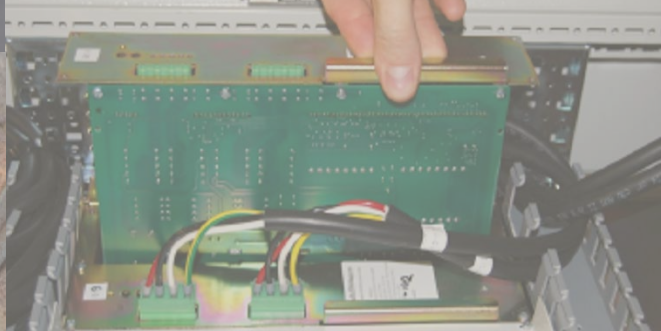


Wastewater Disinfection

TrojanUVSigna

Efficient - Cost-effective - Easy Maintenance





PRESENTATION OUTLINE



INNOVATIVE WASTEWATER DISINFECTION SOLUTION

- TrojanUVSigna Overview
- Key System Components
- Design Considerations
- Maintenance Overview
- Typical Installations

TROJAN  SIGNA™



WATER TREATMENT SOLUTION PROVIDER

- > 800 associates, operating from 25 locations in 12 countries
- Fully owned by Danaher Corporation (NYSE)
- 5.0% investment in R & D
- Over 8,000 municipal UV installations on 6 continents
- Leading supplier of UV for municipal, industrial, commercial and consumer applications
- Logistics & Manufacturing in Canada



WASTEWATER DISINFECTION SOLUTIONS

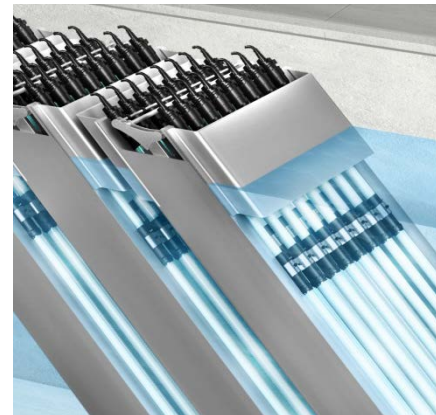
TROJAN UV3000PLUS™

- Small & medium applications
- LPHO lamp (250 Watts)
- Horizontal, parallel flow lamp array
- 4, 6 or 8 lamps / module

TROJAN UVSIGNA™

- Medium & large applications
- TrojanUV Solo Lamp™ (1000 Watts)
- Staggered, inclined lamp array
- 2, 4, 6 lamp rows / bank

- ActiClean™ – chemical and mechanical automatic cleaning
- High electrical efficiency (lamp technology and sizing factors)
 - User-friendly controls and modern sensor technology
 - Bioassay validation to ensure accurate dose delivery
- Flexible installation and easy retrofitting chlorine tanks or UV channels



TROJANUVSIGNA OVERVIEW



TROJANUVSIGNA OVERVIEW

- Introduced by Trojan in 2010
- Initial configuration ideal for large-scale WW disinfection & chlorine conversions
- New core technology platform (Solo Lamps, advanced drivers)
- Used proven, state of the art components from UV3Plus and Drinking Water systems:
 - ActiClean™
 - Sensors
 - Controls
 - Validation Techniques



EVOLUTION OF TROJANUVSIGNA

- Installing 25 systems
- Treating total flow of > 5300 MLD
- Largest application to date:
*MWRDGC -Terrence J. O'Brien WRP
in Chicago, IL – 2006 MLD, 7
channels, secondary effluent*
- In 2013, introduced 6-row banks
- In 2015, introduced 2-row banks

