

APPENDIX C

UV EQUIPMENT TECHNICAL INFORMATION



UV4000™ PLUS PROPOSAL

January 14, 2008

PETERSON & MATZ, INC.
2250 Point Boulevard
Suite 300
Elgin, IL 60123
USA

Attention: Chuck Hansen
Reference: Metro WRD - Northside Plant, IL
Quote No: EAG1520E

In response to your request, we are pleased to provide the following **Trojan System UV4000™ Plus** proposal for the **Metro WRD - Northside Plant** project. Since Trojan introduced the open channel approach to disinfection in 1982, many municipalities have selected ultraviolet as the preferred method for pathogen destruction at their facilities.

The **Trojan System UV4000™ Plus** utilizes medium pressure lamp design, which requires a significantly lower number of lamps as well as reduced total space for installation. All of Trojan's UV systems are modular in design, with each design system customized in response to the effluent criteria. The lamps are oriented in a horizontal configuration parallel to the flow and incorporate a fully automated mechanical/chemical cleaning system that eliminates the need for manual sleeve cleaning. In addition, the Trojan System UV4000™ Plus utilizes a variable output power supply so that power draw is optimized based on continuous effluent monitoring.

Please review carefully our design criteria for peak flow rate, total suspended solids, disinfection limit, and UV transmittance to ensure that the criteria used match actual project parameters. When detailed project design commences, please contact our office for a review of all design parameters, including dimensions and equipment requirements. In addition, Trojan is able to provide analytical services to quantify effluent quality and confirm design criteria.

Trojan's price for the attached design is **\$8,990,557** (in US\$). This quoted price includes the equipment as described, freight to site and start-up by qualified personnel. This quote **excludes** any taxes that may be applicable. The above information is to be used for budget estimates only and is valid for 90 days from this date.

Please do not hesitate to call me if you have any questions or would like additional information. Thank you for the opportunity to quote the **Trojan System UV4000™ Plus** on this project.

With best regards,
Trojan Technologies Inc.

Stephen Payler
Municipal Applications
Encl.



DESIGN CRITERIA

Current Peak Design Flow: **450 US_MGD**
Future Peak Design Flow: **450 US_MGD**
UV Transmission: **65 %, minimum**
Total Suspended Solids: **15 mg/l (Maximum; grab samples)**
Max Average Particle Size: **30 microns**
Disinfection Limit: **400 fecal coliform per 100 ml, based on a 1 day maximum of consecutive daily grab samples**
Design Dose: **40,000 µWs/cm² EPA Dose**

DESIGN SUMMARY

Based on the above design criteria, the Trojan System UV4000™Plus proposed consists of:

Number of Channels: **5**
Number of Reactors per Channel: **1**
Number of Banks per Reactor: **2**
Number of Modules per Bank: **7**
Total Number of UV Lamps: **1680 (168 per bank)**
Number of Power Distribution Centers: **10**
Number of System Control Centers: **1**
Type of Level Controller: **Motorized Weir Gate (By Others)**
Automatic Mechanical/Chemical Cleaning: **Included**
UV Module Lifting Device: **Included**

EFFLUENT CHANNEL DIMENSIONS

L = Minimum length required for flow equalization: **40.5 ft**
W = Channel width based on number of UV modules: **106 in**
D = Maximum depth required for UV Module access: **172 in**

Dimensions are given for reference only. Consult Trojan Technologies for overall system detailed dimensions.

ELECTRICAL REQUIREMENTS

1. The UV System Control Center requires an electrical service of one (1) 120 Volt, 1 phase, 2 wire (plus ground), 16.7 Amps.
2. Each Power Distribution Center requires an electrical service of one (1) 277/480 Volt, 3 phase, 4 wire (plus ground), 569 kVA.
3. Each UV Reactor has one (1) Hydraulic Systems Center and requires an electrical services of one (1) 120 Volt, 1 phase, 2 wire (plus ground), 50 Amps.

NOTES

1. UV Disinfection Equipment specification is available upon request.
2. If there are site-specific hydraulic constraints that must be applied, please consult the manufacturer's representative to ensure compatibility with the proposed system.
3. Standard spare parts and safety equipment are included with this proposal.
4. Electrical disconnects required as per local state code are not included in this proposal.
5. Trojan Technologies Inc. warrants all components of the system (excluding UV lamps) against faulty workmanship and materials for a period of 12 months from date of start-up or 18 months after shipment, which ever occurs first.
6. Payment Terms: 10% after approved submittal, 80% upon delivery of equipment to site, 10% after equipment acceptance.

OPERATING COSTS FOR TROJAN SYSTEM UV4000™Plus

Design Criteria

Average Flow:	333 US_MGD
Yearly Usage:	5880 hours
UV Transmission:	65%

Power Requirements

Total Power Draw:	5376 kW
Average Power Draw:	3,182 kW
Annual Operating Hours:	5880 hours
Cost per kW Hour:	\$0.05
Annual Power Cost:	\$935,508

Replacement Lamp Costs

Number of lamps replaced per year:	1001
Price per lamp:	\$215
Annual Lamp Replacement Cost:	\$215,215

Total Annual Operation and Maintenance Costs are: \$1,150,723

NOTES

1. O&M costs are based on system flow-pacing using a 4-20 mA signal from a flow meter (supplied by others).
2. O&M costs are based on the system operating at the average flow conditions.



UV4000™PLUS PROPOSAL

January 14, 2008

PETERSON & MATZ, INC.
2250 Point Boulevard
Suite 300
Elgin, IL 60123
USA

Attention: Chuck Hansen
Reference: Metro WRD - Calumet Plant, IL
Quote No: EAG1534F

In response to your request, we are pleased to provide the following Trojan System UV4000™Plus proposal for the Metro WRD - Calumet Plant project. Since Trojan introduced the open channel approach to disinfection in 1982, many municipalities have selected ultraviolet as the preferred method for pathogen destruction at their facilities.

The Trojan System UV4000™Plus utilizes medium pressure lamp design, which requires a significantly lower number of lamps as well as reduced total space for installation. All of Trojan's UV systems are modular in design, with each design system customized in response to the effluent criteria. The lamps are oriented in a horizontal configuration parallel to the flow and incorporate a fully automated mechanical/chemical cleaning system that eliminates the need for manual sleeve cleaning. In addition, the Trojan System UV4000™Plus utilizes a variable output power supply so that power draw is optimized based on continuous effluent monitoring.

Please review carefully our design criteria for peak flow rate, total suspended solids, disinfection limit, and UV transmittance to ensure that the criteria used match actual project parameters. When detailed project design commences, please contact our office for a review of all design parameters, including dimensions and equipment requirements. In addition, Trojan is able to provide analytical services to quantify effluent quality and confirm design criteria.

