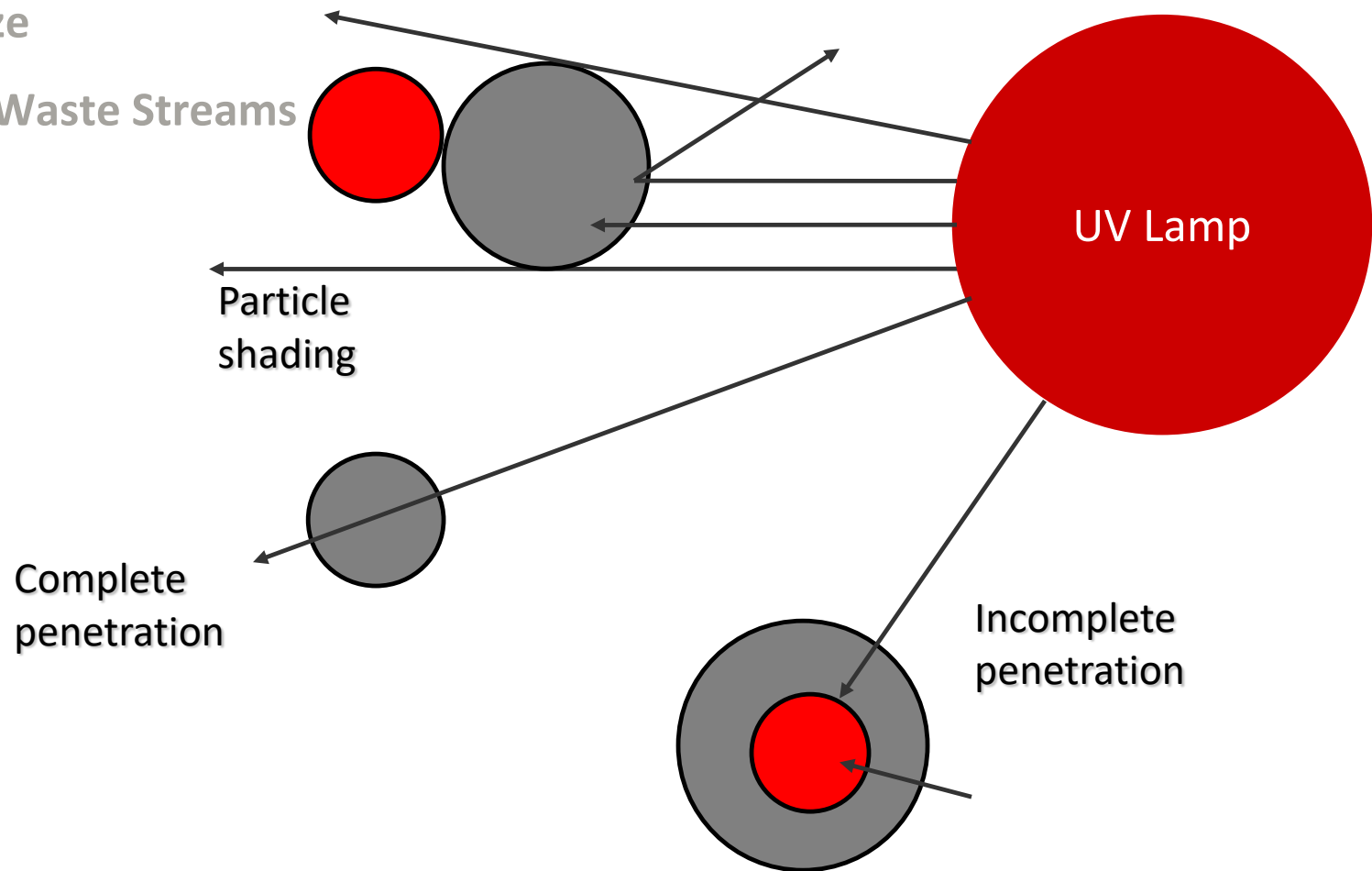
How to Measure UVT?



Not Meeting Permit???