South Milwaukee, WI
113 MLD channel



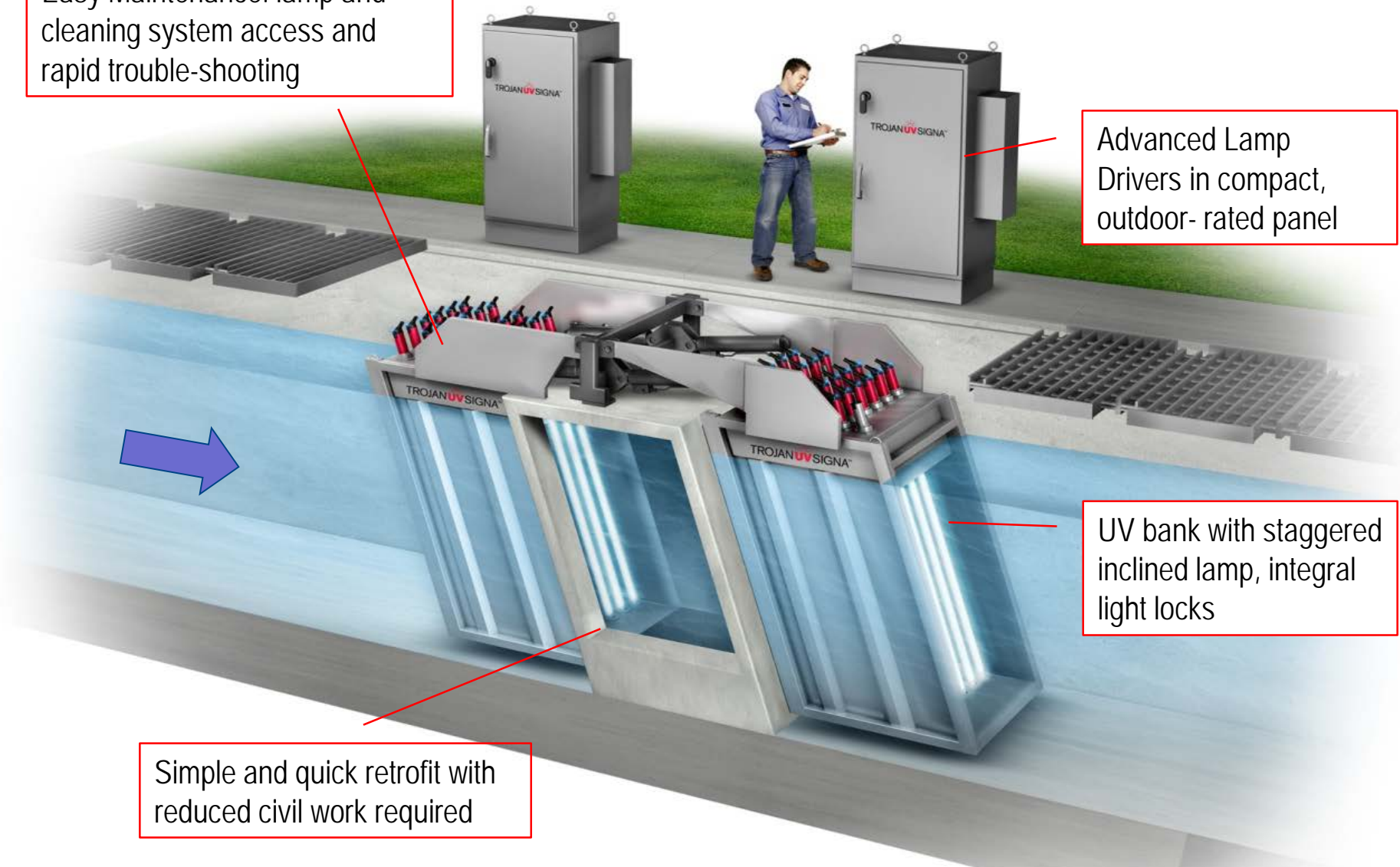
TROJANUVSIGNA – 4 ROW & 6 ROW BANKS

Easy Maintenance: lamp and cleaning system access and rapid trouble-shooting

Advanced Lamp Drivers in compact, outdoor-rated panel

UV bank with staggered inclined lamp, integral light locks