Trojan's price for the attached design is \$8,990,557 (in US\$). This quoted price includes the equipment as described, freight to site and start-up by qualified personnel. This quote **excludes** any taxes that may be applicable. The above information is to be used for budget estimates only and is valid for 90 days from this date.

Please do not hesitate to call me if you have any questions or would like additional information. Thank you for the opportunity to quote the Trojan System UV4000™Plus on this project.

With best regards,
Trojan Technologies Inc.

Stephen Payler
Stephen Payler
Municipal Applications
Encl.



DESIGN CRITERIA

Current Peak Design Flow: 480 US_MGD
Future Peak Design Flow: 480 US_MGD
UV Transmission: 65 %, minimum
Total Suspended Solids: 15 mg/l (Maximum; grab samples)
Max Average Particle Size: 30 microns
Disinfection Limit: 400 fecal coliform per 100 ml, based on a 1 day maximum of consecutive daily grab samples
Design Dose: 40,000 µWs/cm² EPA Dose

DESIGN SUMMARY

Based on the above design criteria, the Trojan System UV4000™Plus proposed consists of:

Number of Channels: 5
Number of Reactors per Channel: 1
Number of Banks per Reactor: 2
Number of Modules per Bank: 7
Total Number of UV Lamps: 1680 (168 per bank)
Number of Power Distribution Centers: 10
Number of System Control Centers: 1
Type of Level Controller: Motorized Weir Gate (By Others)
Automatic Mechanical/Chemical Cleaning: Included
UV Module Lifting Device: Included

EFFLUENT CHANNEL DIMENSIONS

L = Minimum length required for flow equalization: 40.5 ft
W = Channel width based on number of UV modules: 106 in
D = Maximum depth required for UV Module access: 172 in

Dimensions are given for reference only. Consult Trojan Technologies for overall system detailed dimensions.

ELECTRICAL REQUIREMENTS

1. The UV System Control Center requires an electrical service of one (1) 120 Volt, 1 phase, 2 wire (plus ground), 16.7 Amps.
2. Each Power Distribution Center requires an electrical service of one (1) 277/480 Volt, 3 phase, 4 wire (plus ground), 569 kVA.
3. Each UV Reactor has one (1) Hydraulic Systems Center and requires an electrical services of one (1) 120 Volt, 1 phase, 2 wire (plus ground), 50 Amps.

NOTES

1. UV Disinfection Equipment specification is available upon request.
2. If there are site-specific hydraulic constraints that must be applied, please consult the manufacturer's representative to ensure compatibility with the proposed system.
3. Standard spare parts and safety equipment are included with this proposal.
4. Electrical disconnects required as per local state code are not included in this proposal.
5. Trojan Technologies Inc. warrants all components of the system (excluding UV lamps) against faulty workmanship and materials for a period of 12 months from date of start-up or 18 months after shipment, whichever occurs first.
6. Payment Terms: 10% after approved submittal, 80% upon delivery of equipment to site, 10% after equipment acceptance.

OPERATING COSTS FOR TROJAN SYSTEM UV4000™Plus

Design Criteria

Average Flow:	305 US_MGD
Yearly Usage:	5880 hours
UV Transmission:	65%

Power Requirements

Total Power Draw:	5376 kW
Average Power Draw:	2903.04 kW
Annual Operating Hours:	5880 hours
Cost per kW Hour:	\$0.05
Annual Power Cost:	\$853,493.76

Replacement Lamp Costs

Number of lamps replaced per year:	847
Price per lamp:	\$215
Annual Lamp Replacement Cost:	\$182,105

Total Annual Operation and Maintenance Costs are: \$1,035,598.76

NOTES

1. O&M costs are based on system flow-pacing using a 4-20 mA signal from a flow meter (supplied by others).
2. O&M costs are based on the system operating at the average flow conditions.

WASTEWATER DISINFECTION





Proven UV Solutions for Low Quality Effluent & Large Flows

Selected for some of the world's largest & most challenging treatment applications

Trojan Technologies Inc. is an ISO 9001: 2000 registered company that has set the standard for proven UV technology and ongoing innovation for more than 25 years. With unmatched scientific and technical expertise, and a global network of water treatment specialists, representatives and technicians, Trojan is trusted more than any other firm as the best choice for municipal UV solutions. Trojan has the largest UV installation base – over 4,000 municipal installations worldwide. In North America alone, almost one in five wastewater

treatment plants rely on our proven, chemical-free disinfection solutions.

The TrojanUV4000Plus™ is one of the reasons why. This robust, high capacity system introduced the benefits of high intensity, medium-pressure lamp technology to wastewater treatment. It also redefined sleeve cleaning technology with Trojan's patented, dual-action, chemical/mechanical ActiClean™ system. With over 375 installations – including some of the largest wastewater treatment plants in the world – the TrojanUV4000Plus™ is allowing engineers and operators to

incorporate chemical-free, UV disinfection for large flows of 10 MGD (1,578 m³/hr) and greater in a minimal amount of space – with a fraction of the number of lamps required by low-pressure systems. The extremely compact system can be used for low UV transmittance applications previously unattainable with ultraviolet technology. It also offers the flexibility to treat a wide range of wastewater; from primary, secondary and blended effluents to combined and sanitary sewer overflows to water for reuse applications.

TROJAN UV4000PLUS™

Providing high volume treatment effectively and reliably

System Control Center (SCC)



Continuously monitors and controls all UV functions and dose pacing. It incorporates a PLC and menu-driven, touch-screen interface for at-a-glance confirmation of system parameters, performance, and simple control of all system functions. The dose pacing program conserves power and extends lamp life by varying lamp intensity and controlling bank on/off status according to flow and water quality parameters. The SCC features discrete outputs and/or serial communication links to the plant SCADA system for full remote monitoring.

Submerged Effluent Reactor

All effluent in the channel flows by gravity through the fully submerged, open-ended reactor, where the effluent is exposed to high intensity UV light. The innovative, submerged design and contoured reactor interior ensures stringent control of the water layer around the lamps for consistent disinfection regardless of flow rate. Modules with UV lamps pivot into the reactor opening at both ends.

UV Intensity Sensor

Each bank of UV modules incorporates a UV intensity sensor that continually monitors UV lamp output.

Module Removal Mechanism (MRM)

The MRM lifts modules out of the channel to an optimal working height for maintenance. The device uses a reversible electric winch housed in a weather-proof, stainless steel case. The integrated safety hook allows multiple hook-up points for holding modules at different positions for maximum service convenience.

Power Distribution Center (PDC)

The PDC provides power to each bank of modules and monitors data from the module (including UV intensity signals), cleaning system control and status, hydraulic systems, and effluent level signals. PDCs are housed in TYPE 4X rated, stainless steel enclosures mounted directly on the system above the channel.