- **Factors that effect UVT?**

- TSS in the effluent
- Upstream Coagulants Being Used (Ferric)
- Particle Size
- Industrial Waste Streams
- Color



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



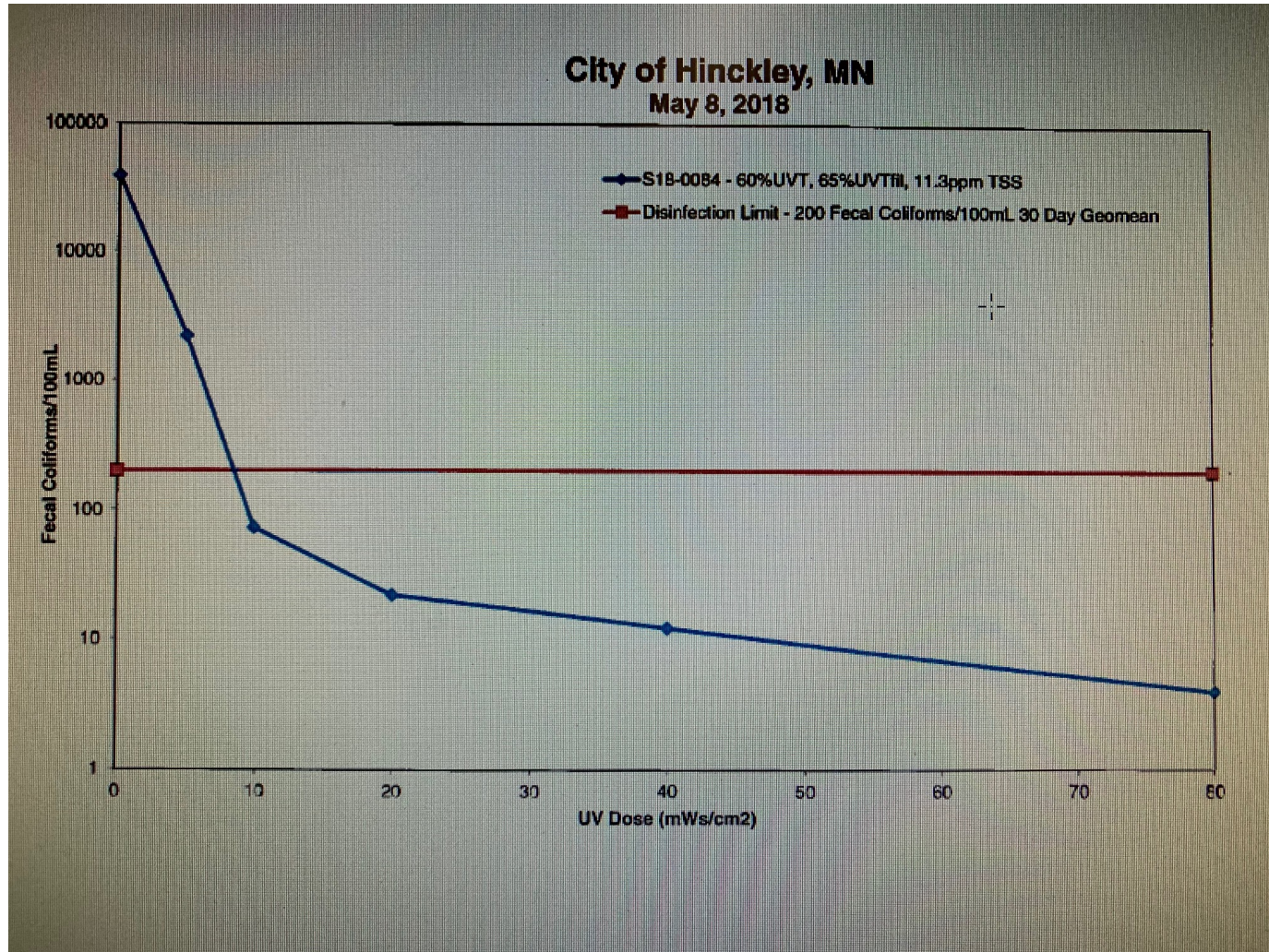
Not Meeting Permit???

- **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???

