

LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE

APPENDIX "A" – OFFER DOCUMENT

PROPOSAL NO. 146-23 LRPCP UV Disinfection Equipment Pre-Purchase

This Proposal is submitted by:

TROJAN TECHNOLOGIES GROUP ULC	
Proponent's Registered Legal Business Name	
3020 GORE RD. LONDON, ON N5V 4T7	
Mailing Address	
LONDON, ONTARIO N5V 4T7	
City, Province/State, Postal/Zip	
ROB JANSEN	rjansen@trojantechnologies.com
Proponent Contact Person	E-mail address
(519 ) 457-3400 ext. 2830	( 519 ) 457-3030
Telephone	Facsimile

1. **I, WE DECLARE** that no person, firm or Corporation other than the one whose signature or the signature of whose proper officers is or are attached above, has any interest in this Proposal or in the contract proposed to be taken.
2. **I, WE FURTHER DECLARE** that this Proposal is made without any connection, knowledge, comparison or figures or arrangements with any other Proponent, firm or person making a Proposal for the same services and is in all respects fair and without collusion or fraud.
3. The undersigned have carefully read and understand the requirements in this RFP, have satisfied ourselves as to the scope of services required and the conditions under which those services are to be provided and do hereby submit our Services Proposal and Cost Proposal.
4. The undersigned hereby agrees to comply in all respects with the requirements as specified in the RFP attached hereto, which specifications and conditions are to be read with and form part of this proposal.

Dated at London, ON this 3rd day of January, 2024

TROJAN TECHNOLOGIES GROUP ULC

Corporate Name

Tom Siller

Name of Signatory (Please Print)

 President

Signature, and Title

-END OF APPENDIX "A" -



# THE CITY OF WINDSOR

LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE  
PROPOSAL NO. 146-23  
SUBMITTED BY TROJAN TECHNOLOGIES

DECEMBER 2023



December 19, 2023

LITTLE RIVER POLLUTION CONTROL PLANT  
UV DISINFECTION EQUIPMENT PRE-PURCHASE

RE: TrojanUV 3000Plus™ Submission

To Whom it may concern

We are pleased to submit the enclosed TrojanUV3000Plus™ proposal for consideration by the City of Windsor, ON and Stantec. To facilitate your navigation through the enclosed information we have summarized the design and key differentiating benefits with the TrojanUV3000Plus™ in this letter.

We are providing a Trojan3000Plus™ option that will include two (2) channels with 2 banks in each channel for both plant 1 and plant 2 that will retrofit into the existing channels without having to do expensive civil work like other systems. Each UV bank can operate independently and turn down to 60% power. Water level control will be done using a Motorized Weir Gates. The following information package provides detailed responses to each of the areas identified in the RFP. Of note, the RFP asked for a lot of extra items that added significant cost, we have chosen to include those as they were asked for, even though it may make our bid price seem higher than others that don't include all of them, but we are open to discussions during design to see if any can be value engineered.

We would like to bring to your attention several benefits uniquely offered by Trojan.

***Experience – It comes with Trojan***

- Trojan has set the standard for proven UV technology and innovation for over 40 years – and has the largest UV installation base, over 12,000 municipal installations operating worldwide.
- Over 2,500 UV3000Plus™ systems are operating around the world as it is one of our flagship products.
- Through thousands of installations worldwide, Trojan has proven its ability to design and supply UV systems that exceed Owner expectations. If selected, Trojan is fully committed to support City of Windsor and their engineer through the detailed design, purchase agreement, submittal, equipment delivery and startup phases by carrying out all provisions required.

***UV Lamps – The key component***

- Trojan's UV3000Plus™ lamps undergo a special manufacturing process that ensures lamp life longevity. This feature has also been NWRI validated to allow the use of a higher lamp aging factor in the overall system sizing – further increasing the system efficiency.
- Trojan offers the most comprehensive lamp warranty with the UV3000Plus™. Lamps are warranted at 100% (non-prorated) for 9,000 operating hours and we offer a further prorated warranty up to 12,000 operating hours. This means that if a lamp fails prior to 9,000 hours a replacement lamp is provided at no cost. Failed or spent lamps will be recycled by Trojan at an approved facility, again at no cost to the Owner.

***Cleaning System – The best in the industry***

- Trojan is the only UV manufacturer to offer a fully automatic chemical/mechanical sleeve cleaning system essentially eliminating operator involvement for sleeve cleaning. The NWRI validated quartz sleeve fouling factor (0.95) confirms the efficiency of the cleaning system – saving the Owner in power costs.

- With other manufacturers a chemical dip tank along with a larger overhead crane is required to facilitate module removal from the channel for sleeve cleaning. The Trojan UV3000Plus™ module weighs only 110 lbs and can be removed from the channel by the operators or using a small davit crane.

***Modularity – For safety and redundancy***

- The UV3000Plus™ system is uniquely modular. Each single-leg UV module is an independent electrical sub-system and one power distribution center is provided for each group (bank) of UV modules.
- This configuration increases the electrical redundancy of the system and allows operators to work safely while the highest percentage of UV equipment stays in operation.

***Ballast Location – Compact with convection-cooling***

- Electronic ballasts are housed in an aluminum enclosure mounted directly above the UV module. The enclosure design and material of construction does not require any forced-air or A/C cooling. This design feature saves the Owner both capital and operating costs and is proven reliable and effective in thousands of installations worldwide.
- The UV system can be installed completely outdoors, again saving in construction costs. Minimal ancillary facilities or equipment is required with the Trojan system.

***Service – Local and long term***

- Trojan stands behind every TrojanUV3000Plus™ system that we design and manufacture. Trojan will provide the City of Windsor with a Lifetime UV Disinfection Performance Guarantee - valid for the life of the UV system.
- Trojan offers a 1-800 number with qualified Technicians available 24-hours / 7 days a week for emergency support.
- Trojan UV installations are supported by a network of over 50 factory-trained certified technicians in North America, and include many located locally out of the Trojan headquarters in London, Ontario

Thank you for the opportunity to present this proposal to the City of Windsor and Stantec. If you have any questions, please do not hesitate to contact us at (519) 457-3400 or through our local sales representative, Andrew Pelley with H2Flow Inc. at (416) 854-4248.

Best regards,



Rob Jansen  
Regional Manager  
Trojan Technologies



## APPENDIX B - SUBMISSION CONTENTS



## DECLARATION OF CONFLICT

The Bid shall consist of the following Technical Information:

1. **Declaration of Conflict.** Include a declaration of conflict statement which identifies any person(s) employed by the City in any capacity that:
  1. Has a direct or indirect financial interest in the award of the Contract to any Proponent;
  2. Is currently employed by, or is a consultant to or under contract to a Proponent;
  3. Is negotiating or has an arrangement concerning future employment or contracting with any Proponent;
  4. Has an ownership interest in, or is an officer or director of any Proponent.

**NOTE: if the Proponent does not have a conflict to declare then no written response is required.**

**TROJAN'S RESPONSE:**

No conflict to declare.





## PROPONENT INFORMATION



**2. Proposer Information.** The following information should be included:

1. If Proposer is a corporate entity, **please provide proof of legal name** by submitting a copy of one of the following:
  - a) first page of Articles of Incorporation;
  - b) if applicable, first page of Articles of Amendment;
  - c) if applicable, first page of Profile Report; or,
  - d) Certificate of Status.
  
2. If the Proposer is a Joint Venture, identify the contractual arrangements among the parties to the Joint Venture; the corporate resources of each party to the Joint Venture; the lead or single point of contact for the City; confirmed roles for each of the parties to the Joint Venture; and include a letter from each party to the Joint Venture acknowledging the structure of the Joint Venture, and that each will be jointly and severally liable to the City if the Proposer is awarded the Contract.
  
3. Where the Proposer is a Joint Venture, the activities of each member of the Joint Venture, and its/their corporate resources.

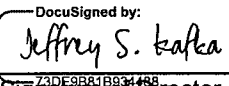
**TROJAN'S RESPONSE:**

Please see following page for first page of Article of Incorporation.



**TROJAN TECHNOLOGIES GROUP ULC**  
(the "Company")

The Company has as its articles the following articles.

Full name and signature of a director	Date of Signing
<p><small>DocuSigned by:</small>                        _____                      Signature of Director                      Jeffrey S. Kafka                      _____                      Name of Director</p>	<p>December 22, 2016                      _____, 20____</p>

Incorporation number: ~~BC1191904~~ ~~XXXXXXXX~~ BC1191904

**TROJAN TECHNOLOGIES GROUP ULC**  
(the "Company")

**ARTICLES**

ARTICLE 1 – INTERPRETATION .....	2
ARTICLE 2 – SHARES AND SHARE CERTIFICATES .....	3
ARTICLE 3 – ISSUE OF SHARES .....	4
ARTICLE 4 – SHARE REGISTERS .....	5
ARTICLE 5 – SHARE TRANSFERS .....	5
ARTICLE 6 – TRANSMISSION OF SHARES .....	6
ARTICLE 7 – ACQUISITION OF COMPANY’S SHARES .....	7
ARTICLE 8 – BORROWING POWERS .....	7
ARTICLE 9 – ALTERATIONS .....	8
ARTICLE 10 – MEETINGS OF SHAREHOLDERS .....	9
ARTICLE 11 – PROCEEDINGS AT MEETINGS OF SHAREHOLDERS .....	11
ARTICLE 12 – VOTES OF SHAREHOLDERS .....	14
ARTICLE 13 – DIRECTORS .....	18
ARTICLE 14 – ELECTION AND REMOVAL OF DIRECTORS .....	19
ARTICLE 15 – ALTERNATE DIRECTORS .....	21
ARTICLE 16 – POWERS AND DUTIES OF DIRECTORS .....	22
ARTICLE 17 – INTERESTS OF DIRECTORS AND OFFICERS .....	22
ARTICLE 18 – PROCEEDINGS OF DIRECTORS .....	23
ARTICLE 19 – EXECUTIVE AND OTHER COMMITTEES .....	26
ARTICLE 20 – OFFICERS .....	27
ARTICLE 21 – INDEMNIFICATION .....	28
ARTICLE 22 – DIVIDENDS AND RESERVES .....	29
ARTICLE 23 – ACCOUNTING RECORDS AND AUDITOR .....	30
ARTICLE 24 – NOTICES .....	31
ARTICLE 25 – RECORD DATES .....	33
ARTICLE 26 – SEAL .....	33
ARTICLE 27 – PROHIBITIONS .....	33
ARTICLE 28 - UNLIMITED LIABILITY COMPANY PROVISIONS .....	34
ARTICLE 29 - SPECIAL RIGHTS AND RESTRICTIONS .....	34



# EXPERIENCE

**3. Experience.** Provide a narrative which details and demonstrates the Proponent's experience and why the Proponent is uniquely qualified to carry out the services under the Contract. Such experience details should be relevant to the project at hand and be of similar size and scope.

**TROJAN'S RESPONSE:**

For more than a quarter of a century, identifying key market opportunities and matching proven solutions to water-related environmental problems has been the hallmark of Trojan Technologies. Since 1977, Trojan has led the change to water disinfection systems that use environmentally responsible, cost-effective ultraviolet light in place of chemicals.

Today, Trojan is recognized around the world as the leader in advanced UV water treatment technology and is committed to aggressively leveraging its proprietary expertise in a growing number of key market sectors. These markets include municipal drinking water, municipal wastewater, environmental contaminant treatment and residential applications, as well as the ultra-purification of water used in food and beverage manufacturing, pharmaceutical processing, and semi-conductor applications around the world.

Trojan's success is evident in more than 12,000 municipal UV disinfection facilities operating in over 50 countries the largest installed base of UV systems in the world. Within North America, there are over 1,600 3000Plus systems installed.

Trojan services a growing customer base around the globe through an extensive network of dealers and representatives. This strong distribution network allows us to provide unparalleled levels of service and support to customers regardless of where they are located.

All Trojan systems are designed to meet specific regulatory requirements around the world, including the U.S., Canada, Great Britain, New Zealand, Australia and Germany. In addition to meeting and exceeding these requirements, UV disinfection creates minimal by-products and is extremely safe for both UV system operators and the public.

Trojan's advanced manufacturing facilities ensure a high level of quality control at every stage of the process, from initial design to final installation. In 1998, Trojan received the ISO 9001-2008 designation – an internationally recognized model for quality assurance in design, development, production, installation and service.



Trojan Technologies is registered to the ISO 9001:2000 standard, and where applicable, complies with the requirements of industry standards such as NSF, DVGW, CSA, UL, RHOS and CE.