Electronic Ballast

High-efficiency, variable-output (30% - 100% power) electronic ballasts regulate the power to the UV lamps. The variable-output design permits the plant to dose pace based on flow rate and water quality. Ballasts (one per lamp) are inside the modules, and housed in weather-resistant, TYPE 6P rated enclosures. An integrated cooling system is contained within the ballast enclosure, eliminating the requirement for air conditioning and allows for the entire system to be installed outdoors.

UV Modules

UV lamps are mounted on stainless steel modules that are submerged in the effluent channel. The lamps are enclosed in quartz sleeves, positioned horizontally and parallel to the water flow. Modules consist of multiple lamps and are mounted in parallel to form a bank. Ballasts are mounted inside the modules, and all ballast and lamp wiring runs inside the stainless steel module frame to protect it from exposure to UV light and effluent.

Water Level Control

Water level in the UV channel can be controlled using either a motorized weir gate or a fixed weir located downstream of the reactor. Trojan's engineering staff will assist to design and select the most appropriate device based on hydraulic and site-specific considerations.

ActiClean™ Cleaning System

A chemical/mechanical cleaning system prevents fouling of the UV lamp sleeves. Hydraulically driven wiper collars filled with ActiClean™ gel surround the quartz sleeves. The gel is comprised of a non-corrosive, operator-friendly cleaning chemical that contacts the sleeves between the collar's two rubber wiper seals. Cleaning can be programmed to occur at preset intervals, and takes place online while the lamps are submerged and operating.

Key Benefits

TrojanUV4000Plus™

Increased operator, community and environmental safety. Uses environmentally-friendly ultraviolet light – the safest alternative for wastewater disinfection. No disinfection by-products are created, and no chlorine compounds must be transported, stored or handled.

Ideal for challenging wastewater applications. Treats a wide range of wastewater flows, including effluents with UV transmittance as low as 15%, combined & sanitary sewer overflows, and water for reuse applications.

Proven, regulatory-endorsed disinfection based on actual dose delivery testing (bioassay validation), and over 375 installations worldwide. Verified field performance data eliminates the sizing assumptions of theoretical dose calculations.

Reduced installation costs. Easily retrofitted into existing chlorine contact chambers, leaving the majority of the chamber available for storage, by-pass or emergency back-up – eliminating the expense and footprint associated with the construction of new structures.

Operator-friendly maintenance. Features significantly fewer lamps, modules that are electrically separate, and an integrated power winch to remove modules from the channel to a convenient working height.

Dual-action sleeve cleaning system improves performance and reduces labor costs. Unsurpassed chemical/mechanical cleaning system maintains maximum sleeve transmittance, and works online while disinfecting.

Optimized for efficient operation. Uses a fraction of the number of lamps required by conventional low-pressure systems, and features high efficiency, variable-output electronic ballasts and dose pacing to minimize power consumption.

Guaranteed performance and comprehensive warranty. Trojan systems include a Lifetime Disinfection Performance Guarantee. Ask for details.

Designed for Challenging & Large Scale Applications

System provides effective treatment of very low UVT effluent and large flows

Benefits:

- Use of high intensity lamps and chemical/mechanical sleeve cleaning overcomes operational limitations of low-pressure systems for low quality wastewater and large scale applications
- Capable of treating wastewater effluents with UV transmittance levels as low as 15% – eliminating the drawbacks and dangers of chemical disinfection
- Compact system designed for treatment of large wastewater flows of 10 MGD and greater
- Requires only 2.5 lamps per 1 MGD of secondary effluent
- Configurable in multiple channels, with single or multiple banks per channel, for optimal sizing based on upstream treatment processes & effluent quality

TrojanUV4000Plus™ Treatment Capabilities	
Disinfection Application	Capability
Primary Wastewater Effluent	Yes
Blended Wastewater Effluent	Yes
Secondary Wastewater Effluent	Yes
Fixed Film Processes	Yes
Tertiary Wastewater Effluent	Yes
Water Reuse Applications	Yes
Combined Sewer Overflows (CSO)	Yes
Sanitary Sewer Overflows (SSO)	Yes
Storm Sewer Overflows	Yes



The TrojanUV4000Plus™ has been optimized for disinfection of low quality wastewater using high intensity lamps, and vortex mixers (left) to increase flow turbulence around the lamps. Trojan's UV technology allowed the City of Honolulu, Hawaii to disinfect primary effluent at their Sand Island treatment facility (right), and thereby save hundreds of millions of dollars that would have been required to build secondary treatment facilities.

High Intensity UV Lamps

Medium-pressure lamp technology reduces number of lamps significantly

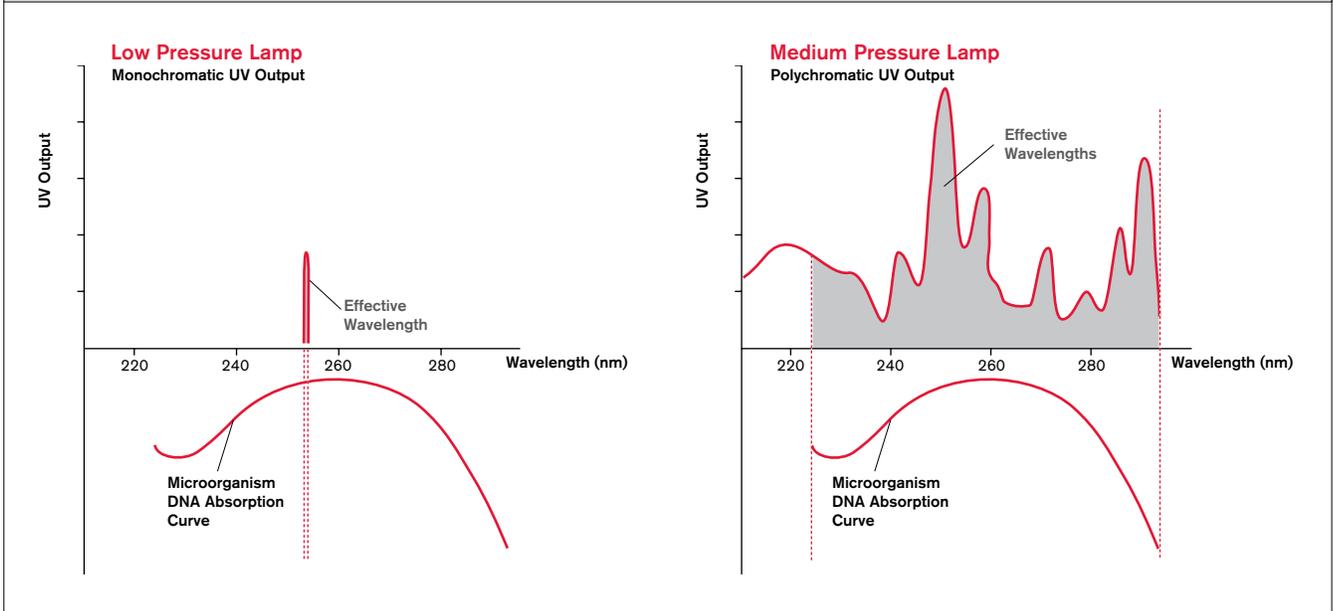
Benefits:

- High intensity, medium-pressure lamps produce significantly more UV energy than low-pressure lamps
- Reduced number of lamps – the TrojanUV4000Plus™ uses a fraction of the lamps required by conventional low-pressure UV systems
- Medium-pressure lamps are polychromatic, and produce a broad range of wavelengths – the majority of which are effective against microorganisms (see below)
- Fewer lamps allow the system to be located in compact spaces, reducing installation costs
- Minimize number of related components (sleeves, seals, wipers, ballasts, etc.), reducing O&M costs



Trojan pioneered the use of high intensity, medium-pressure ultraviolet lamps for wastewater disinfection. The technology minimizes the system footprint, and offers the capability of treating high flow rates, and low quality effluents with UVT levels as low as 15%.

Comparison of Low-Pressure and Medium-Pressure Lamp Technologies



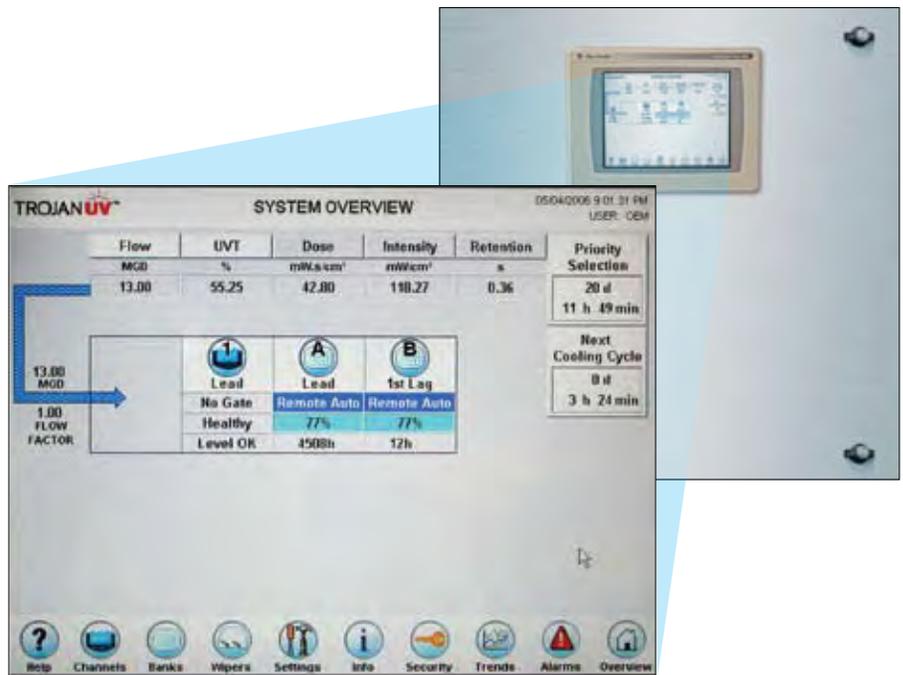
The intensity and breadth of UV wavelengths delivered by medium-pressure lamps are significantly greater than low-pressure lamps. A larger portion of the ultraviolet light that medium-pressure lamps emit is absorbed by the DNA of microorganisms, which results in effective disinfection with fewer lamps.

User-Friendly Controls & Operation

Intuitive, touch-screen controller allows at-a-glance system monitoring and control

Benefits:

- PLC-based system monitors and controls all UV functions via an operator-friendly, touch-screen display on the System Control Center (SCC)
- Menu-driven interface simplifies access to all system functions, set points, and alarm reporting for fast accurate diagnostics of process or maintenance issues
- Automated dose delivery is based on lamp age, and other water parameters from optional sensors, including flow rate, UV transmittance, turbidity, etc.
- Discrete outputs and/or serial communication links to the plant SCADA system enable full remote monitoring



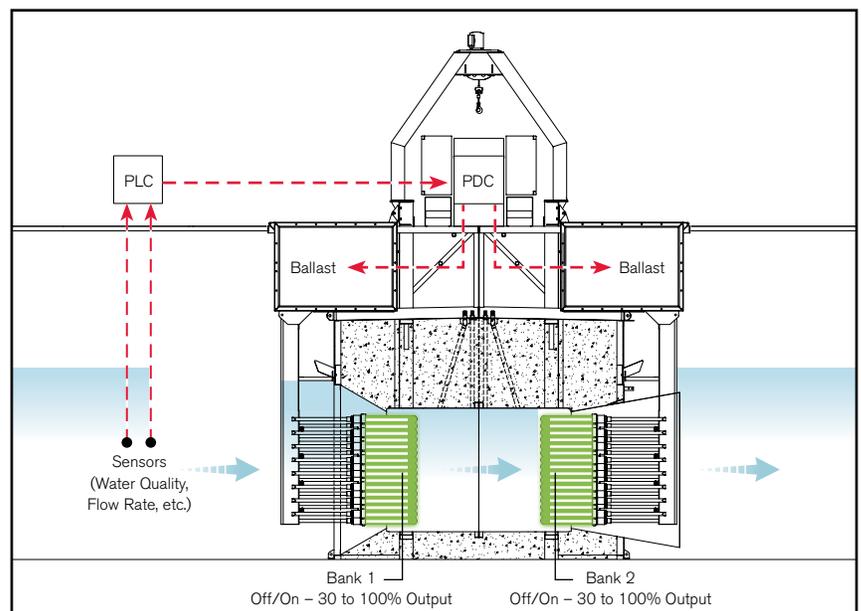
The PLC-based controller combines sophisticated system operation and reporting with an operator-friendly, touch-screen display.

Dose Pacing Reduces O&M Costs

System accurately matches UV output to disinfection requirements

Benefits:

- High efficiency ballasts vary output from 30 – 100% per bank in order to match UV dose with effluent quality and flow rate
- UV lamps are “dimmed” to optimize UV dose, and banks can be turned off during periods of no or low flow
- Multiple sensor inputs allow maximum efficiency so disinfection requirements are fully met using the minimum amount of power
- Dose pacing increases the operating life of UV lamps, thereby reducing the frequency, expense and labor required for lamp replacement



The dose pacing system of the TrojanUV4000Plus™ uses a PLC-based controller that monitors lamp age and water quality (e.g. flow rate, UVT, turbidity) and adjusts lamp output to ensure full disinfection is achieved using minimal power.