Matt Fritze

Great Northern Environmental

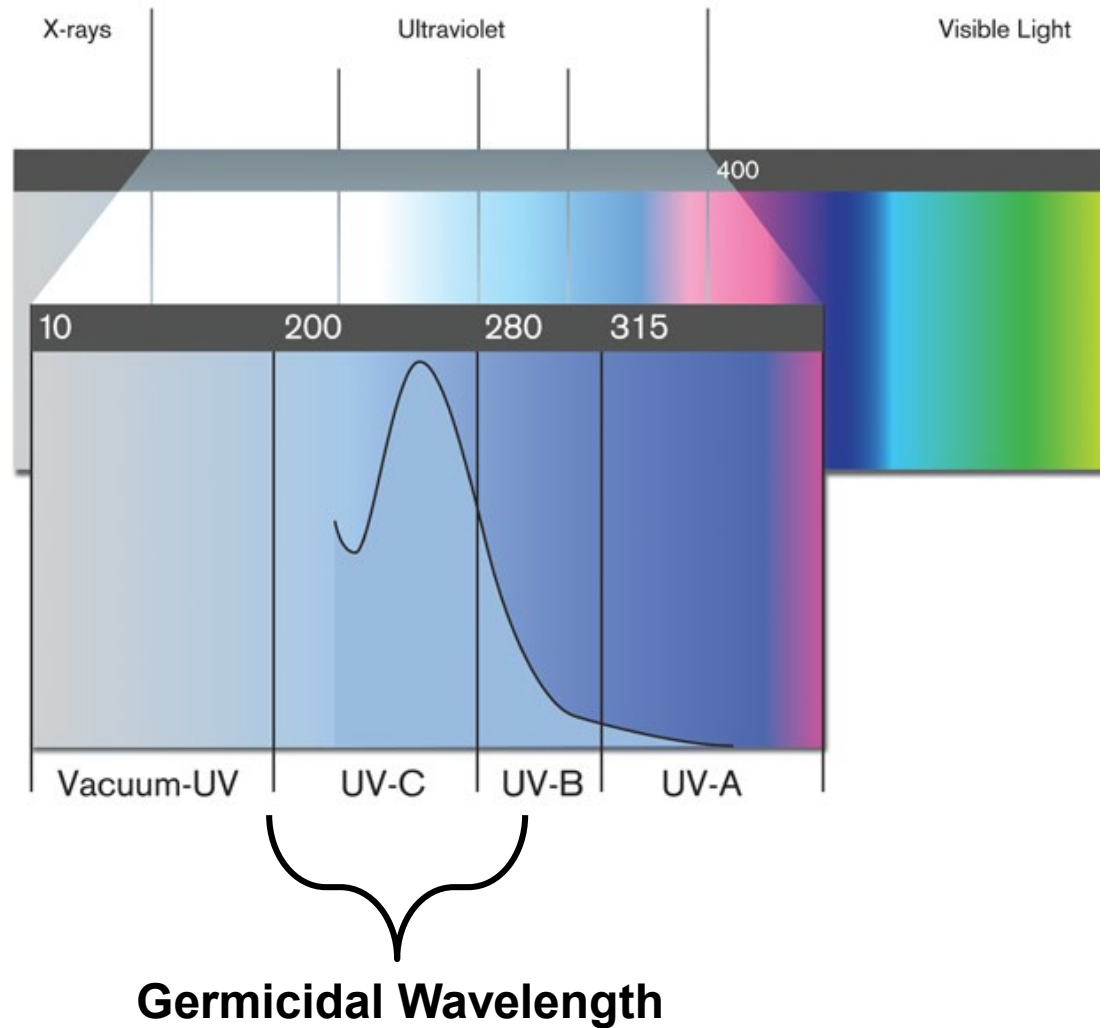
Email: mfritze@gnenv.com

Cell: (952) 239-2264



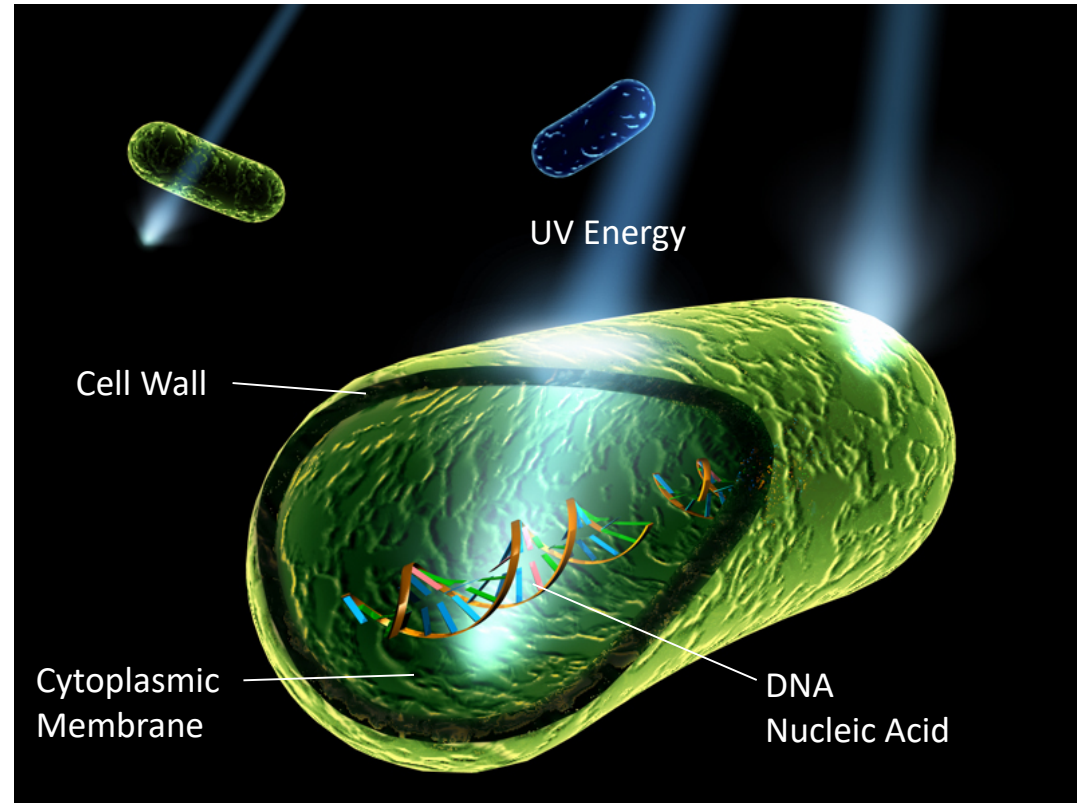
UV Light

- 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