This document describes the internal and external procedures used by Trojan Technologies to meet Trojan's quality standards and the customer requirements per detailed project specifications.

The overview of the Trojan procedures, policies, and documentation is segregated into 5 main categories:

- Project Management
- Vendor and Material Management
- Quality Assurance Inspection
- Manufacturing Assembly and Test
- Document Control and Record Retention

### **Project Management**

Application projects are led by a Trojan Project Manager who is responsible for:

- Serving as the prime contact both internally and externally through to substantial completion
- Planning and managing the project to meet customer and Trojan specifications
- Managing the project schedules
- Ensuring activities and resources across operational departments are sufficient to implement according to plan

The Project Manager follows the Order Fulfillment process from design, manufacturing, quality, shipping and overall production planning, and controls activities related to the project. The Order Fulfillment process is standard work for application projects and includes a set of integrated tools for production management.

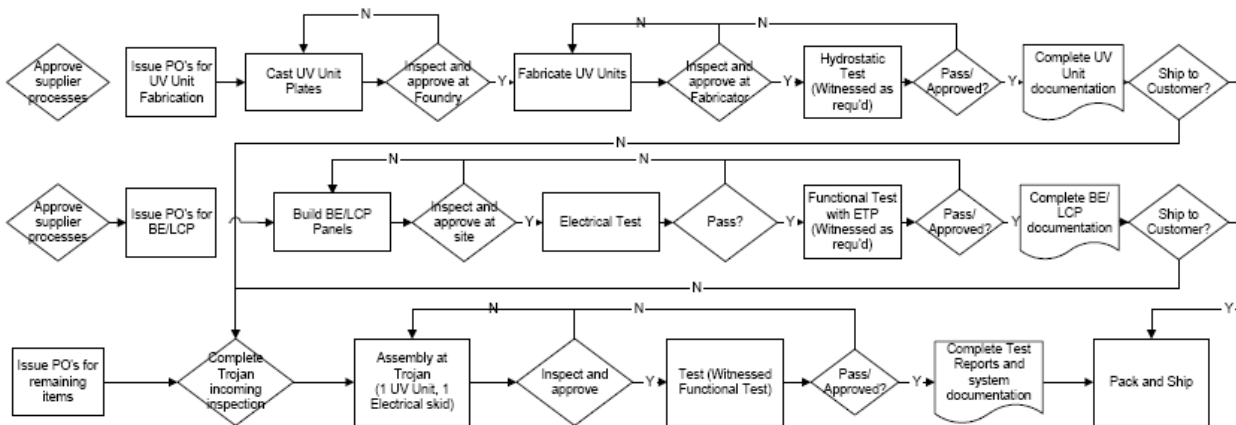
Customer specific requirements are central to the product design, and are detailed in the Engineering Submittal. This includes drawings which reference the relevant standards and customer specific requirements.

The Manufacturing and Inspection Plan further details the fabrication requirements and required quality assurance and control measures. Together, the drawings, customer specifications and Manufacturing and Inspection plan represent the basis for product inspection and acceptance.

A high level Order Fulfillment process flow is outlined in below:



## PROJECT PROCESS FLOW



**Notes: Manufacturing and Shop Test Strategy**

Functional testing of one fully assembled unit will be completed at Trojan Technologies in London, ON. The Electrical Test Panel (ETP) will be used to functionally test the remaining LCP panels at the Trojan panel supplier. UV units will undergo hydrostatic testing at the Fabricator in China. Lamps, sleeves and sensors will be installed in the field. Samples will be used for testing and removed prior to shipment.

Diamonds indicate high level inspection and hold points. Refer to the M&I Plan for a complete summary of hold points related to the casting and fabrication processes.

## Vendor and material management

Care is taken in any situation where the choice is made to outsource a process to ensure that the work carried out, or the product supplied meets the defined requirements. This applies to:

- Purchased product
- Subcontracted services
- Material testing

### PURCHASED PRODUCT

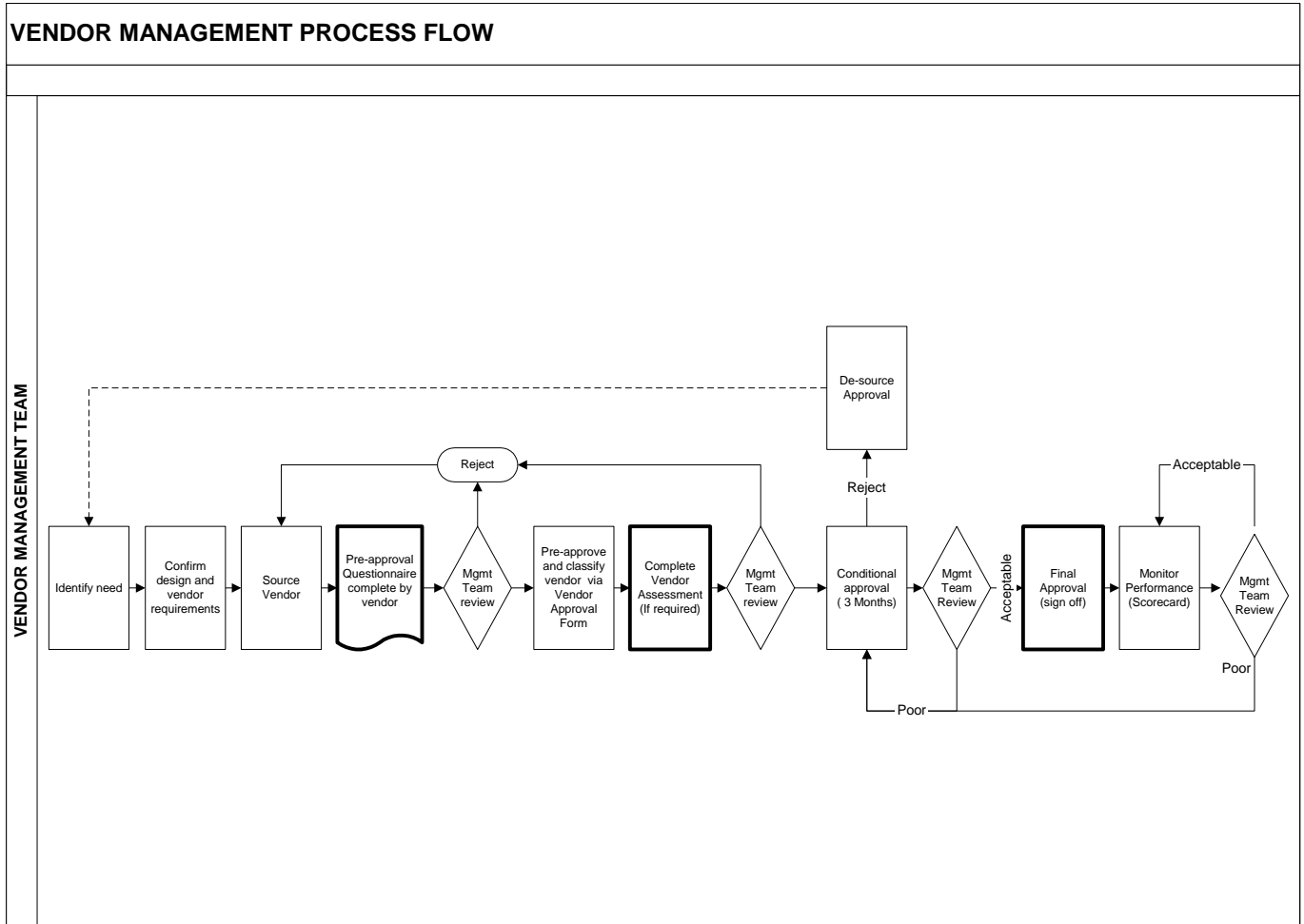
Where appropriate, a Component Qualification Plan is used to measure a supplier’s capability to consistently manufacture and supply product according to specifications. Suppliers are expected to demonstrate how the product will be manufactured and inspected, and provide samples and evidence of ongoing capability. Records that result from the Component Qualification procedure are managed and maintained by the Quality Assurance department according to the Record and Retention Guidelines and may include:

- Component Qualification Plan/Record
- Supplier test and inspection records
- Trojan inspection/test results
- Inspection Method Sheet



## SUBCONTRACTED SERVICES

Selected and approved suppliers have met the requirements outlined in Trojan’s Vendor Management process. This process is designed to ensure that only suppliers who meet the expectations and standards of Trojan Technologies are deemed acceptable and may be used to provide a product or service.



The suppliers selected for the casting and fabrication have been measured against a Vendor Management Procedure, and the requirements outlined by the project specification.

## MATERIAL TESTING

### External Testing

Material testing will be performed by the casting and fabrication subcontractors, and reviewed and approved by Trojan Technologies in accordance with the contract documents. Please refer to the respective supplier documentation for further details on external material testing. Independent third party laboratory analysis may also be employed to confirm the compliance with contract documents.



### **Internal Testing**

Material testing performed internally by Trojan Technologies pertains to the UV vessels which will be tested using a material analyzer, and the quartz sleeves which will be transmittance tested during the sample inspection.

### **Quality Assurance**

The Quality Assurance department consists of a Manager, Specialists and Technicians. Together, the team is responsible for the overall quality of vendors and products, and QA process efficiency. Business processes that are owned and managed by QA include Incoming Inspection, the Non Conformance system, Containment of non-conforming product, Calibration, Corrective Action and Internal Auditing.

### **INSPECTION AND TEST PROCEDURES**

Inspection and Test points can take place both internally at Trojan Technologies, and externally at supplier locations. Refer to the appendix A.1 and A.2 for Trojan's Inspection Plan for major suppliers.

#### **External Inspection and Test**

The external Inspection and Test pertains to the casting, fabrication and welding requirements of the UV Vessels, and is detailed in the respective subcontractor documentation package. The following procedures have been reviewed and approved by Trojan Technologies to ensure the capabilities for meeting the contract requirements are in place:

- Material Management
- Material Control
- Material Handling
- Welding Procedures
- Casting Acceptance and Welding Repair
- Fabrication Procedures
- Testing
- Documentation
- Worker Qualification Records
- Material Samples
- Test Reports and Records

#### **Internal Inspection and Test**

Product is measured at receiving inspection to ensure conformance to specified requirements. Receiving Inspection is a key step in an Order Fulfillment process, ensuring that the conformance of product is verified against the specification in order to prevent the unintentional use of non-conforming product. The nature and frequency of inspection depends on the degree of customization of the product, components revisions changes driven by the Engineering Change Management process, the conformance or non-conformance history of the product, lot size, supplier region (domestic vs. International) etc.

Product that is filtered through receiving inspection can be grouped into 3 basic categories:





**A** - Customized items that require specific inspection and test as directed by Trojan Engineering and the Project Specific requirements. Components assigned to category 'A' and typically subject to 100% inspection.

**B** - Previously qualified components that require inspection as directed by Trojan Engineering's critical component drawing specifications and are subject to a random sample inspection.

**C** - 'Off the Shelf' components that require verification against the Trojan Engineering's component specification and are subject to a random sample inspection.

Purchase Orders generated by Trojan's Purchasing department indicate where Material Certificates are required on specific components for review and retention. Material Certificate requirements are also crossed referenced with the Item Master Data information housed in the MRP system.

Measurements taken during receiving inspection are recorded and retained by QA.

Checklists for the internal sample inspection of Quartz Sleeves will be retained, as well as checklists that are to be used by Trojan Technologies for auditing purposes at the casting and fabricator subcontractor locations.

#### **CORRECTIVE ACTION**

The Corrective Action (CA) process is designed to identify and eliminate the root cause(s) of systemic issues as they apply to product, processes or supplier performance. This process is initiated through the Non Conformance system tool using inputs such as the Non Conformance history, formal or informal impact assessments on the product and/or customer, and customer complaints to drive the escalation of a Corrective Action.

Corrective Action is reviewed by the QA Specialist or CA Team Leader, who is then responsible for leading the implementation and for verifying the effectiveness of the actions taken prior to closing the CA.

#### **Manufacturing assembly and test**

A standard process is maintained and followed by the Manufacturing Engineering department when creating assembly and test procedures for projects. (The flow chart displayed below illustrates this process.)