Design Flexibility Reduces Installation Costs

Compact system minimizes footprint and allows easy retrofit into existing facilities

Benefits:

- High intensity, medium-pressure lamps and unparalleled sleeve cleaning allow maximum disinfection in minimal space – over 100 MGD (15,780 m³/hr) in a single effluent channel
- Requires only 1/8th to 1/15th the amount of space of chlorine disinfection, reducing construction and capital costs substantially
- System is designed for simplified retrofit into existing chlorine contact tank infrastructure, minimizing construction costs – and leaving the majority of the contact tank available for storage, by-pass or emergency back-up
- Electronic ballasts are inside the modules, eliminating the need for large ballast panels mounted beside the UV channel
- All system components can be installed outdoors



In this retrofit installation, each reactor was installed in one pass of the existing chlorine contact basin with only minor modifications to the channels. This allows the majority of the basin to be used for storage, by-pass or emergency back-up.



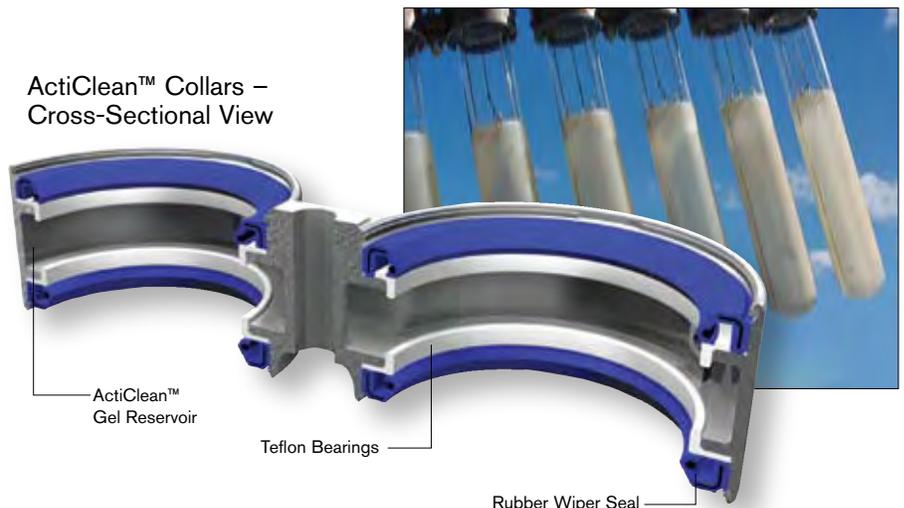
The eight TrojanUV4000Plus™ reactors used to disinfect 600 MGD (94,680 m³/hr) at this large wastewater treatment facility require a footprint measuring only 80' x 120' (24 x 36 m) – a fraction of the space needed for chlorine disinfection.

Unsurpassed Chemical/Mechanical Sleeve Cleaning

ActiClean™ dual-action cleaning system eliminates fouling and reduces maintenance costs

Benefits:

- Unsurpassed chemical/mechanical cleaning system ensures optimal sleeve transmittance so maximum UV energy is delivered to the effluent
- Cleans automatically at preset intervals without disrupting disinfection, thereby reducing downtime and O&M costs of manual cleaning



Operator Comments About the TrojanUV4000Plus™

"It does the job and it's simple to operate."

"It's user-friendly and low maintenance."

"We're getting a better kill than we expected. We've always dealt with chlorine and sulphur dioxide, but this does every bit as well. It doesn't seem to need as much maintenance – there's no dangerous chemicals, and it's cleaner."

System Specifications	
System Characteristics	TrojanUV4000Plus™
Typical Applications	10 MGD and greater; primary, secondary, blended, and tertiary wastewater, CSO, SSO, and water reuse applications
Lamp Type	Medium-pressure, polychromatic UV output
Ballast Type	Electronic; variable-output (30 – 100%)
Input Power Per Lamp	3,200 Watts
Lamp Configuration	Horizontal, parallel to flow
Lamps Per Module	6 to 24
Modules Per Bank	2 to 7
Level Control Device Options	Fixed weir or motorized weir gate
Enclosure Ratings	
Module Ballast Enclosure	TYPE 6P (IP67)
All Other Enclosures	TYPE 4, 4X or 3R (IP56, IP65 or IP14)
Ballast Cooling Method	Closed loop system; no air conditioning or forced air required
Structural Materials	Wetted parts: 316 SST; Non-wetted parts: 304 SST
Maximum Ambient Temperature	122° F (50°C)
Sleeve Cleaning System	
ActiClean™ Cleaning System	Dual-action; chemical/mechanical; programmable for automated cleaning at defined intervals; manual override
ActiClean™ Cleaning Gel	Non-corrosive, operator-friendly
System Control Center	
Controller	Various PLC options; Ask your Trojan Representative for details
UV Intensity Monitoring	1 sensor per bank
Inputs Required / Optional	4-20 mA flow signal / 4-20 mA UVT signal
Typical Outputs Provided	Bank status, common alarms and SCADA communication
Maximum Distance from UV Channel	500 ft. (152 m)
Electrical Requirements	
Power Distribution Centers	50/60 Hz, 277/480V, 3 phase, 4 wire + ground or 50/60 Hz, 230/400V, 3 phase, 4 wire + ground
Hydraulic System Center	50/60 Hz, 120V, single phase, 2 wire + ground or 50/60 Hz, 230V, single phase, 2 wire + ground
System Control Center	50/60 Hz, 120V, single phase, 2 wire + ground or 50/60 Hz, 230V, single phase, 2 wire + ground

Find out how your wastewater treatment plant can benefit from the TrojanUV4000Plus™ – call us today.