Lamp Output

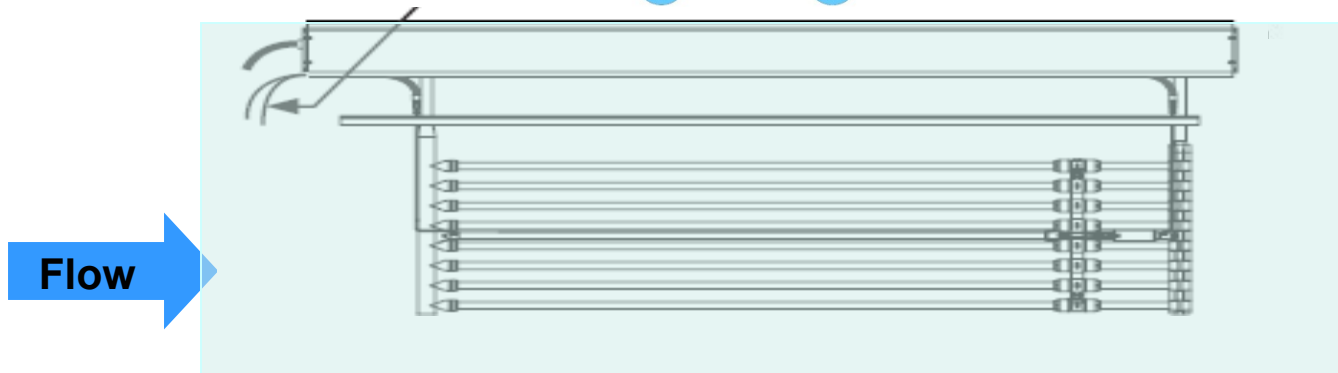
- Intensity ↓ with Age

Sleeve Fouling

- ↓ Intensity

Water Quality

- UVT
- NTU



Retention Time

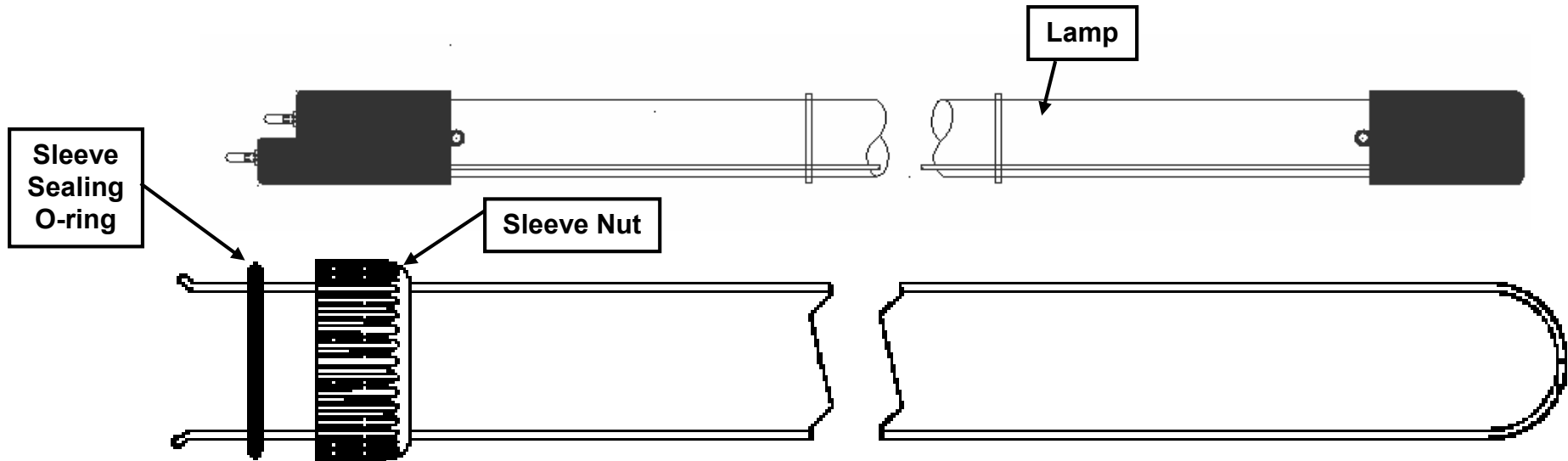
- Duration of exposure of a microorganism to UV light