Process at a Glance (PaaG) is a Manufacturing Engineering controlled document that describes some or all of the following:

- tooling and/or fixture requirements
- consumables specifications
- critical to quality aspects of the assembly
- the manufacturing assembly process
- reference documentation

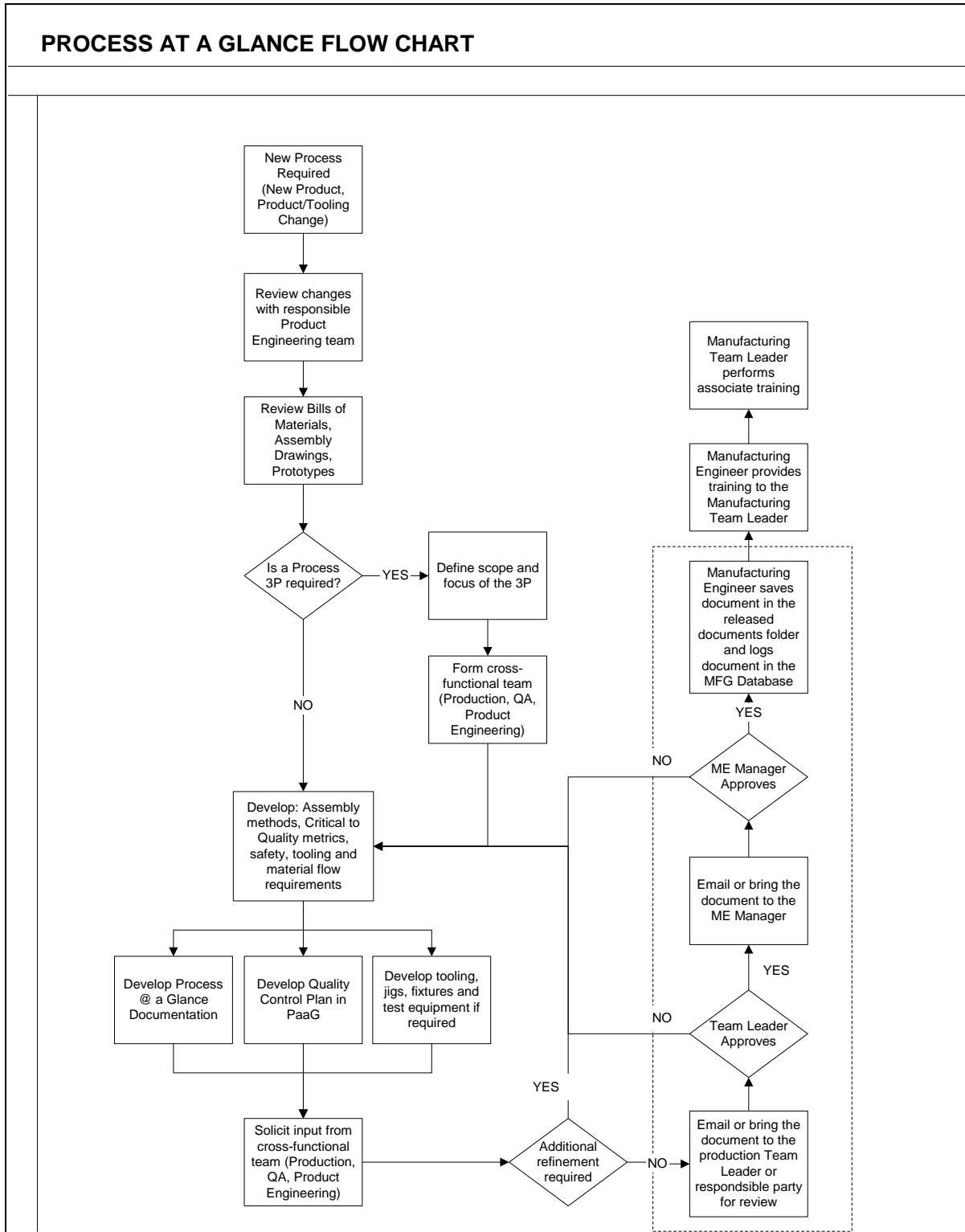
PaaG documents are intended to be a tool for providing assembly and test information to manufacturing associates within Trojan and to select suppliers.

PaaG supplemental information is supplied via the Bill of Materials, Assembly Drawings, Production Orders, Build Sheets, Routings, Pick Lists, Layout Drawings, Control Philosophies, Outbound Advice, and Production Order Checklist.



## HIGH LEVEL PROCESS FLOW

### PROCESS AT A GLANCE FLOW CHART



## CALIBRATION OF TEST INSTRUMENTS

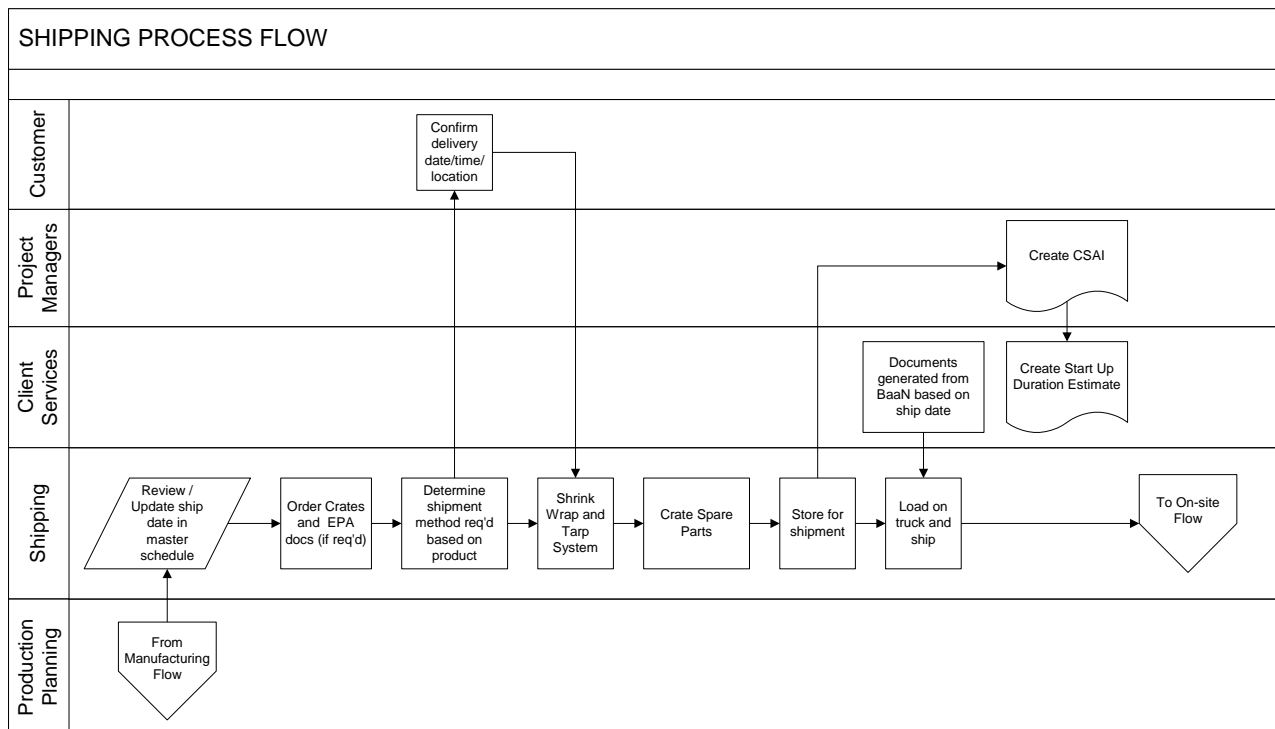
Inspection and measurement equipment is managed according to an Internal Calibration Procedure to ensure accuracy and reliability in product measurement. This applies to any monitoring and measuring devices used in Labs, Service, Receiving Inspection and Manufacturing that could affect the quality of the product supplied to the customer. This includes equipment that is used to:

- Verify purchased product against requirements
- Perform qualification of supplier samples
- Develop specifications
- Perform measurement of samples provided by a customer
- Determine acceptable performance
- Manufactured product intended to be received by a customer

Measuring equipment meeting the above criteria shall be calibrated or verified at specified intervals or prior to use against measurement standards traceable to international or national measurement standards. The standards used by Subcontracted Calibration Labs include NIST and NRCC. Historical calibration records are stored in the Quality Assurance Lab, and kept for the life of the instrument.

## PACKAGING AND SHIPPING OF PRODUCT

The Shipping department is responsible for determining the appropriate packing, shipping and delivery methods of industrial product lines and for ensuring that all items on the project 'Ship List' are accounted for. The standard flow chart below outlines the process followed:



NOTE: Only Nylon slings are used when moving material by crane.



### **Document Control and Record Retention**

Documentation available within the company is controlled to ensure it is used accurately and appropriately. It can be available in varying formats and media depending on the appropriateness for the specific documentation. Accuracy and proper intention of use is ensured by assigning process owner's who are responsible for:

- Ensuring the documentation is reviewed and approved before released for use
- Updating and re-approving documentation as required
- Controlling changes to documentation to prevent errors

All associates will have access to the correct documentation by:

- Making sure that the current revision of documents is clear
- Making documentation available at the point of use
- Preventing the unintended use of obsolete documents
- Ensuring that records can be retrieved as required after archiving





## PROONENT QUALIFICATIONS AND CREDENTIALS

**4. Proponent Qualifications and Credentials.** Describe the Proponent's qualifications and expertise respecting the competencies outlined in the Instructions to Proponents. Include reference to specific key personnel if necessary.

**TROJAN'S RESPONSE:**

Trojan has over 400 employees located in London, Ontario that solely focus on UV applications day to day. On top of the team of Sales, Designers, Engineering, Project Management, Controls, Service, and Aftermarket support that are the ones that mainly deal with the customer and are covered in other sections. Trojan also offers a host of support staff that have unique specialties. These teams are available for every project to help support the design, submittal, installation, and after installation support. Below are just a few of them.

CFD Team

Within the Engineering Department, designers first use SolidWorks Premium and the Flow Simulation add-on to perform up-front design and optimization of new designs; CFD analysts then step in to perform more refined examinations and optimization of the systems. Drawing on many years of academic and industrial experience, Trojan's CFD experts have advanced university educations and combined more than 30 years of UV reactor analysis experience. Trojan's CFD capabilities are state-of-the-art. Comprised of industry leading software packages and matching computer resources, Trojan has at its disposal the ANSYS 14.0 suite of software (Modeler, Mesher and FLUENT Solver), Tecplot 360 post processor, Esteco modeFrontier optimization software as well as Breault Research ASAP and in-house developed software for producing accurate light intensity predictions. With computers capable of handling models in excess of 40 million elements, virtually any geometry can be resolved with high fidelity.

Lab Testing

Trojan is able to troubleshoot and help find solutions for plant upsets that may be interfering with UV disinfection by housing their own micro lab on site at our Trojan headquarters. They are able to perform a number of tests including Fecal, Ecoli, Enterro, Collimated beam analysis, UVT testing, TSS, etc. etc. This is a major benefit for customers as it helps us determine how best to help them. The lab ensures that the tools that we use to complete analysis and perform tasks in the laboratory are performing in their allowable tolerances to ensure that the data they output is accurate.

**CALIBRATION OF TEST INSTRUMENTS**

Inspection and measurement equipment is managed according to an Internal Calibration Procedure to ensure accuracy and reliability in product measurement. This applies to any monitoring and measuring devices used in Labs, Service, Receiving Inspection and Manufacturing that could affect the quality of the product supplied to the customer. This includes equipment that is used to:

- Verify purchased product against requirements



- Perform qualification of supplier samples
- Develop specifications
- Perform measurement of samples provided by a customer
- Determine acceptable performance
- Manufactured product intended to be received by a customer

Measuring equipment meeting the above criteria shall be calibrated or verified at specified intervals or prior to use against measurement standards traceable to international or national measurement standards. The standards used by Subcontracted Calibration Labs include NIST and NRCC. Historical calibration records are stored in the Quality Assurance Lab, and kept for the life of the instrument.

#### Shop Drawing Control

Application projects are led by a Trojan Project Manager who is responsible for:

- Serving as the prime contact both internally and externally through to substantial completion
- Planning and managing the project to meet customer and Trojan specifications
- Managing the project schedules
- Ensuring activities and resources across operational departments are sufficient to implement according to plan

The Project Manager follows the Order Fulfillment process from design, manufacturing, quality, shipping and overall production planning, and controls activities related to the project. The Order Fulfillment process is standard work for application projects and includes a set of integrated tools for production management.

Customer specific requirements are central to the product design, and are detailed in the Engineering Submittal. This includes drawings which reference the relevant standards and customer specific requirements.

The Manufacturing and Inspection Plan further details the fabrication requirements and required quality assurance and control measures. Together, the drawings, customer specifications and Manufacturing and Inspection plan represent the basis for product inspection and acceptance.  
Submittals

To outline how a submittal flows through the organization. The process described below is from initial Build Sheet release to the point it is shipped to the client for review.