Simple and quick retrofit with reduced civil work required



TROJANUVSIGNA – 2 ROW BANKS

Lowest lamp count and high electrical efficiency

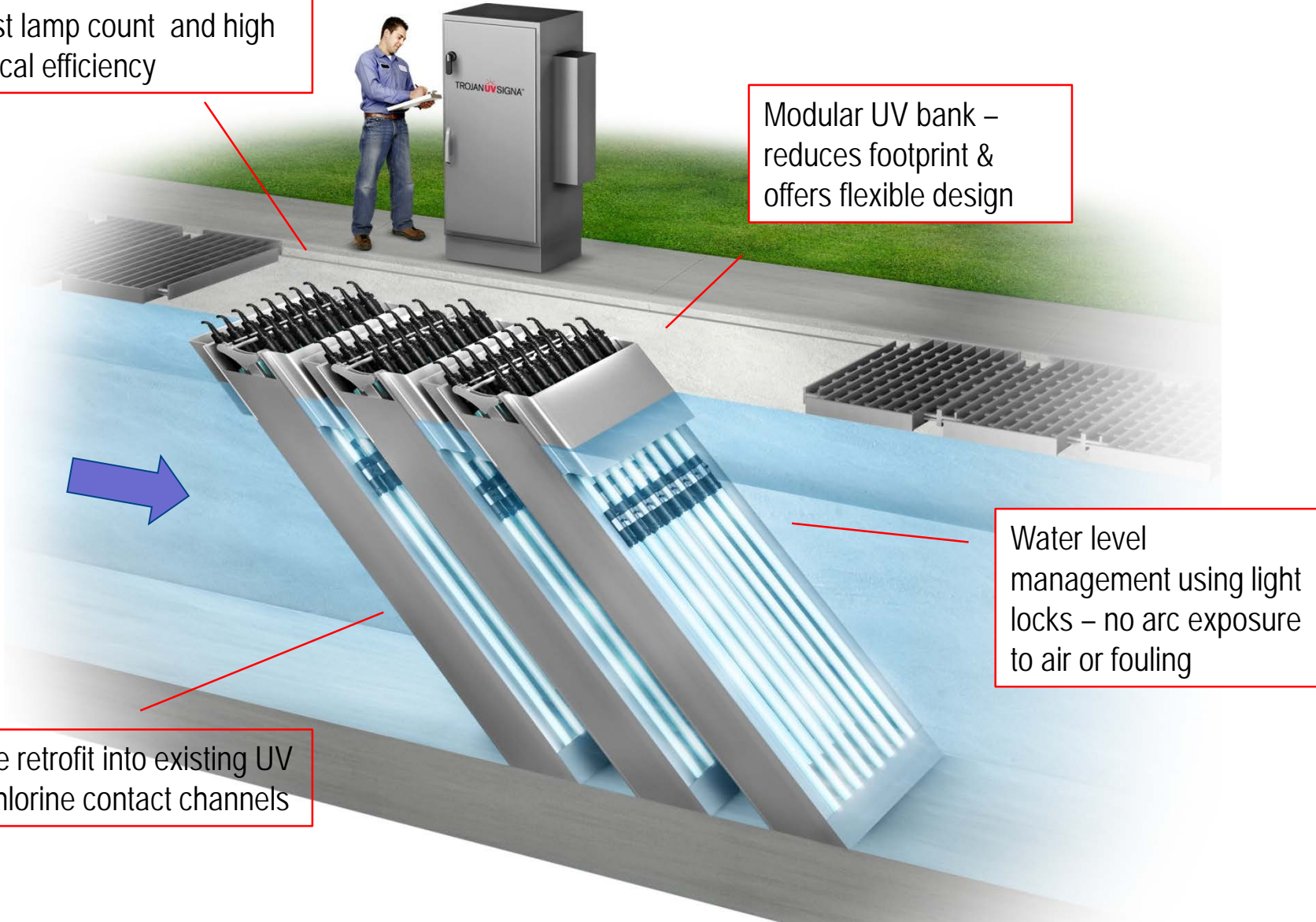


Modular UV bank – reduces footprint & offers flexible design



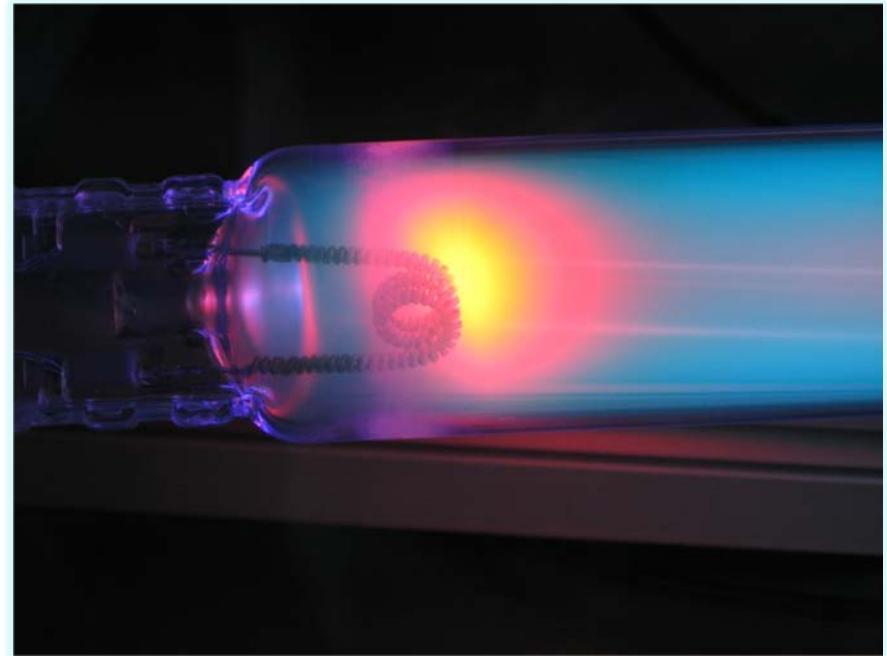
Water level management using light locks – no arc exposure to air or fouling