High Flow = Low Retention Time

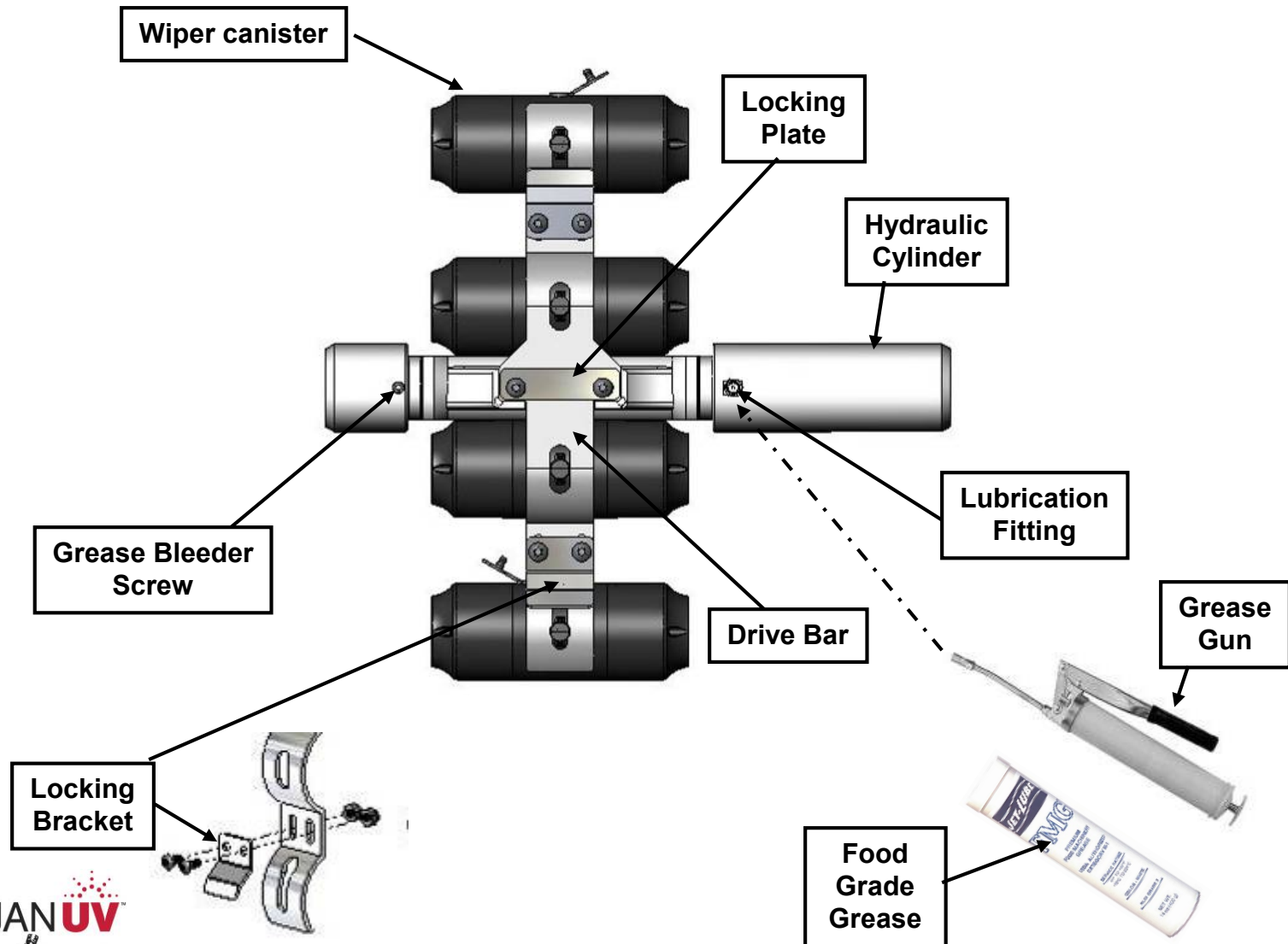
Low Flow = High Retention Time

Lamp & Sleeve

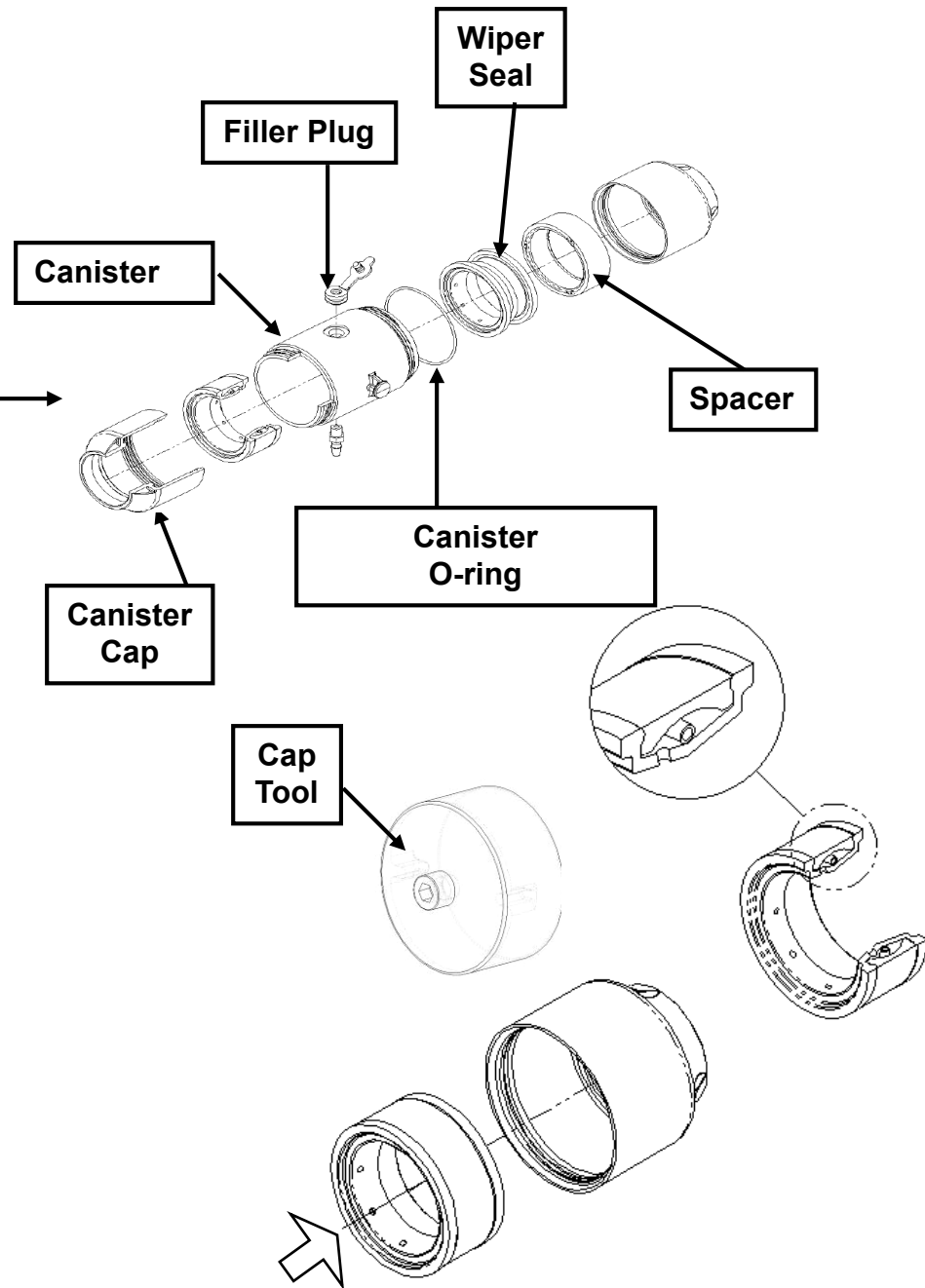
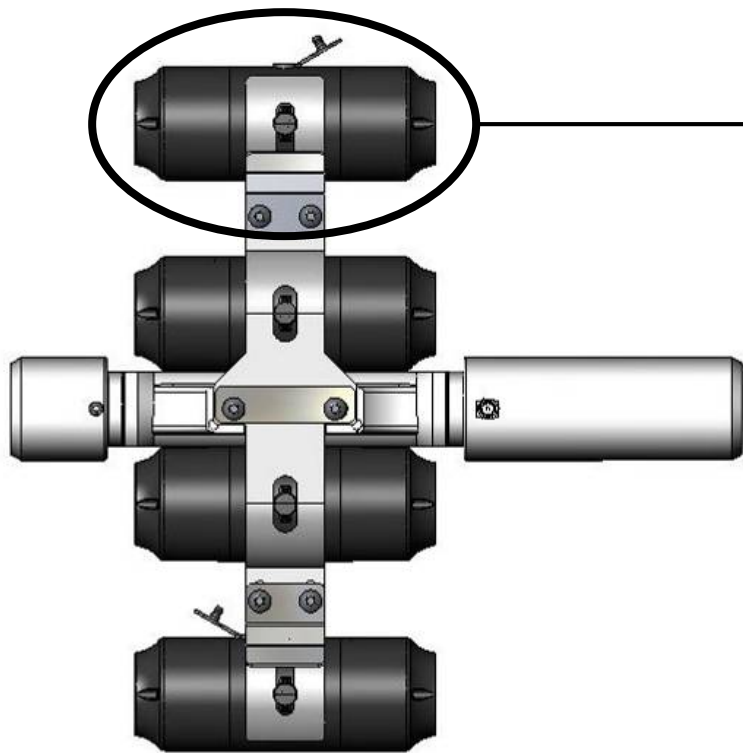
- Low Pressure High Output Amalgam Lamp
- End Of Lamp Life Rated for 12000 hours
- Amalgam deposit positioned to bottom of lamp
- Replace O-ring at every lamp change
- Use Cotton Gloves when handling lamps