A Document Coordinator compiles the submittal documentation to match the requirements outlined in the Contract Documents. The Document Coordinator (DC) checks the completed package for accuracy, completeness and consistency. Then the Document Coordinator forwards the completed package to another Document Coordinator for checking. Note that the checking party is different from the DC who assembles the submittal.



Once the package is correct, the checker must sign and date the “Checked By” section on the Submittal Cover Page and project specific drawings. The completed submittal is forwarded to the Project (PM) for approval.

Once the package is correct, the PM must sign and date the “Approved By” section on the Submittal Cover Page and project specific drawings.

Upon client approval of the submittal or if the project is released prior to full approval of the submittal by the PM, the project is to be configured.





**4. Proponent Qualifications and Credentials.** Describe the Proponent's qualifications and expertise respecting the competencies outlined in the Instructions to Proponents. Include references to specific key personnel if necessary.

### TROJAN'S RESPONSE:

Please see below for information on Trojan's qualifications and expertise.

Trojan is **uniquely positioned** by bringing innovative, technology-based solutions to **municipalities, industrial enterprises, and consumers to solve their water related and process problems in an environmentally responsible way.** Trojan develops and offers lasting solutions that build the level of confidence customers and end-users have in their water. Trojan has proven that and our UV technology specifically in the Little River Plants where it has been operating for more than 30 years (which is longer than the Product's intended life). This has been possible because of the following:

### CAPABILITIES CONSISTENT INNOVATION



Trojan has an impressive portfolio of protected inventions that now exceeds 50 separate inventive ideas, with more than half implemented in current commercial products. To date we have over 200 granted and pending worldwide patents. Our large Research and Development department generate many significant ideas each year, some will be patented, and the remainder become part of Trojan's know how which gives Trojan greatest advantage in the marketplace. The management and protection of intellectual property at Trojan has been an important factor in creating a technological advantage for the company.



### CAPABILITIES ISO 9001 PRODUCTION FACILITY



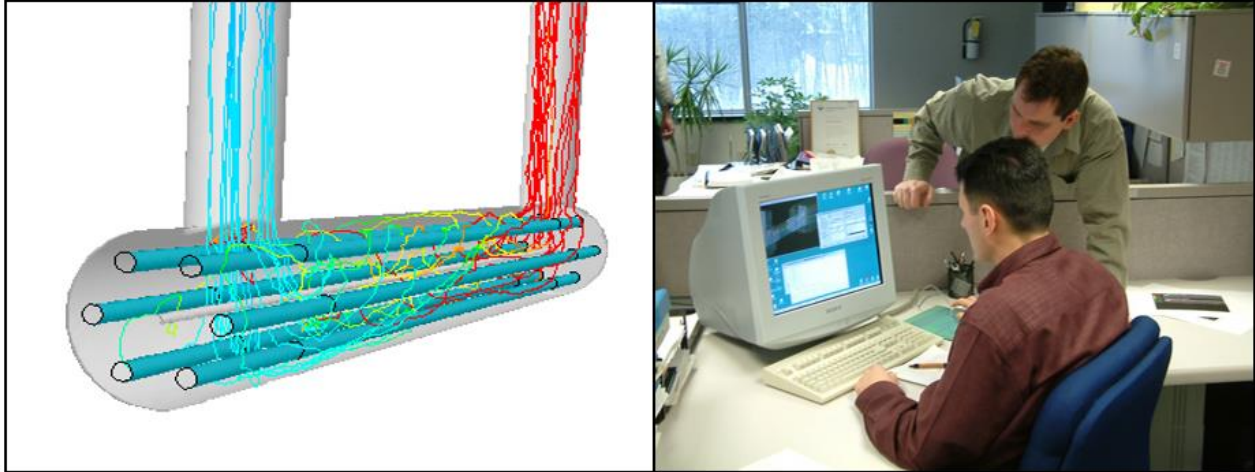
Trojan is dedicated to maintaining and building upon our high level of customer satisfaction, through the efforts of our associates and quality management system, in all our products and processes.

To achieve this, we are committed to:

- Managing our performance against defined objectives
- Developing robust, repeatable processes that yield superior Quality, Delivery, and Cost
- Involvement of all associates in ensuring our quality objectives are achieved
- Meeting or exceeding statutory, regulatory and customer specific requirements, and the requirements of applicable standards, including ISO 9001
- Continuous improvement of our products, services and overall quality management system through customer engagement and the utilization of the Veralto Business System.



### CAPABILITIES ADVANCED COMPUTER/CFD DESIGN



Within the Engineering Department, designers first use SolidWorks Premium and the Flow Simulation add-on to perform up-front design and optimization of new designs; CFD analysts then step in to perform more refined examinations and optimization of the systems. Drawing on many years of academic and industrial experience, Trojan's CFD experts have advanced university educations and combined more than 30 years of UV reactor analysis experience. Trojan's CFD capabilities are state-of-the-art. Comprised of industry leading software packages and matching computer resources, Trojan has at its disposal the ANSYS 14.0 suite of software (Modeler, Mesher and FLUENT Solver), Tecplot 360 post processor, Esteco modeFrontier optimization software as well as Breault Research ASAP and in-house developed software for producing accurate light intensity predictions. With computers capable of handling models in excess of 40 million elements, virtually any geometry can be resolved with high fidelity.

Having the capability of advanced CFD and 3D Modeling helps Trojan keep our commitment to leading edge design practices, that allow our design groups to predict and optimize water flow through the system before it progresses to our pilot lab. System turbulence can be predicted and controlled, and difficult Engineering problems can be solved before any parts are actually built. Prototypes can be built with high level of confidence and system performance can be more accurately predicted. This means better and more reliable and effective products.

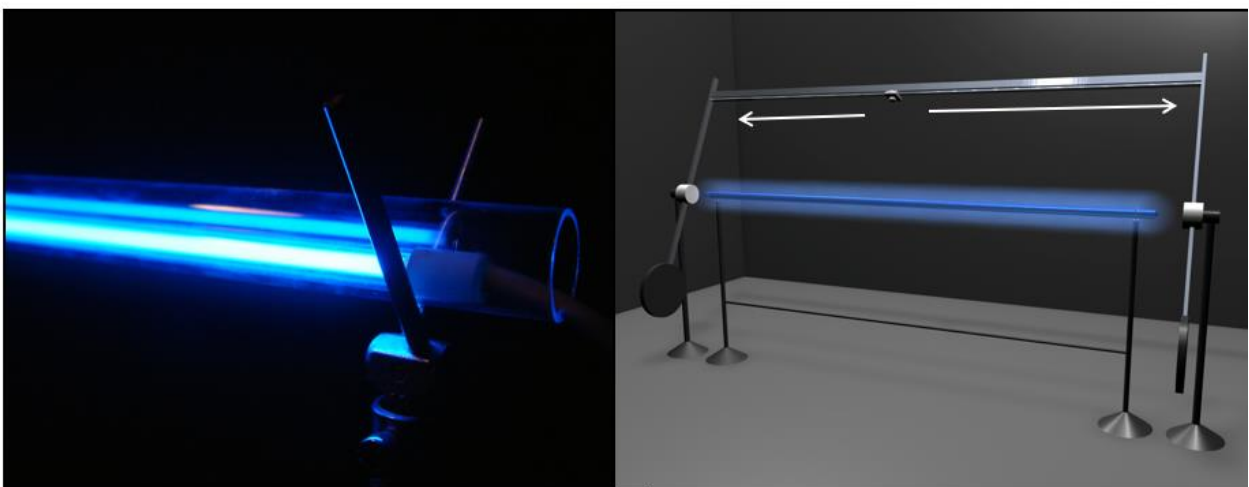


### CAPABILITIES SOPHISTICATED ON-SITE WATER ANALYSIS

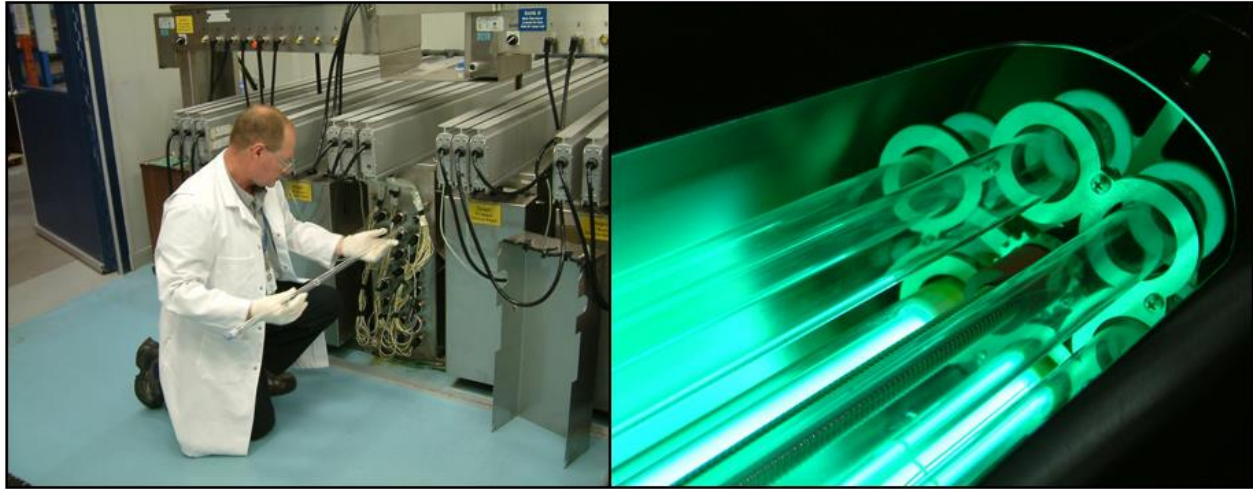


In our Microbiology Lab, we analyze Drinking Water, Industrial Process Water and Wastewater samples from around the world. Because Water and Wastewater characteristics vary quite widely from one place to the next, it is important for us to assess a broad range of samples to determine the effectiveness of treatment for various water implications. Various tests allow us to assess the characteristics of water that determine how effective UV is with each type of sample. We are then able to capture detailed information on the effectiveness of the treatment and collect that information in a database. This database is an extremely important tool in our sizing of systems.

### CAPABILITIES 360° ORBITAL LAMP TESTING LAB



### CAPABILITIES IN-WATER LAMP TESTING FACILITIES



Our Lamp Lab is unique in the industry and is used to test lamps and ballasts. We conduct in water testing of lamp output, lamp aging, durability and performance under conditions that simulate real systems in the field. A comprehensive failure analysis system of tests is performed on each combination of components. This allows us to predict and maximize system efficiency and ensure that our systems are reliable and cost effective for our clients to operate for the duration of their life cycle.

### CAPABILITIES ON-SITE ECT RESEARCH & TESTING LAB



The Environmental Contaminant Treatment or ECT Pilot facility gives Trojan the ability to perform pilot scale contaminant treatment testing with UV and hydrogen peroxide at our headquarters in London, Ontario. The system is capable of testing and analyzing flows of up to 1000 gallons per minute and can be used to optimize the performance of various Trojan reactors treating contaminants such as pesticides, pharmaceuticals, and industrial solvents.





## REFERENCES

**5. References.** The following information should be included:

1. An installation list with a minimum of ten (10) UV disinfection Systems installed in Canada and the USA. The overall list shall include three (3) UV disinfection project examples completed in the last five (5) years, installed in the Province of Ontario, and of the same type and scope as the UV equipment proposed for the LRPCP. The submittal shall include data from a minimum of three (3) successfully operating installations that verify the experience of the manufacturer completed on the attached Appendix B Schedule 1, including contact names, email addresses and telephone numbers, for those projects noted under Section 3 – Experience.
2. Provide for each reference:
  - a. Brief description of the scope of work undertaken
  - b. Type of services provided
  - c. Similarities to the projects/delivery of core services under this RFP
  - d. Client name with contact names, telephone numbers and emails

NOTE: Preference will be given to those Proponents with relevant service experience in Municipal or Government entities.

**TROJAN'S RESPONSE:**

- 1) Please see following pages for complete list of North American 3000Plus Installs. This is only for North America and for the proposed product. There are approximately 12,000 Trojan systems installed worldwide. Additionally, please see below for a smaller list of references with contacts.





**LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE**

**APPENDIX “B” - SCHEDULE 1  
REFERENCE INFORMATION**

YEAR COMPLETED	DESCRIPTION OF INSTALLATION*	FOR WHOM EQUIPMENT WAS PROVIDED**	VALUE
2020	3000Plus 3 duty channels, 1 redundant channel 2 banks per channel 20 eight-lamp modules per bank	GALT WWTP	\$2.2M
2018	3000Plus 1 duty channel, 1 redundant channel 2 banks per channel 6 four-lamp modules per bank	CRAIGLEITH WWTP	\$0.5 M
2019	Signa2Row 1 duty channel 2 duty banks per channel 22 lamps per banks	SARNIA WWTP	\$0.5 M
2018	Signa2Row 1 duty channel 3 duty banks per channel 12 lamps per banks	COLLINGWOOD WWTP	\$0.5 M

**-END OF APPENDIX “B, Schedule 1”-**

- i. Sarnia WPCC
  1. The identity of the project owner: **City of Sarnia**
  2. A contact name and title, address and telephone number for the project owner: **Trevor Bourgeois, Superintendent, W.P.C.C., [trevor.bourgeois@sarnia.ca](mailto:trevor.bourgeois@sarnia.ca), 519-344-8507 x 4625**
  3. A description of the project stating the type of wastewater process involved, and type of UV disinfection system installed, capacity of the plant; **Activated Sludge, TrojanUVSigna™, 91 MLD**
  4. A description of the services that were provided; **Shop drawings, equipment supply, start-up, commissioning and operator training, aftermarket support.**
  5. Description of the scope of work indicating how this is similar to what is required for the Little River plants; **All of the same major project deliverables here were the same as those that would be provided for the Little River plants, this was an older Trojan system that was upgraded to a newer system.**
  6. Name of key staff that managed and participated in the project a **Rob Jansen, Monica Harrington, Mike Bartram, service techs, and Steve Smydo**
  
- ii. Galt WWTP
  1. The identity of the project owner: **Region of Waterloo**
  2. A contact name and title, address and telephone number for the project owner: **Nathan Morris, Supervisor, Infrastructure Management, Water Services, [nmorris@regionofwaterloo.ca](mailto:nmorris@regionofwaterloo.ca), 519-575-4791**
  3. A description of the project stating the type of wastewater process involved, and type of UV disinfection system installed, capacity of the plant; **Activated sludge, TrojanUV3000™Plus, 171,000 m3/day**
  4. A description of the services that were provided; **Shop drawings, equipment supply, start-up, commissioning and operator training, controls integration support, aftermarket support.**
  5. Description of the scope of work indicating how this is similar to what is required for the Little River plants; **All of the same major project deliverables here were the same as those that would be provided for the Little River plants, this was an older Trojan system that was upgraded to a newer system.**
  6. Name of key staff that managed and participated in the project a **Rob Jansen, Monica Harrington, Mike Bartram, service techs, and Steve Smydo**
  
- iii. New Hamburg WWTP
  1. The identity of the project owner: **Region of Waterloo**
  2. A contact name and title, address and telephone number for the project owner: **Nathan Morris, Supervisor, Infrastructure Management, Water Services, [nmorris@regionofwaterloo.ca](mailto:nmorris@regionofwaterloo.ca), 519-575-4791**
  3. A description of the project stating the type of wastewater process involved, and type of UV disinfection system installed, capacity of the plant; **Activated sludge, TrojanUV3000™B, 900 m<sup>3</sup>/hour peak.**

4. A description of the services that were provided; **Shop drawings, equipment supply, start-up, commissioning and operator training, controls integration support, aftermarket support.**
  5. Description of the scope of work indicating how this is similar to what is required for the Little River plants; **All of the same major project deliverables here were the same as those that would be provided for the Little River plants, this was an older Trojan system that was upgraded to a newer system.**
  6. Name of key staff that managed and participated in the project a **Rob Jansen, Monica Harrington, Mike Bartram, service techs, and Steve Smydo**
- iv. Collingwood WPCP
1. The identity of the project owner: **Town of Collingwood**
  2. A contact name and title, address and telephone number for the project owner: **Jennifer Adams, Supervisor, Wastewater Treatment Operations, Environmental Services, [jadams@collingwood.ca](mailto:jadams@collingwood.ca), 705-445-1581 Ext 3311.**
  3. A description of the project stating the type of wastewater process involved, and type of UV disinfection system installed, capacity of the plant; **Extended aeration, TrojanUVSigna™, ~65,000 m<sup>3</sup>/day peak**
  4. A description of the services that were provided; **Shop drawings, equipment supply, use of temporary treatment trailer during construction, start-up, commissioning and operator training, aftermarket support.**
  5. Description of the scope of work indicating how this is similar to what is required for the Little River plants; **All of the same major project deliverables here were the same as those that would be provided for the Little River plants, this was an older Trojan system that was upgraded to a newer system.**
  6. Name of key staff that managed and participated in the project a **Rob Jansen, Monica Harrington, Mike Bartram, service techs, and Steve Smydo**
- v. Craigeith WPCP
1. The identity of the project owner: **The Town of the Blue Mountains**
  2. A contact name and title, address and telephone number for the project owner: **Mark Service, Wastewater Supervisor, [mSERVICE@thebluemountains.ca](mailto:mSERVICE@thebluemountains.ca), 519-599-3131 ext. 454.**
  3. A description of the project stating the type of wastewater process involved, and type of UV disinfection system installed, capacity of the plant; **Activated sludge, TrojanUV3000™Plus, 19,640 m<sup>3</sup>/day**
  4. A description of the services that were provided; **Shop drawings, equipment supply, start-up, commissioning and operator training, controls integration support, aftermarket support.**
  5. Description of the scope of work indicating how this is similar to what is required for the Little River plants; **All of the same major project deliverables here were the same as those that would be provided for the Little River plants, this was an older Trojan system that was upgraded to a newer system.**
  6. Name of key staff that managed and participated in the project a **Rob Jansen, Monica Harrington, Mike Bartram, service techs, and Steve Smydo**



## Trojan UV 3000 Plus North American Install List

Project Name	State/Prov/Ctry	Country	Design MGD	UVT	Product Type	CRDD
Clark County Central Expansion	NV	US	70	70	UV3Plus	6/11/2007
Cherry Point	SC	US	18.75	65	UV3Plus	9/24/2007
Schwartz WWTP Horry County	SC	US	37.5	65	UV3Plus	7/13/2005
Sahuarita WWTP	AZ	US	1.85	55	UV3Plus	8/13/2004
Lancaster (LA County)	CA	US	1	65	UV3Plus	4/20/2006
Rosamond	CA	US	0.5	55	UV3Plus	10/15/2008
Cottonwood	AZ	US	3.3	65	UV3Plus	7/6/2000
Woodlands WWTP #2 Expansion	TX	US	15.6	65	UV3Plus	9/8/2003
Kincardine (Base Bid)	ON	CA	3.17	45	UV3Plus	7/15/2011
Laurel - Smyly WWTF	MS	US	15	65	UV3Plus	2/25/2005
Laurel - Massey WWTF	MS	US	15	65	UV3Plus	2/25/2005
Boonville	IN	US	9	65	UV3Plus	5/16/2002
Williston	ND	US	4.896	65	UV3Plus	8/24/2012
Plum Creek	CO	US	16.2	65	UV3Plus	1/14/2004
Lindenhurst	IL	US	5.7	65	UV3Plus	12/15/2011
Wild Horse Pass	AZ	US	2.3	65	UV3Plus	12/19/2000
Whitmore Village Const. Wetlands WWTF	HI	US	0.144	55	UV3Plus	5/9/2003
Sun Dog Ranch	AZ	US	10	65	UV3Plus	10/23/2001
Marcy Gulch WWTP, Highlands Ranch	CO	US	16.5	65	UV3Plus	2/13/2002
Harris Co ID #18	TX	US	1.6	65	UV3Plus	2/17/2012
Pooler	GA	US	2.5	65	UV3Plus	8/11/2004
White House	TN	US	2.75	65	UV3Plus	8/30/2002
Whitmore Village - Insurance	HI	US	0.144	55	UV3Plus	10/1/2003
Diamondhead Exp.	MS	US	7.5	65	UV3Plus	9/4/2001
Chatham	MA	US	5.6	65	UV3Plus	8/15/2010
VICTORIA	NF	CA	1.638	40	UV3Plus	(blank)
Harbeson - Allen Harim	DE	US	2.2	65	UV3Plus	5/26/2016
Owasso	OK	US	5	65	UV3Plus	8/15/2000
Troy	MO	US	2.25	65	UV3Plus	3/2/2006
Poteet WWTP	TX	US	2.08	65	UV3Plus	4/4/2005
Hortonville	WI	US	1.872	65	UV3Plus	5/15/2010
Arbury WWTP - Will County	IL	US	4.2	65	UV3Plus	3/18/2004
Eyman Prison	AZ	US	0.745	65	UV3Plus	6/9/2015
Garrett	IN	US	2.5	65	UV3Plus	6/10/2003
MONTICELLO	IA	US	2.7	55	UV3Plus	4/1/2003
Plainfield South	IN	US	5.3	65	UV3Plus	11/15/2004
Union	MO	US	3.2	65	UV3Plus	11/16/2006
West Goshen	PA	US	8	65	UV3Plus	3/20/2000
Fredonia	KS	US	2.2	65	UV3Plus	11/1/2005
Baton Rouge Landfill (Expansion)	LA	US	1	55	UV3Plus	7/16/2002
Chewelah	WA	US	3	55	UV3Plus	9/20/2001



Canmore - UV3000Plus Pre07 Replacement	AB	CA	9.246	65	UV3Plus	11/9/2023
Essex Replacement	ON	CA	5.978	65	UV3Plus	9/28/2023
Glenville Upgrade	WV	US	4	65	UV3Plus	11/16/2023
White Run Upgrade	PA	US	2.5	65	UV3Plus	12/7/2023
Menomonie	WI	US	4	50	UV3Plus	3/17/2023
Vail (Eagle River WSD)	CO	US	8	65	UV3Plus	9/5/2023
Delaware County - Olentangy ECC Upgrade	OH	US	10	65	UV3Plus	11/15/2023
Ottawa	KS	US	12	65	UV3Plus	11/6/2023
Stratford Replacment - New BETA 3000Plus	ON	CA	8.242	60	UV3Plus	12/21/2022
Central Square	NY	US	1.35	65	UV3Plus	9/27/2023
Jefferson	GA	US	2.5	65	UV3Plus	2/17/2023
Corydon WWTF	IA	US	3.93	65	UV3Plus	7/25/2023
Wayne Replacement WWTF	NE	US	2.16	65	UV3Plus	10/27/2023
Pembroke-Corfu	NY	US	1.44	65	UV3Plus	10/26/2023
West Pennsboro Upgrade	PA	US	1.5	65	UV3Plus	8/24/2023
Prairie Grove Phase 2	AR	US	3	65	UV3Plus	6/15/2023
Hancock County Upgrade	WV	US	2.3	65	UV3Plus	6/13/2023
Clear Creek Conservancy District	IN	US	3	65	UV3Plus	9/28/2023
Kulpmont-Marion Upgrade	PA	US	2.7	65	UV3Plus	2/2/2023
Trafalgar	IN	US	1.6	65	UV3Plus	7/12/2023
Elba	NY	US	0.24	55	UV3Plus	1/19/2023
Thornbury WWTP Upgrade	ON	CA	7.855	65	UV3Plus	10/2/2023
Lincoln	NE	US	72	65	UV3Plus	3/1/2022
Nassau WRF (3000Plus)	FL	US	2.84	65	UV3Plus	7/20/2022
Butterball - Ozark	AR	US	3	60	UV3Plus	9/25/2023
Clemson University	SC	US	4.1	65	UV3Plus	6/30/2022
Homedale	ID	US	1	50	UV3Plus	8/24/2023
Wagoner County	OK	US	3.05	65	UV3Plus	9/30/2022
Lodi Replacement	OH	US	4.33	65	UV3Plus	4/14/2023
Canastota	NY	US	5	65	UV3Plus	3/16/2023
Marathon City	WI	US	2.2	55	UV3Plus	11/17/2022
Armstrong WWTF	IA	US	1.355	43	UV3Plus	10/17/2023
West Branch WWTF	IA	US	5	65	UV3Plus	4/4/2023
Maquoketa	IA	US	2.4	65	UV3Plus	11/27/2023
Whiteland Replacement	IN	US	2.5	65	UV3Plus	3/9/2022
Brownstown Upgrade	IN	US	2.68	65	UV3Plus	10/26/2023
Turbotville	PA	US	3.6	65	UV3Plus	3/16/2022
Waterloo PTP Replacement, WI	WI	US	2	65	UV3Plus	10/13/2023
Gilberts, IL Replacement	IL	US	3	65	UV3Plus	9/30/2022
Calls Creek WWTP - Watkinsville, GA (Phase 1)	GA	US	7.5	65	UV3Plus	11/15/2022
New Glarus Replacement	WI	US	2.51	65	UV3Plus	11/24/2023
Panama City - Millville WWTP	FL	US	12.5	55	UV3Plus	6/26/2023
Westville IN	IN	US	3.6	65	UV3Plus	10/6/2022