Head Office (Canada)

3020 Gore Road
 London, Ontario
 Canada N5V 4T7
 Telephone: (519) 457-3400
 Fax: (519) 457-3030

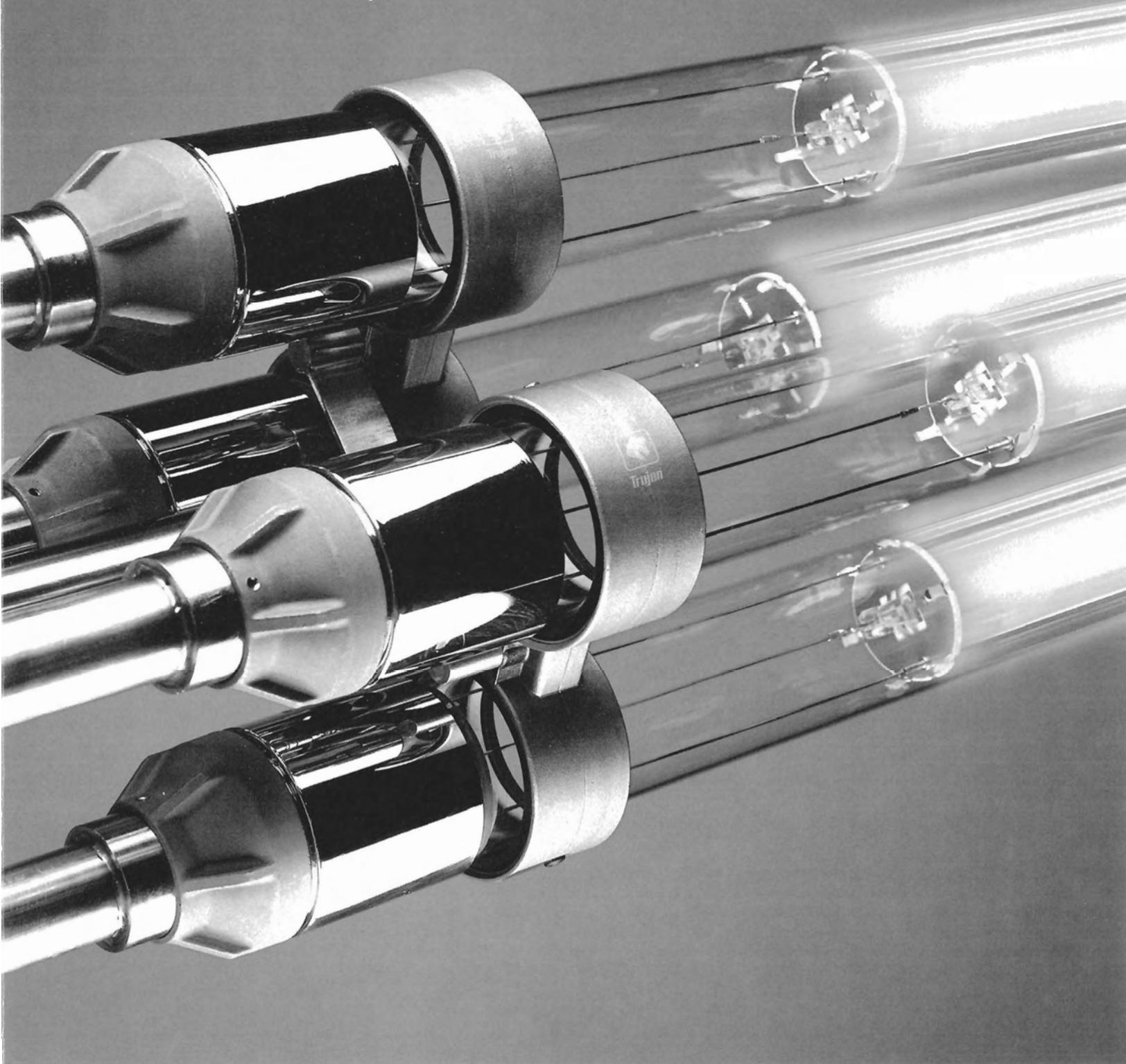
Trojan UV Technologies UK Limited (UK): +44 1905 77 11 17
 Trojan Technologies Inc (The Netherlands): +31 70 391 3020
 Trojan Technologies Inc (France): +33 1 6081 0516
 Trojan Technologies Espana (Spain): +34 91 564 5757
 Trojan Technologies Deutschland GmbH (Germany): +49 6024 634 75 80
 Hach/Trojan Technologies Inc. (China): 86-10-65150290

www.trojanuv.com

Products in this brochure may be covered by one or more of the following patents:
 U.S. 5,418,370; RE 36,896; 6,342,188; 6,635,613; 6,663,318; 6,719,491; 6,984,834; 7,018,975
 Can. 2,117,040; 2,239,925; 2,286,309
 Other patents pending.

World Leader in UV Disinfection Systems

Electronic Filing - Received, Clerk's Office, October 20, 2008



TROJAN  UV4000TM PLUS



Trojan Technologies

Trojan UV4000™ Plus

The first choice for cost-effective UV wastewater disinfection – featuring Trojan's unique compact design and automated chemical and mechanical self-cleaning technology

More than 3,000 Trojan Technologies ultraviolet (UV) light wastewater disinfection systems operate in municipalities around the world. Commercially pioneered by Trojan in 1982, UV disinfection offers a chemical-free, cost-effective, and environmentally safe alternative to chlorine-based systems for treating effluents, reclaimed water, combined sewer overflows and storm water.

Technological advances in the Trojan UV4000™ Plus

UV4000™ Plus builds on the features and advantages of earlier generation Trojan UV systems. Installed in an open channel, UV4000™ Plus UV lamps are mounted horizontally and parallel to the flow. This design optimizes hydraulics, inducing turbulence and dispersion, and ensures that wastewater is properly

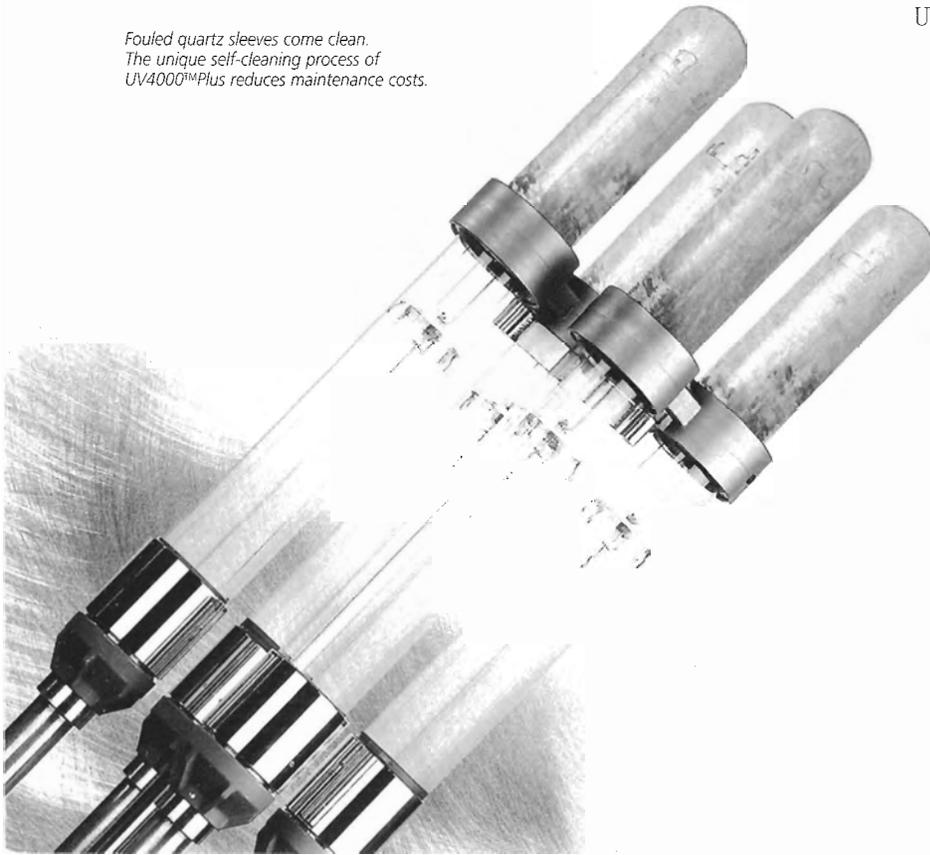
exposed to the UV output for the required duration. Gravity flow carries wastewater through the system, eliminating the need for pressurized vessels, piping, and pumps. Multiple banks of UV lamps can be placed in series in each UV channel. Typical installations use two banks in series for most standard applications and multiple banks in series for wastewater reclamation projects.