Wiper Drive Assembly

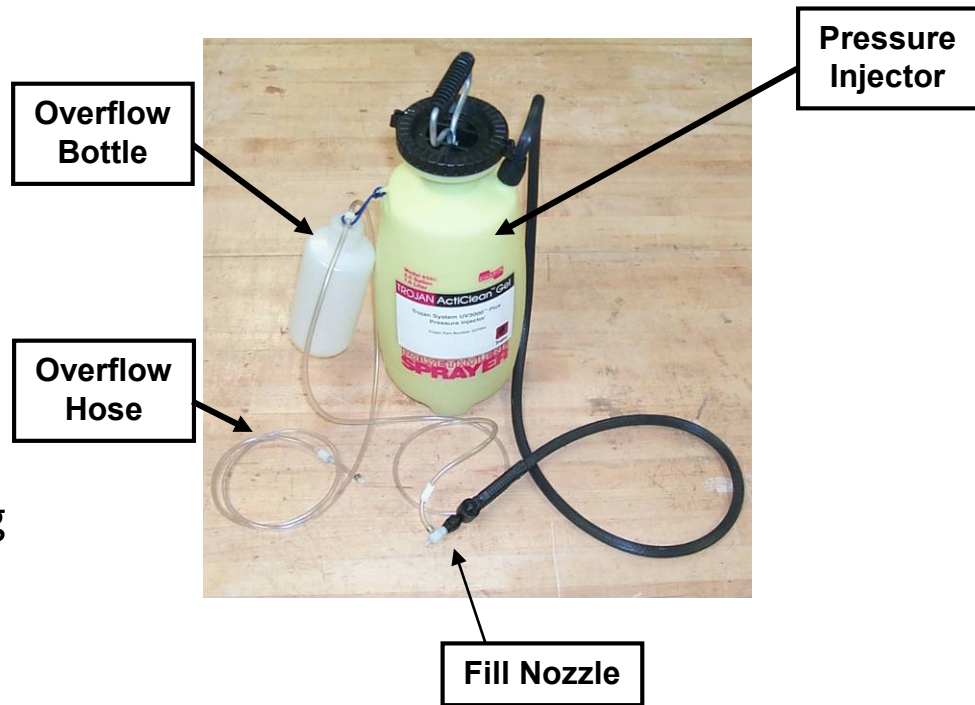


Wiper Assembly

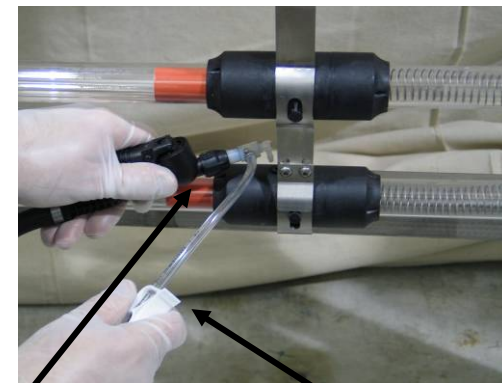


Filling Cleaning Solution

- 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



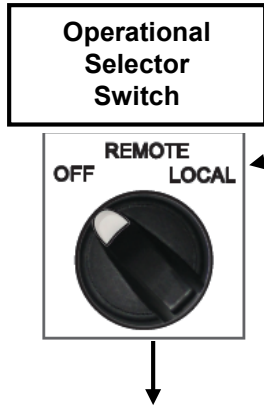
Connecting Overflow



Connecting Fill Nozzle

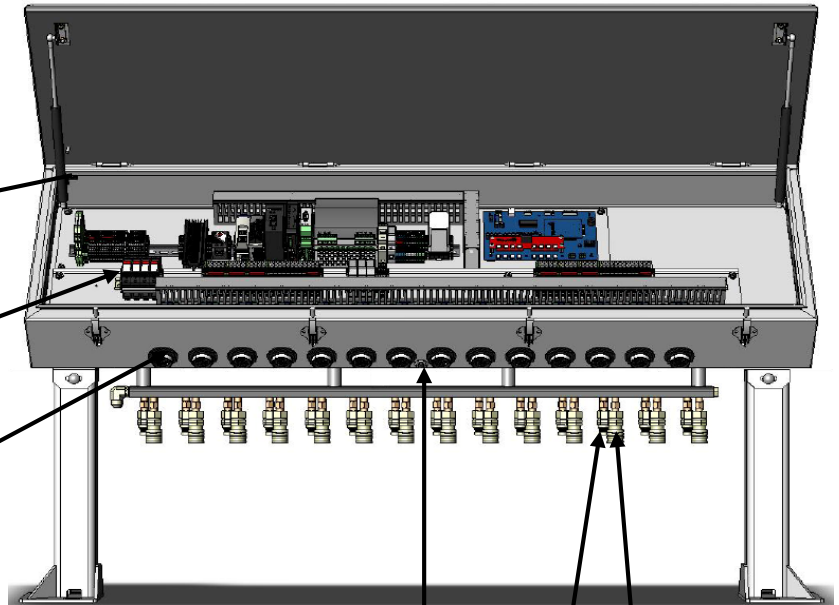
Relieving pressure

Power Distribution Center - PDC