St. James Phase II	MO	US	3	60	UV3Plus	1/26/2023
St. Theresa Point FN - PTP Replacement	MB	CA	2.282	50	UV3Plus	10/27/2023
Cressona	PA	US	4.608	65	UV3Plus	11/29/2021
Mount Morris WWTP	NY	US	2.1	50	UV3Plus	11/29/2021
West Point	MS	US	6	65	UV3Plus	9/28/2022
Lowell Upgrade	IN	US	4	65	UV3Plus	2/11/2022
Tucumcari	NM	US	4	65	UV3Plus	1/28/2022
Sebring Upgrade	OH	US	3	65	UV3Plus	1/30/2023
Fairbury UV3000B Replacement	NE	US	1.53	65	UV3Plus	2/28/2023
Champlain	NY	US	1.65	65	UV3Plus	1/18/2023
Great Bend 2nd Channel	KS	US	3.64	65	UV3Plus	8/31/2022
Churubusco Replacement	IN	US	0.952	65	UV3Plus	9/21/2023
Centerville Richeyville Upgrade	PA	US	1.12	65	UV3Plus	5/23/2023
Nicholasville - Jessamine Creek Replacement	KY	US	28	65	UV3Plus	1/18/2023
Franklin Township - Meadowbrook Road Upgrade	PA	US	24	65	UV3Plus	3/28/2023
Cedarburg Replacement	WI	US	8	65	UV3Plus	3/10/2022
Morton	WA	US	2.1	60	UV3Plus	12/20/2021
Cascade Locks - UV3000B Replacement	OR	US	0.504	55	UV3Plus	3/29/2023
Denis St Pierre DSP (formerly Belle River)	ON	CA	20.341	65	UV3Plus	10/17/2022
Levis Saint-Nicolas, QC	QC	CA	14.662	55	UV3Plus	7/20/2023
Fairview South WWTF	PA	US	6	65	UV3Plus	6/30/2021
New Cumberland WWTF	PA	US	4.7	65	UV3Plus	6/30/2021
Franklin WWTF	PA	US	1.33	65	UV3Plus	6/30/2021
Sparta Replacement	WI	US	6.5	65	UV3Plus	9/22/2023
City of Caledonia	MN	US	1.6	65	UV3Plus	7/25/2022
Roseville - Dry Creek WWTP	CA	US	45	66	UV3Plus	12/3/2007
Suffolk County - Bergen Point	NY	US	90	52	UV3Plus	9/9/2013
Roseville - Pleasant Grove WWTP	CA	US	30	70	UV3Plus	2/22/2010
Mid Halton	ON	CA	34.871	60	UV3Plus	12/1/2015
Merced	CA	US	18.55	55	UV3Plus	6/15/2010
Athens - Cedar Creek WRF Second UV Channel	GA	US	12.1	65	UV3Plus	1/12/2022
Bristow	OK	US	5.04	65	UV3Plus	3/1/2023
Sunland Park Replacement	NM	US	5.64	65	UV3Plus	6/17/2021
Smithfield - Sioux Falls	SD	US	3.6	35	UV3Plus	5/31/2022
Medicine Hat Expansion	AB	CA	8.982	55	UV3Plus	4/19/2023
Rochester	IN	US	3.6	60	UV3Plus	10/28/2021
New Castle County-Water Farm No 1 Upgrade	DE	US	5	65	UV3Plus	2/13/2023
Chewelah	WA	US	3	55	UV3Plus	4/1/2021
Western Wayne Regional - Cambridge City	IN	US	4.8	65	UV3Plus	9/27/2022
Cannelton	IN	US	3.668	65	UV3Plus	11/1/2022





Gas City Replacement	IN	US	3	65	UV3Plus	2/23/2021
Coaldale	AB	CA	2.642	55	UV3Plus	2/11/2022
Fitzgerald Creek WWTP	GA	US	7.5	65	UV3Plus	4/15/2022
Lakeville - Livingston County	NY	US	6.2	65	UV3Plus	11/17/2021
Cypress Creek WWTP (Replacement)	AL	US	7.5	65	UV3Plus	2/17/2021
South Sioux City	NE	US	3.5	50	UV3Plus	10/13/2022
Cheboygan	MI	US	6.5	65	UV3Plus	2/25/2022
Dona Ana County South Central Replacement	NM	US	6.336	60	UV3Plus	9/21/2023
Sherrill WWTP	NY	US	4	65	UV3Plus	2/14/2022
Twin Lakes Replacement	WI	US	4.1	65	UV3Plus	4/1/2022
Petawawa Replacement	ON	CA	5.548	65	UV3Plus	12/20/2022
Shelby County - Lake Loramie WWTP	OH	US	3	65	UV3Plus	3/22/2023
Ripley	NY	US	0.85	65	UV3Plus	6/1/2022
Great Bend	KS	US	3.64	65	UV3Plus	1/21/2021
Joplin - Turkey Creek - Phase II	MO	US	35	65	UV3Plus	9/23/2021
CFB Trenton Replacement	ON	CA	2.245	65	UV3Plus	10/26/2020
Frackville Replacement	PA	US	7	65	UV3Plus	10/16/2020
Elk Run Heights	IA	US	1.92	65	UV3Plus	5/26/2022
Lery WWTP	QC	CA	1.532	50	UV3Plus	10/7/2021
Nazareth Borough Municipal Authority	PA	US	12	65	UV3Plus	7/16/2021
Wolfville WWTP	NS	CA	4.243	40	UV3Plus	3/23/2021
Cowansville WWTP, QC	QC	CA	7.793	60	UV3Plus	6/29/2023
Walkerton	ON	CA	4.797	65	UV3Plus	6/29/2021
Sisters Bay	WI	US	2	65	UV3Plus	7/23/2020
Bloomington - Blucher Poole WWTP Upgrade	IN	US	16	65	UV3Plus	2/28/2020
Beaupre Replacement, QC	QC	CA	11.371	42	UV3Plus	12/9/2022
Hutchinson Replacement UV System	KS	US	18	65	UV3Plus	9/29/2020
Okmulgee Replacement UV System	OK	US	10	65	UV3Plus	5/3/2021
South Dearborn Expansion	IN	US	15	65	UV3Plus	12/7/2022
Port Washington Replacement	WI	US	13.9	61	UV3Plus	2/14/2022
Lebanon Replacement	OH	US	12	65	UV3Plus	2/19/2020
Anthony	NM	US	5.3	65	UV3Plus	7/19/2023
WARSAW	NY	US	3.84	65	UV3Plus	5/28/2021
Story City	IA	US	6.813	65	UV3Plus	10/29/2020
Blytheville - New WWTP	AR	US	8.64	65	UV3Plus	9/22/2021
Dundee	NY	US	1	65	UV3Plus	5/5/2023
Vermillion UV3000Plus Pre07 Replacement	SD	US	4.2	60	UV3Plus	5/17/2023
Red Creek WWTP	NY	US	1.5	65	UV3Plus	7/14/2022
Missouri City Steep Bank - Third Channel	TX	US	6	65	UV3Plus	11/16/2022
Lima	NY	US	1.44	55	UV3Plus	9/24/2021
Harlowton	MT	US	0.864	45	UV3Plus	4/8/2021





Monroe City	MO	US	2.664	65	UV3Plus	3/10/2022
Adel	IA	US	3.5	65	UV3Plus	6/2/2021
Amherst - Rutledge Creek Upgrade	VA	US	1.8	65	UV3Plus	12/16/2020
East Iron Range	MN	US	1.44	45	UV3Plus	11/18/2021
Memphis Upgrade	IN	US	2.2	65	UV3Plus	11/16/2020
Tipton, IA	IA	US	5	60	UV3Plus	12/17/2020
Williamsburg	IA	US	3.456	65	UV3Plus	5/17/2022
Saukville Replacement	WI	US	3.8	65	UV3Plus	10/10/2022
North Baltimore	OH	US	1.5	60	UV3Plus	2/25/2021
Thompson Falls	MT	US	0.72	55	UV3Plus	8/18/2021
Nunda	NY	US	0.6	65	UV3Plus	4/1/2022
Dunbar Borough Twp SA Replacement	PA	US	2.02	65	UV3Plus	10/19/2021
Ville de Beauharnois	QC	CA	7.608	65	UV3Plus	4/13/2021
Carlisle Upgrade	IN	US	1.1	65	UV3Plus	2/18/2020
Wuskwi Siphk First Nation	MB	CA	0.228	50	UV3Plus	6/24/2020
Sapulpa Replacement UV System	OK	US	9	65	UV3Plus	10/5/2020
Warrensburg West Side Replacement UV System	MO	US	12.4	60	UV3Plus	12/20/2019
Geneseo, NY	NY	US	4	55	UV3Plus	10/21/2019
Fort Leonard Wood	MO	US	11	65	UV3Plus	1/20/2021
TriCo Clay Twp - 2004 replacement	IN	US	11.5	65	UV3Plus	7/23/2020
Princeton Replacement	IN	US	8.55	65	UV3Plus	11/25/2020
Hudson	WI	US	4.8	55	UV3Plus	12/10/2020
Council	ID	US	1.31	50	UV3Plus	12/19/2019
Gonzales Replacement	TX	US	6.75	65	UV3Plus	9/13/2022
St. Charles West Side	IL	US	5.02	65	UV3Plus	9/30/2021
Atikokan	ON	CA	6.026	65	UV3Plus	8/26/2020
Del Hart	WI	US	6.54	65	UV3Plus	2/10/2020
Akron, NY	NY	US	2.5	65	UV3Plus	4/1/2021
Crandall Replacement	TX	US	4.5	65	UV3Plus	3/10/2020
Koshkonong	WI	US	2.911	55	UV3Plus	8/22/2019
Savannah	MO	US	4.1	65	UV3Plus	8/25/2021
Philadelphia	NY	US	3.168	65	UV3Plus	7/27/2023
Gaspé, QC	QC	CA	4.491	50	UV3Plus	5/30/2019
Wolcott	IN	US	3	65	UV3Plus	6/29/2021
Rolla Vichy Road WWTP	MO	US	1.5	60	UV3Plus	3/24/2021
Barbers Hollow	OH	US	2.7	65	UV3Plus	3/9/2023
Hickory - Pilgrims Pride	KY	US	3	65	UV3Plus	3/29/2022
Stockton	IL	US	1.7	65	UV3Plus	8/18/2023
Olymel - Saint-Esprit, QC	QC	CA	0.476	60	UV3Plus	12/2/2019
Chateauguay, QC	QC	CA	21.134	64	UV3Plus	9/16/2019
McMinnville WRF	OR	US	32	65	UV3Plus	4/18/2019
Ridgefield South St Replacement	CT	US	6	65	UV3Plus	4/12/2021
ONWASA NW - Replacement UV System	NC	US	5	75	UV3Plus	5/26/2020
Pickens	SC	US	4.25	65	UV3Plus	1/26/2022