Simple retrofit into existing UV and chlorine contact channels



SOLO LAMP TECHNOLOGY

- 1000 Watt amalgam lamp
- Guaranteed 15,000 hour lamp life
- Lamp dimming from 100 to 30% power
- Technical features (e.g. active filament heating) produce highly stable and consistent lamp output performance
- Optimal balance - fewest lamps with highest electrical efficiency
- Instant start - no cool down period



SOLO LAMP BENEFITS

- Lowest lamp count: Fewer parts, ballasts, seals etc. → highest reliability & lowest maintenance
- In-place lamp replacement: Bank stays in place while individual lamps changed
- Maintain disinfection while other lamps and banks remain on-line
- Less time spent on lamp replacements
- Quick diagnostics: LED on/off status for each lamp



ADVANCED LAMP DRIVER TECHNOLOGY

High Reliability & Efficiency:

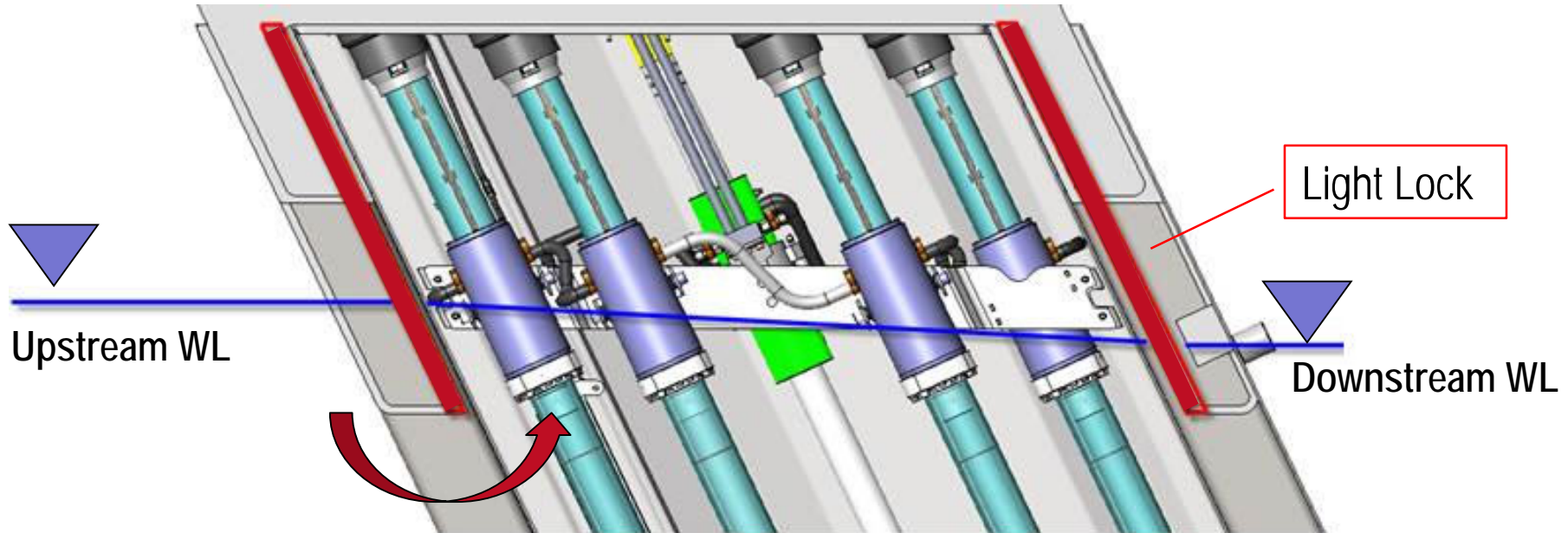
- Ten (10) year warranty
- Advanced troubleshooting capabilities
- Power factor of 99%
- Humidity controlled & factory-tested