Medium-pressure, high-intensity UV lamps

The incorporation of medium-pressure, high-intensity UV lamps reduces the number of lamps required by 90 per cent, lessening space requirements and decreasing installation and maintenance costs.

The UV lamp array is positioned within the UV reactor providing a controlled water layer geometry at all flows. The unique design of the UV reactor eliminates the potential for short-circuiting of flow that could result in performance failure. High-intensity lamps also extend the applicability of UV disinfection to poorer quality effluents.

*Fouled quartz sleeves come clean.
The unique self-cleaning process of
UV4000™ Plus reduces maintenance costs.*



Trojan System UV4000™Plus Latest Advancements

Better By Design...

- Medium-pressure, variable output high-intensity lamps
- ActiClean™ fully automated chemical mechanical cleaning
- Improved reactor hydraulics
- Improved ballast cooling
- Improved wiper design
- Reduced number of hydraulic lines and connections
- Simplified module removal mechanism



Variable lamp output improves disinfection control

The output of UV4000™Plus high-intensity lamps can be varied as effluent quality and flow rates change. Matching lamp output to actual wastewater conditions conserves energy, prolongs lamp life, reduces operating costs, and ensures that an adequate dose is delivered regardless of the effluent quality and flow rate.

This process is fully automated using Trojan's On-line UV Transmission Monitor, which tracks changes in effluent quality. In conjunction with a flow signal, the effluent quality data is used to automatically adjust lamp output to maintain disinfection standards. Lamp life is extended and operating costs are reduced.

The Trojan Difference

- ActiClean™ fully automated chemical and mechanical self-cleaning technology cuts labor costs
- High-intensity lamps reduce total lamp requirements by 90 per cent; reduces operational costs
- Variable output ballasts allow UV output to be tailored to meet wastewater and flow conditions
- Open-channel, gravity flow configuration eliminates need for pressurized vessels, piping, and pumps
- Environmentally safe – no chlorine required; and no disinfection by-products created
- Dedicated regional field service staff ready to meet your needs
- In-house call center technicians available through 1-800 line
- Significant annual commitment to Research and Development for innovations such as: on-line chemical and mechanical cleaning; lamp and ballast testing laboratory; microbiology services; and reactor design and optimization



ActiClean™ automated chemical and mechanical self-cleaning technology

Effluents will eventually coat the quartz sleeves that house the UV lamps, reducing their effectiveness and increasing their energy consumption. To offer an alternative to costly and time-consuming manual cleaning, Trojan's scientists and engineers developed an automatic, self-cleaning system. With the UV4000™Plus the modules – while remaining in operation – are thoroughly cleaned by a combined chemical and mechanical self-cleaning system. Chemical cleaning has become the industry standard way to remove scaled deposits that accumulate on the quartz sleeve over time. In fact, the US EPA Design Manual on Municipal Wastewater Disinfection, when discussing design considerations for effective maintenance, explains that “periodic chemical and/or detergent cleaning will be required to maintain the outer quartz.” (EPA/625/1-86/02, p. 237)

Trojan's sealed cleaning mechanism uses a small amount of solution to remove deposits on the quartz sleeves more effectively than mechanical cleaning alone can do. Cleaning cycles are activated by a timer and are programmed to clean modules sequentially within each operating bank.

The fully automated cleaning cycle is programmed for each installation and is set to operate as frequently as once an hour, depending on the rate of fouling. Plants that previously could not use conventional UV reactors because poor effluent quality led to rapid lamp fouling (e.g., primary effluent, CSOs) can now take full advantage of the economic, environmental, and safe benefits of ultraviolet light with UV4000™Plus.

Ease of Maintenance

The self-cleaning technology of UV4000™Plus allows the UV lamp modules to remain submerged in the channel until the lamps need

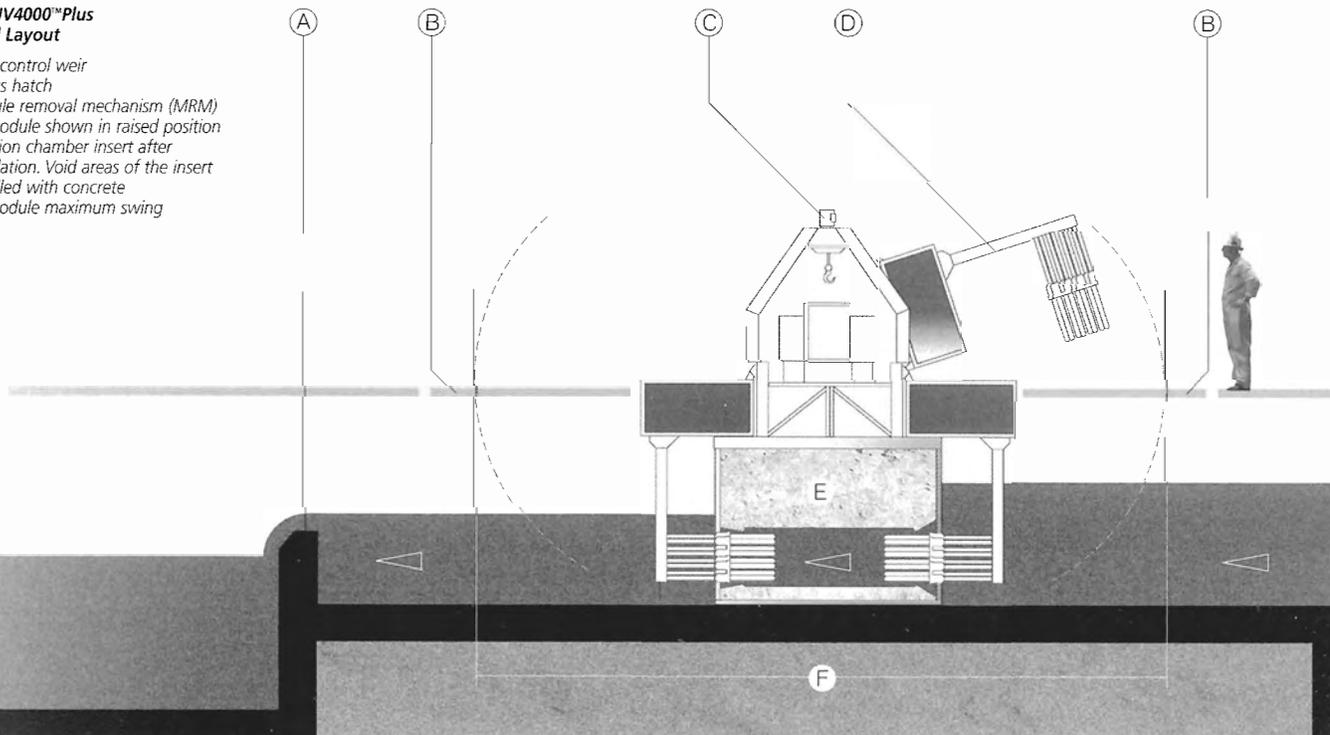
replacing. When lamps need to be replaced, modules are lifted out of the channel by the Module Removal Mechanism (MRM). Using a reversible electric winch, the MRM raises lamp modules from the channel to a convenient working height. One person can replace single or multiple lamps in minutes.