Bowie Replacement	TX	US	3.75	65	UV3Plus	3/20/2020
East Palestine Wet Weather Facility	OH	US	2.5	50	UV3Plus	5/6/2021
Cherokee Replacement	IA	US	3.39	60	UV3Plus	9/26/2019
Bucyrus Upgrade	OH	US	7	65	UV3Plus	12/10/2020
Hastings Replacement	MI	US	4.6	65	UV3Plus	7/30/2020
Harrisburg	SD	US	3	65	UV3Plus	3/1/2021
East Bethlehem, PA	PA	US	4.2	65	UV3Plus	6/20/2019
Wheelersburg Replacement	OH	US	3.5	65	UV3Plus	12/11/2020
Strathmore Expansion	AB	CA	3.17	61	UV3Plus	5/21/2020
Coppermine WRF - Phase 2	GA	US	2.75	65	UV3Plus	6/26/2023
Dallas - Phase 2	GA	US	7.5	65	UV3Plus	8/12/2019
Cambridge (Galt) Replacement	ON	CA	45.173	45	UV3Plus	12/22/2020
Roseville Pleasant Grove WWTP	CA	US	8.3	65	UV3Plus	11/9/2023
Dover NH Replacement	NH	US	16.8	65	UV3Plus	6/23/2023
North East Brunswick WWTP UV System Expansion	NC	US	6.25	65	UV3Plus	2/17/2021
Millsboro - Mountaire Farms	DE	US	5	50	UV3Plus	6/25/2021
Christiansburg Upgrade	VA	US	12	65	UV3Plus	9/12/2019
Warrensburg East Side Replacement UV System	MO	US	12.4	60	UV3Plus	11/6/2020
LeRoy	NY	US	6	65	UV3Plus	2/22/2023
Berthoud	CO	US	6	65	UV3Plus	6/17/2019
Gadsden Upgrade - Koch Foods	AL	US	3	65	UV3Plus	8/6/2019
Westfield Upgrade, NY	NY	US	6.5	65	UV3Plus	6/5/2019
Salamanca WWTP	NY	US	5	65	UV3Plus	8/25/2020
Valley Center	KS	US	3	65	UV3Plus	10/16/2019
St Paul WWTP	AB	CA	3.434	65	UV3Plus	3/31/2020
Union City Replacement	IN	US	3	65	UV3Plus	7/1/2020
West Hill	PA	US	3.25	65	UV3Plus	12/18/2020
Manchester-Shortsville WWTP	NY	US	1.35	65	UV3Plus	2/24/2023
Neepawa	MB	CA	0.9114	55	UV3Plus	3/26/2019
Ridgeland UV System	SC	US	3.75	65	UV3Plus	6/17/2020
Central Mainline, PA	PA	US	3.26	65	UV3Plus	12/21/2018
Roxton Pond	QC	CA	1.1346	50	UV3Plus	3/25/2019
Stamford	CT	US	68	67	UV3Plus	2/4/2020
Lakewood Upgrade, OH	OH	US	35	65	UV3Plus	11/6/2019
Lakewood HRT, OH	OH	US	35	65	UV3Plus	1/29/2020
Medio Creek STP - Replacement	TX	US	21.25	65	UV3Plus	6/25/2019
Boxelder - Replacement	CO	US	8.9	65	UV3Plus	9/23/2020
Warsaw Upgrade	IN	US	18	65	UV3Plus	10/25/2019
Terrebonne Lapiniere, QC	QC	CA	23.406	60	UV3Plus	9/14/2023
Fort McMurray WRF	AB	CA	27.157	65	UV3Plus	4/17/2019
Girard	OH	US	12	60	UV3Plus	1/11/2019
Algonquin	IL	US	15.84	65	UV3Plus	7/16/2020
Lumsden, SK SBR	SK	CA	2.256	50	UV3Plus	12/18/2019
Winslow	AZ	US	2.2	65	UV3Plus	9/7/2022
Pawling WWTF	NY	US	1.62	65	UV3Plus	8/15/2018





Central City Replacement UV System	KY	US	8	65	UV3Plus	7/20/2020
Salem Lakes Expansion	WI	US	5.18	65	UV3Plus	9/24/2019
South Tyger River WWTP (Replacement)	SC	US	2.5	60	UV3Plus	5/24/2018
Livingston Manor	NY	US	2.4264	65	UV3Plus	10/11/2022
Keystone - Fredericksburg	PA	US	1.5	65	UV3Plus	12/23/2020
Wickenburg Ranch	AZ	US	0.73	65	UV3Plus	5/20/2020
Stockbridge, GA	GA	US	1.9	65	UV3Plus	6/24/2019
Gimli Expansion	MB	CA	3.487	55	UV3Plus	10/30/2018
Middleport	NY	US	1.36	65	UV3Plus	4/1/2021
DeWitt	IA	US	3.03	65	UV3Plus	7/29/2020
Oakfield	NY	US	1.6	65	UV3Plus	1/18/2019
Channahon Replacement	IL	US	4	65	UV3Plus	2/12/2020
UV3000plus module	ON	CA	0.5	65	UV3Plus	9/30/2004
Brewster Heights (Resubmittal)	NY	US	0.3	65	UV3Plus	10/29/2004
Sherbrooke Rock Forest	QC	CA	1.876	65	UV3Plus	4/1/2019
SALEM	MO	US	3.62	60	UV3Plus	5/17/2018
Hagerstown Upgrade	IN	US	0.875	65	UV3Plus	2/15/2019
Central Berkeley Second UV System	SC	US	7.5	60	UV3Plus	3/4/2021
Plymouth Replacement, CT	CT	US	4.5	65	UV3Plus	11/15/2018
Mandeville (Replacement)	LA	US	4	45	UV3Plus	7/11/2018
Townsend Low UVT	MT	US	0.612	40	UV3Plus	8/23/2019
Fort McClellan - Replacement UV System	AL	US	8.8	65	UV3Plus	8/15/2018
Lochbuie Replacement WWTP	CO	US	9	65	UV3Plus	11/22/2019
Flaugherty Run Upgrade	PA	US	6.67	65	UV3Plus	7/11/2018
Smith Falls Replacement	ON	CA	13.394	65	UV3Plus	8/23/2018
New Lexington	OH	US	5.4	55	UV3Plus	9/25/2018
Lynden WWTP	WA	US	6.82	65	UV3Plus	3/30/2018
Sturgis	SD	US	2	65	UV3Plus	10/15/2020
Blissfield	MI	US	5.5	65	UV3Plus	8/25/2021
Olmito WWTP	TX	US	3.75	65	UV3Plus	9/19/2023
Chesapeake City	MD	US	0.9	65	UV3Plus	7/1/2021
Cortez Sanitation District	CO	US	5	65	UV3Plus	7/17/2019
Rib Mountain	WI	US	4.34	65	UV3Plus	12/15/2017
Carey	OH	US	5	65	UV3Plus	4/1/2020
Big Lake	TX	US	4.2	65	UV3Plus	6/24/2019
Nelsonville	OH	US	4.8	65	UV3Plus	1/24/2022
Wasagamack	MB	CA	1.164	60	UV3Plus	2/15/2018
Mt Vernon	IA	US	5	65	UV3Plus	9/27/2019
Georgetown Upgrade	IN	US	2.4	65	UV3Plus	11/21/2018
Kingsville Replacement	ON	CA	4.113	65	UV3Plus	3/14/2018
New Palestine	IN	US	1.5	65	UV3Plus	5/23/2018
Olymel Yamachiche, QC	QC	CA	0.824	60	UV3Plus	11/23/2018
Lynn, IN	IN	US	0.5	65	UV3Plus	7/18/2019
Ogdensburg, NY	NY	US	13	65	UV3Plus	6/30/2020





Fort Huachuca Replacement	AZ	US	3.5	65	UV3Plus	12/28/2017
Hite Creek Upgrade 2	KY	US	10	65	UV3Plus	3/17/2021
Ripley	MS	US	5	65	UV3Plus	4/23/2018
Spring City	PA	US	3	60	UV3Plus	7/5/2018
Volga	SD	US	1.15	45	UV3Plus	2/22/2019
Johnson Creek Replacement	WI	US	2.1	65	UV3Plus	11/20/2018
Otterbein	IN	US	1.3	65	UV3Plus	2/23/2018
Paris	TN	US	6.3	65	UV3Plus	5/31/2018
COSHOCTON	OH	US	6.6	65	UV3Plus	3/29/2018
Beecher	IL	US	3	65	UV3Plus	2/18/2019
Upper Mill Creek Upgrade - Butler County	OH	US	40	65	UV3Plus	9/24/2018
LeSourdsville Upgrade - Butler County	OH	US	36	65	UV3Plus	12/18/2018
Craigeith	ON	CA	5.188	65	UV3Plus	2/21/2018
Huntsville (Dist. of Muskoka), Re	ON	CA	3.513	65	UV3Plus	3/20/2018
White Haven	PA	US	2.4	65	UV3Plus	3/1/2019
Elida Upgrade	OH	US	1.2	50	UV3Plus	12/12/2019
Blind River	ON	CA	2.031	60	UV3Plus	9/29/2017
Caruthersville	MO	US	4	65	UV3Plus	11/18/2020
Listowel (North Perth) Upgrade	ON	CA	6.736	65	UV3Plus	12/5/2018
Pacific City Joint Water-Sanitary Authority PCJWSA	OR	US	1.27	45	UV3Plus	6/21/2018
Thornbury Replacement	ON	CA	1.894	65	UV3Plus	2/21/2018
Prattville - Pine Creek WWTP Expansion	AL	US	18.5	65	UV3Plus	2/14/2018
West Unity Upgrade	OH	US	1.46	65	UV3Plus	3/12/2018
Knightstown	IN	US	2.1	65	UV3Plus	3/15/2018
Becancour, QC	QC	CA	2.734	55	UV3Plus	3/29/2018
Wilton	IA	US	2.227	65	UV3Plus	11/30/2018
Ascot Corner, QC	QC	CA	0.266	20	UV3Plus	11/30/2018
Taylor	TX	US	16	65	UV3Plus	6/22/2017
Spartanburg Lower North Tyger River WWTP	SC	US	10	60	UV3Plus	12/21/2017
Upper Gwynedd Expansion	PA	US	10	60	UV3Plus	6/11/2019
Ashland Replacement WI	WI	US	4	60	UV3Plus	11/22/2017
Decherd	TN	US	8	65	UV3Plus	5/15/2019
Stilwell	OK	US	4	65	UV3Plus	7/29/2019
Mineola Replacement	TX	US	6	65	UV3Plus	2/16/2023
Glencoe	MN	US	6	58	UV3Plus	10/30/2020
Kemptville (6 lamp modules)	ON	CA	4	65	UV3Plus	12/19/2017
Mount Olive	NC	US	5	65	UV3Plus	11/15/2017
Alamosa Replacement	CO	US	4.75	65	UV3Plus	4/24/2018
Eudora Replacement UV System	KS	US	3	65	UV3Plus	12/13/2023
Manto Sipi First Nation	MB	CA	0.396	50	UV3Plus	2/15/2017
Potsdam Replacement	NY	US	7.01	65	UV3Plus	5/24/2018
Taylor Creek Expansion	OH	US	13.75	65	UV3Plus	9/18/2019



Dartmouth 28 fecal max	MA	US	12	60	UV3Plus	11/13/2017
Plant 20	KS	US	24	65	UV3Plus	6/29/2017
Emerald Coast Utilities Authority - Bayou Marcus	FL	US	23.941	65	UV3Plus	5/21/2018
Denison Paw Paw Replacement	TX	US	13	65	UV3Plus	9/15/2017
Boonville Upgrade	IN	US	12	65	UV3Plus	3/8/2018
Indian Creek WRF	GA	US	6	70	UV3Plus	9/29/2017
Itasca Duplicate System	IL	US	12.1	65	UV3Plus	5/16/2018
LCIDA - Golden Triangle Replacement UV System	MS	US	8.2	65	UV3Plus	8/20/2018
Montpelier	OH	US	3	65	UV3Plus	11/1/2017
Cloverdale Replacement	IN	US	4	65	UV3Plus	3/13/2017
Chalk River	ON	CA	1.691	60	UV3Plus	2/21/2018
Seymour (Webster County)	MO	US	3	65	UV3Plus	12/14/2017
Emporia (Replacement)	KS	US	11	65	UV3Plus	9/20/2018
MONTICELLO	NY	US	8.3	65	UV3Plus	12/11/2017
Georgetown	ON	CA	22.983	70	UV3Plus	6/27/2017
Clayton (replacement)	NC	US	6.25	65	UV3Plus	3/9/2017
Wilmington Upgrade	OH	US	8.5	65	UV3Plus	11/28/2017
Keeseville WWTP - Ausable	NY	US	3.384	65	UV3Plus	3/8/2017
Calls Creek WWTP - Watkinsville, GA	GA	US	3.75	65	UV3Plus	12/19/2017
Castleton Replacement	VT	US	2.95	60	UV3Plus	1/20/2023
Mt. Horeb (two banks)	WI	US	3.16	65	UV3Plus	1/30/2018
Hebron Replacement	OH	US	5	65	UV3Plus	2/15/2021
Honeoye Falls	NY	US	1.5	55	UV3Plus	4/26/2017
Kidron - Gerber	OH	US	0.42	65	UV3Plus	4/27/2017
Denton	MD	US	2.67	65	UV3Plus	3/7/2019
Woodland Park WWTP each bank 1/2 of peak	CO	US	2.77	65	UV3Plus	8/15/2017
Dell Rapids	SD	US	2	65	UV3Plus	6/26/2017
Regie d'assainissement des Coteaux	QC	CA	4.253	50	UV3Plus	9/24/2018
Patoka Lake	IN	US	2.45	65	UV3Plus	2/1/2018
Andrews WWTP	IN	US	1.44	65	UV3Plus	11/22/2017
Lakehaven Utilities - Lakota WWTP	WA	US	14.29	65	UV3Plus	2/23/2017
Redondo WWTP	WA	US	12.5	60	UV3Plus	11/13/2020
Bossier NE WWTP	LA	US	18	65	UV3Plus	12/18/2018
Jacksonville - System Replacement	AL	US	8.75	65	UV3Plus	5/22/2017
Shelby	OH	US	7	60	UV3Plus	9/27/2018
Hampstead Replacement - No-EQ	MD	US	2.93	65	UV3Plus	3/4/2020
Newton County RWSD	IN	US	1.7	65	UV3Plus	9/14/2018
Mobridge - Alternate 1	SD	US	1.61	55	UV3Plus	12/13/2016
Camp Robinson - Replacement System	AR	US	3	65	UV3Plus	3/31/2017
Delhi	ON	CA	2.101	70	UV3Plus	9/28/2017
Viriden	MB	CA	0.951	60	UV3Plus	11/16/2017
Lake Village Replacement UV System	AR	US	1.5	65	UV3Plus	1/25/2017