Incoming Power

Module Receptacles

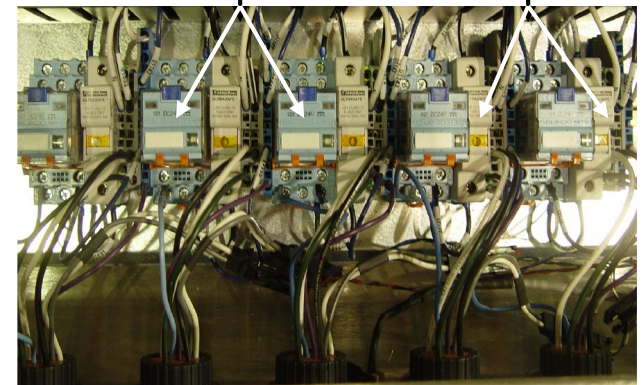


UV Sensor Receptacle

Module Hydraulic Connectors

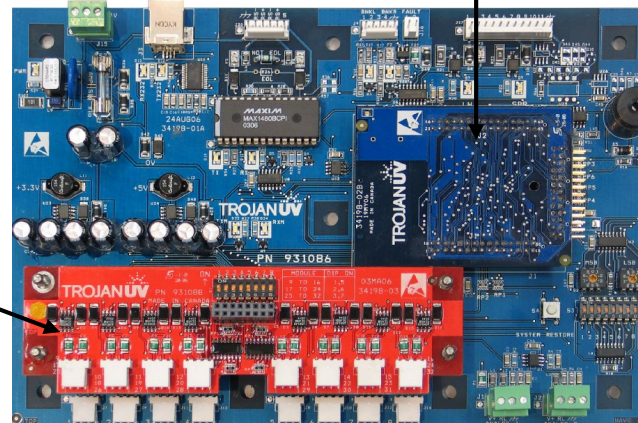
Relays for Module Power

Fuses



Communication Control Board

Processor Board



Daughter Board

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

Hydraulic System Center - HSC

Medium/Large
System HSC

Small
System HSC