Cost Effective:

- Very compact, outdoor 4X rating
- Minimize footprint and installation cost
- Lowest lamp count = fewer drivers



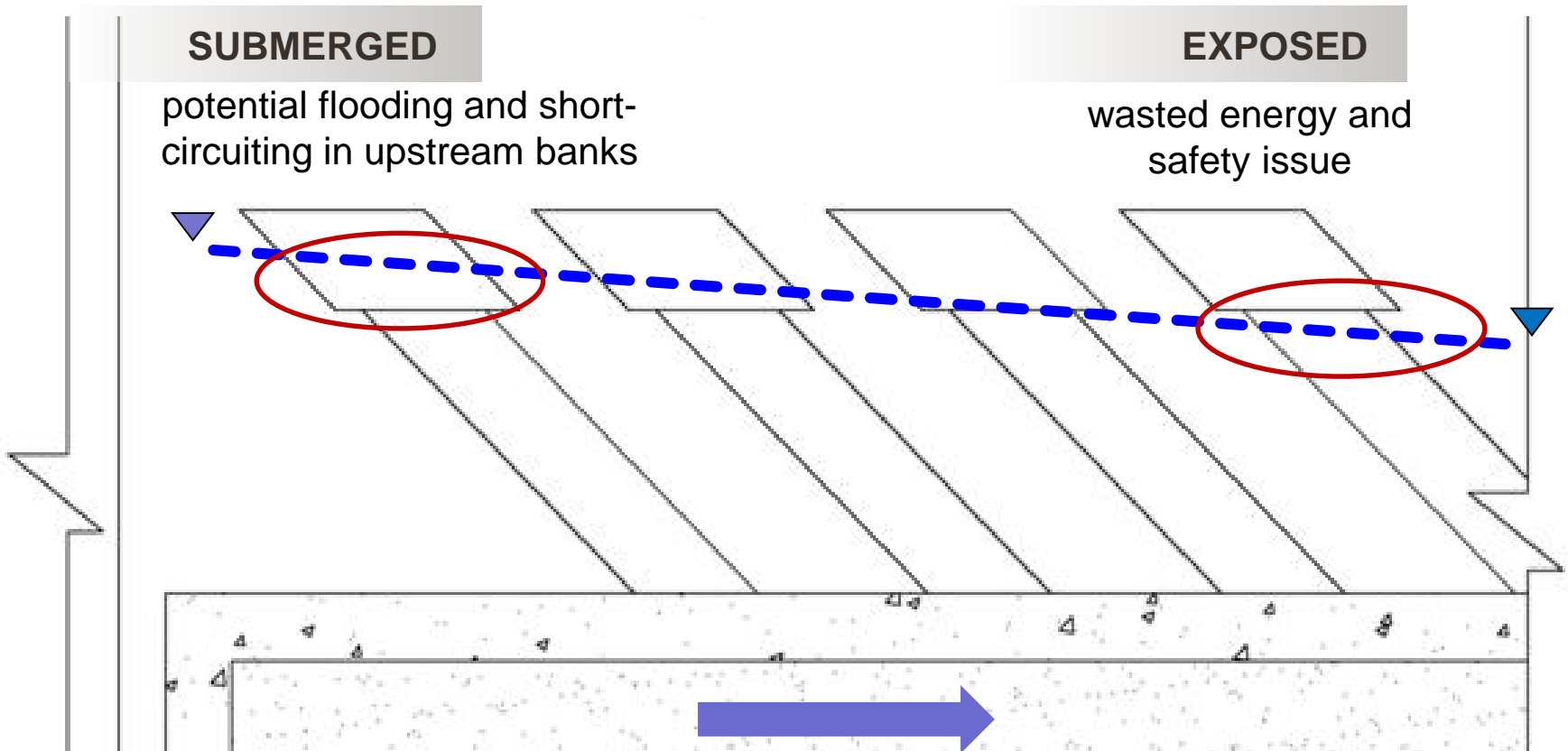
SIMPLE, ACCURATE WATER LEVEL CONTROL



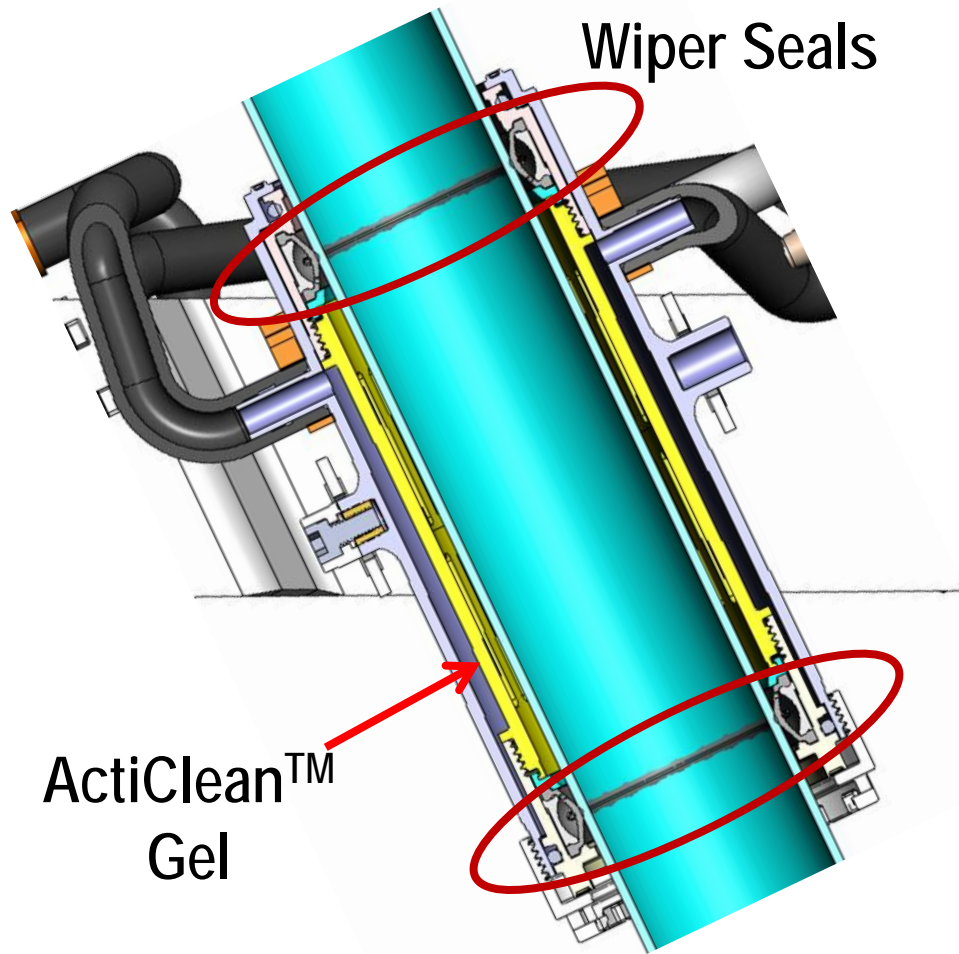
- Paired with simple fixed weir ensures lamps are always submerged
- All effluent forced by the lamps (no short-circuiting above lamps)
- Quartz sleeve fouling reduced (no UV exposure to air)
- Disinfection is insensitive to water level changes

HEADLOSS – AN OPEN REACTOR PROBLEM

- Headloss can result in simultaneously **submerged** and **exposed** components
- Each TrojanUVSigna bank is a **closed reactor**



LAMP AND SENSOR SLEEVE CLEANING



MAINTENANCE MADE EASY WITH ARM



- Hydraulic lifting device on each bank
- Push-button activation
- No crane or channel entry required
- Bank inspection, cleaning, sleeve removal are simple, safe and easy
- No submerged lifting components or tracks located in effluent
- For 2-row banks, integrated bank lifting device is optional

4-row bank with 3 rows populated

TROJANUVSIGNA INSTALLATIONS



AUBURN, AL 34 MGD (129 MLD)



LITTLE BLUE VALLEY, MO 150 MGD (567 MLD)



CHICAGO, IL (Terrence J. O'Brien WRP)