General layout requirements

As with every Trojan UV System, the sizing of UV4000™Plus in a particular application will depend on the effluent quality and flow rates, level of disinfection required, and the degree of equipment redundancy needed (for wastewater reclamation applications). Please contact Trojan's local representative for more information regarding the UV4000™Plus or any of Trojan's products or services.

Trojan UV4000™Plus Channel Layout

- A Level control weir
- B Access hatch
- C Module removal mechanism (MRM)
- D UV module shown in raised position
- E Reaction chamber insert after installation. Void areas of the insert are filled with concrete
- F UV module maximum swing

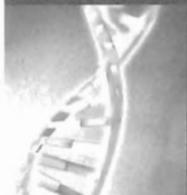


How does UV disinfection work?

Ultraviolet light disinfects wastewater by altering the genetic (DNA) material in cells so that bacteria, viruses, and other microorganisms can no longer reproduce. The UV light is produced by germicidal lamps submerged in an open channel. As wastewater flows past the UV lamps, microorganisms are exposed to a lethal dose of UV energy. The UV dose is a product of UV light intensity and exposure time.

PROTECTING THE ENVIRONMENT WITH UV DISINFECTION

Until recently, chlorine has been the disinfection treatment of choice. Today, however, an increasing number of governments have restricted the amount of chlorine residual that may be discharged into the environment. These restrictions have led to the adding of dechlorinating agents such as sulfur dioxide or sodium bisulfate. But this practice does not adequately protect the marine environment because chlorine combines with organic compounds in the wastewater to form known carcinogens that are not neutralized during the dechlorination process. UV disinfects without the formation of by-products, making UV a safe and cost-effective alternative to chemical-based disinfection.



Trojan Technologies: a pioneer and global innovator

For more than 25 years, Trojan Technologies has led the global improvement of water quality by continually refining its ultraviolet (UV) disinfection systems. Trojan innovations have set industry standards for treating both wastewater and drinking water. With the largest number of UV installations worldwide and an industry-leading research and



development team, Trojan offers municipal water utility operators and engineers unmatched technical insight and experience.

Trojan constantly reengineers its systems to incorporate state-of-the-art technology and offer customers new and improved features, benefits, and conveniences.

Quality products, quality people

Trojan's systems are ISO 9001 certified, an internationally recognized designation that reflects the high quality of Trojan's design, development, production, installation, and service.

Behind the company's products are the most experienced and knowledgeable professionals in the industry. Comprising internationally recognized experts in microbiology, chemistry, physics, and engineering, Trojan's research and development team creates many of today's most successful UV technology innovations.

Trust ... integrity ... teamwork ... respect for employees and customers ... and a strong sense of purpose – these are the underpinnings of Trojan's corporate culture.

By creating a positive work environment that both challenges and rewards employees, Trojan is able to meet its commitments of providing lasting solutions to environmental problems.

Support from the industry leader keeps your system up and running

Trojan's global presence mirrors a strong commitment to its customers and to its future. With offices in Canada, the US, Europe and the UK, Trojan is able to serve customers no matter where they are located. An extensive network of professional manufacturer's representatives expands the company's reach into South America, Europe, the Middle East, and the Pacific Rim, giving Trojan comprehensive global coverage.

Trojan is recognized for its exceptional customer service. The company's highly trained technicians are strategically located at Trojan support centers around the world. This extensive support network allows Trojan to respond quickly to customer calls – no matter what the time zone or location. And the company's state-of-the-art technical support center permits technicians to dial up and diagnose problems on-line, quickly and effectively.



Trojan Technologies

PETERSON and MATZ, INC.

2250 Point Boulevard - Suite 300
Elgin, IL 60123
(347) 844-4405 FAX (847) 844-4403

Canada (Head Office)

3020 Gore Road
London, Ontario
Canada N5V 4T7
Telephone: (519) 457-3400
Fax: (519) 457-3030

United States

1380 East Vocell Blvd.
Suite B, Davis, CA
USA 95616
Telephone: (530) 759-7600
Fax: (530) 759-7620

Europe

Laan van Vredestein 160
2552 DZ The Hague
Netherlands
Telephone: 31-70-391-3020
Fax: 31-70-391-3330

Scandinavia

NOKA AS
P.O. Box 165
3251 Larvik, Norway
Telephone: 47-3318-5710
Fax: 47-3318-5199

United Kingdom

5 De Salis Court
Hampton Lovett, Droitwich, Worcestershire
WR9 0QE England
Telephone: 44-1-905-771117
Fax: 44-1-905-772270

www.trojanuv.com

Trojan Technologies is a publicly traded company on the Toronto Stock Exchange under the symbol TUV.

Printed in Canada. Copyright ©2007 Trojan Technologies Inc., London, Ontario, Canada. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means without the written permission of Trojan Technologies Inc. OA-W-1165-5.2-8R-C-A0001-0402

Products in this brochure may be covered by one or more of the following patents:
Can. 1,163,083; Can. 2,117,060; Can. 2,239,925; Can. 1,327,877
U.S. 4,882,806; U.S. 5,418,370; U.S. 5,590,390; U.S. 4,872,360; U.S. 5,006,244
Other patents pending