Municipality's Goal:

- Add disinfection process prior to discharge to North Shore Channel
- Provide an environmentally-sustainable solution w. optimized O&M and accelerated schedule (operational by 2016)

Design Parameters:

- 2006 MLD peak, 908 ADF
- 65% UVT, 206 e.coli / 100ml limit
- 7 UV channels, 2 banks / channel
- 896 lamps in total
- New building constructed



Source: Progress Illinois

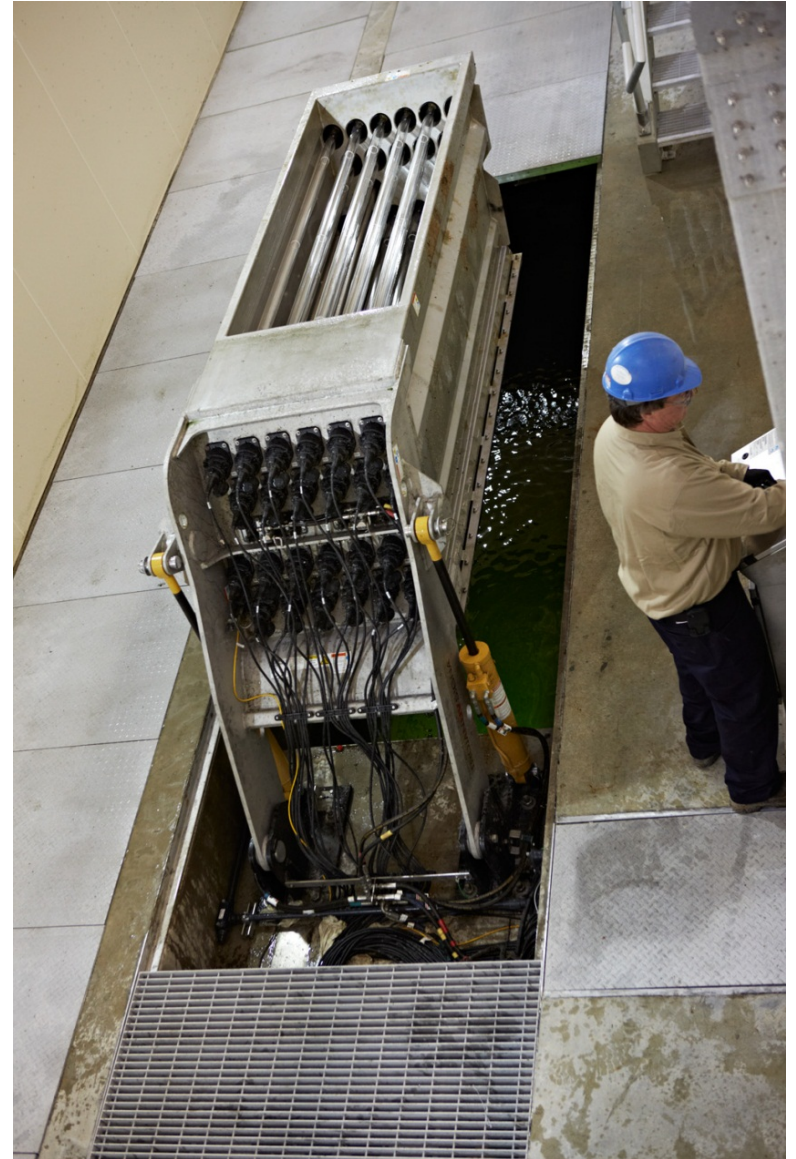




CHLORINE CONTACT TANK RETROFIT



SOUTH MILWAUKEE, WI 30 MGD (113 MLD)



POWER DISTRIBUTION FOR 113 MLD SYSTEM



OUTDOOR INSTALLATION



SUMMARY

- TrojanUVSigna offers unique benefits:
 1. Lowest lamp count → lower maintenance & cost
 2. Simple & reliable water level management
 3. Unique chemical & mechanical cleaning
 4. Flexible design options for new channels or retrofit
 5. Performance Guarantee for the Life of the System
- Trojan offers:
 - Over 35 years experience in UV water solutions
 - Knowledge & experience from over 8,000 municipal installations
 - Continuous innovation to leverage latest technologies
 - Local service & support to ensure successful long term operation

DISCUSSION & QUESTIONS



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THANK YOU