Windsor, Lou Romano	ON	CA	115.179	60	UV3Plus	1/24/2006
Belmont - Indianapolis	IN	US	170	55	UV3Plus	5/24/2012
Woodland	CA	US	15.6	55	UV3Plus	1/16/2006
Albuquerque 3 Channel	NM	US	120	70	UV3Plus	6/5/2010
Southport - Indianapolis	IN	US	150	62	UV3Plus	9/15/2014
Waterloo	ON	CA	52.834	50	UV3Plus	9/23/2010
Kitchener	ON	CA	52.834	60	UV3Plus	9/27/2012
Halifax	NS	CA	50.214	40	UV3Plus	12/12/2005
Nogales	AZ	US	30.7	65	UV3Plus	5/7/2009
Whittier Narrows WRP	CA	US	21	69	UV3Plus	8/14/2008
Norman	OK	US	44	55	UV3Plus	6/23/2015
Alexandria Replacement	VA	US	115	65	UV3Plus	8/24/2016
Lodi White Slough WWTP	CA	US	16.3	55	UV3Plus	7/28/2004
Hillsborough County South	FL	US	16	65	UV3Plus	12/19/2013
Modesto	CA	US	14.5	65	UV3Plus	7/7/2014
Leavenworth	KS	US	30	45	UV3Plus	7/26/2012
Lahaina Replacement 9.0 MGD	HI	US	9	67	UV3Plus	8/15/2013
Palo Alto - RWQCP	CA	US	54	62	UV3Plus	2/5/2010
Missouri River WWTP	MO	US	80	55	UV3Plus	11/30/2012
Mesa - Northwest WWTP	AZ	US	28.2	65	UV3Plus	4/24/2008
Atwater	CA	US	11.2	55	UV3Plus	4/15/2011
Skyway	ON	CA	77.138	70	UV3Plus	6/17/2014
Dartmouth	NS	CA	32.411	40	UV3Plus	10/4/2006
Bend - RFI Design	OR	US	24	55	UV3Plus	5/27/2014
Thunder Bay	ON	CA	44.645	45	UV3Plus	2/15/2009
Northwest Regional WRF	FL	US	15	60	UV3Plus	10/23/2008
Blackhawk WWTP	TX	US	27.75	55	UV3Plus	9/26/2013
Valrico WRF Hillsborough Co.	FL	US	17.5	65	UV3Plus	3/17/2008
Falkenburg AWTP Expansion	FL	US	16.7	65	UV3Plus	3/24/2008
Somerset Raritan Valley SSO	NJ	US	14	33	UV3Plus	11/17/2020
Ironhouse Sanitary District	CA	US	9.6	65	UV3Plus	12/20/2010
Bossier City Upgrade	LA	US	48	65	UV3Plus	1/13/2014
Whites Creek WWTP	TN	US	120	70	UV3Plus	6/15/2012
Pine Creek WWTP - Calgary	AB	CA	63.401	60	UV3Plus	12/15/2006
Kaw Point WWTP	KS	US	48	50	UV3Plus	12/16/2013
North Hudson SA - Adams Street WWTP	NJ	US	45	65	UV3Plus	3/14/2011
Edinburg WWTP	TX	US	39.6	65	UV3Plus	3/29/2012
Big Creek WRF	GA	US	44	65	UV3Plus	12/8/2005
Vancouver Westside Replacement	WA	US	67.55	55	UV3Plus	12/30/2015
Five Mile Creek WWTP	AL	US	75	70	UV3Plus	11/15/2006
Terre Haute	IN	US	48	65	UV3Plus	12/18/2013
Colchester	NS	CA	20.907	40	UV3Plus	12/15/2011
Athens-Clarke County North Oconee WWTP	GA	US	32.1	60	UV3Plus	12/14/2009
Glendale Arrowhead Ranch Replacement	AZ	US	9	65	UV3Plus	12/4/2012





Oakville SW WWTP	ON	CA	66.043	65	UV3Plus	7/12/2006
Watsonville	CA	US	7.7	55	UV3Plus	9/30/2007
El Paso Replacement Hickerson	TX	US	35	65	UV3Plus	2/15/2022
Aquia Replacement - Stafford Co.	VA	US	24	60	UV3Plus	12/21/2006
Prince William County	VA	US	48	70	UV3Plus	5/10/2005
San Marcos WWTP 31 MGD	TX	US	31	65	UV3Plus	1/29/2010
Glen Cove	NY	US	10	50	UV3Plus	2/22/2006
California Men's Colony WWTP	CA	US	5.18	70	UV3Plus	6/18/2013
Fort Kamehameha Replacement	HI	US	30	75	UV3Plus	10/30/2008
Bowling Green WWTP	KY	US	32	65	UV3Plus	6/30/2011
North Durham WRF	NC	US	60	65	UV3Plus	12/13/2010
Sherman WWTP	TX	US	32	60	UV3Plus	9/24/2014
Superior (15 mgd at 45% UVT, 2 channel )	WI	US	15	45	UV3Plus	6/26/2012
Adams Field	AR	US	72	65	UV3Plus	10/1/2007
South Mesquite	TX	US	102.5	65	UV3Plus	12/7/2017
Orange Replacement	TX	US	24	62	UV3Plus	8/20/2016
Galt	CA	US	6	55	UV3Plus	8/5/2010
Avra Valley	AZ	US	8	65	UV3Plus	5/20/2008
Millville	NJ	US	9.2	30	UV3Plus	4/27/2017
Missouri WWTP, St. Charles	MO	US	24.42	65	UV3Plus	5/15/2011
Cornwall	ON	CA	31.7	65	UV3Plus	12/20/2012
Moore's Creek WWTP - Rivanna	VA	US	37.5	65	UV3Plus	9/1/2010
Little Choctawhatchee WWTP	AL	US	39	65	UV3Plus	12/1/2010
Enid	OK	US	36	65	UV3Plus	9/15/2011
Lower Berkeley County	SC	US	54	65	UV3Plus	7/21/2005
Yellow River WRF - Gwinnett County	GA	US	29.3	75	UV3Plus	8/20/2009
Murray - Bee Creek	KY	US	24	65	UV3Plus	10/15/2016
Billings	MT	US	40	65	UV3Plus	11/1/2010
Northwest Bergen 2nd Channel Expansion	NJ	US	20	65	UV3Plus	12/20/2011
Sedona	AZ	US	3.61	70	UV3Plus	3/13/2012
Athens-Clarke County Middle Oconee WWTP	GA	US	25	65	UV3Plus	9/1/2010
Wilson Creek Expansion	TX	US	30	65	UV3Plus	3/19/2018
Grass Valley	CA	US	7.6	70	UV3Plus	4/3/2009
Warren	MI	US	60	65	UV3Plus	9/1/2010
Oakville SW WWTP Expansion	ON	CA	33.022	65	UV3Plus	11/15/2010
Soledad	CA	US	5.5	55	UV3Plus	6/15/2009
Hermitage	PA	US	36	65	UV3Plus	6/24/2011
Stewart Creek NTMWD	TX	US	39	65	UV3Plus	11/24/2016
Auburn (55% UVT Option)	CA	US	6.1	55	UV3Plus	3/2/2010
Yuma	AZ	US	7.5	65	UV3Plus	5/8/2004
Snoqualmie Replacement WRF	WA	US	20	67	UV3Plus	3/30/2017
Seymour	IN	US	30	65	UV3Plus	2/25/2011
Penticton	BC	CA	9.51	60	UV3Plus	9/24/2010
Grand Chute Upgrade	WI	US	25.4	53	UV3Plus	1/24/2011





Dover	NH	US	16.8	65	UV3Plus	9/13/2004
Western Monmouth - 2 channels	NJ	US	24	65	UV3Plus	9/28/2010
Dothan - Omussee Creek WWTP	AL	US	17.1	65	UV3Plus	12/8/2017
Mississippi River WWTP - St. Charles	MO	US	36	65	UV3Plus	12/29/2011
Flower Mound Replacement	TX	US	33.36	65	UV3Plus	8/20/2019
St. Cloud	MN	US	34	58	UV3Plus	11/15/2010
Keswick Expansion	ON	CA	16.907	65	UV3Plus	5/19/2011
Lake Wildwood	CA	US	2.45	55	UV3Plus	10/19/2012
Los Osos WWRF	CA	US	4.04	65	UV3Plus	3/19/2015
Kauai Lagoons	HI	US	3	55	UV3Plus	11/24/2009
Northwest Bergen Complete Channel	NJ	US	20	65	UV3Plus	6/29/2007
Grand Island	NE	US	28.2	60	UV3Plus	3/20/2006
Greenwich	CT	US	34	65	UV3Plus	7/7/2008
El Portal - Yosemite	CA	US	1.5	55	UV3Plus	10/25/2006
Brockville	ON	CA	16.511	60	UV3Plus	10/1/2010
Aberdeen AWWTP	MD	US	10	65	UV3Plus	5/27/2011
Peterborough	ON	CA	31.7	65	UV3Plus	4/4/2003
Altoona - Westerly WWTP	PA	US	60	65	UV3Plus	1/27/2011
Lake Havasu - Islands WWTP	AZ	US	2.5	65	UV3Plus	4/1/2006
Regina WWTP	SK	CA	52.042	55	UV3Plus	3/16/2015
York	PA	US	58.5	65	UV3Plus	3/29/2001
Yucaipa - H.N. Wochholz WWTP	CA	US	9.2	70	UV3Plus	8/1/2007
Columbus	IN	US	44.65	65	UV3Plus	12/15/2010
Western Wake	NC	US	47.3	65	UV3Plus	3/28/2013
Dartmouth (Eastern Passage) Dillon	NS	CA	19.813	65	UV3Plus	6/3/2013
Kennewick	WA	US	16	60	UV3Plus	11/22/2017
Athens	AL	US	20	65	UV3Plus	11/26/2008
WILMINGTON	NC	US	40	65	UV3Plus	9/28/2006
Medio Creek WRC	TX	US	18.75	65	UV3Plus	(blank)
Shepherdsville Replacement	KY	US	23	65	UV3Plus	2/24/2010
Greeley	CO	US	25	50	UV3Plus	8/3/2005
Winchester - Lower Howards Creek	KY	US	10	65	UV3Plus	8/15/2012
Westborough	MA	US	28	65	UV3Plus	5/30/2010
Live Oak	CA	US	4.1	55	UV3Plus	12/21/2010
Prescott Valley Expansion Phase III	AZ	US	7.5	70	UV3Plus	5/31/2006
Dover Township Replacement	PA	US	21	65	UV3Plus	1/8/2010
Madisonville Replacement	KY	US	24	65	UV3Plus	6/20/2013
Upper Trinity (Lakeview)	TX	US	18	65	UV3Plus	9/22/2002
Mooreville	NC	US	18	65	UV3Plus	9/30/2010
Willmar	MN	US	19.6	60	UV3Plus	10/1/2009
Little Maumelle	AR	US	14	65	UV3Plus	1/29/2010
Kelowna	BC	CA	6.446	57	UV3Plus	7/2/2009
Olathe - Cedar Creek WWTP	KS	US	25	65	UV3Plus	7/28/2011
Lincoln Park - Two Bridges S.A.	NJ	US	25	65	UV3Plus	9/24/2010
Longmont Replacement - Final	CO	US	25	55	UV3Plus	9/8/2006





Waimea WWTP	HI	US	1.8	55	UV3Plus	12/23/2011
Oakville Southeast	ON	CA	17.382	65	UV3Plus	12/15/2008
Kleinburg Expansion	ON	CA	3.17	65	UV3Plus	2/18/2010
Pharr	TX	US	25	65	UV3Plus	5/24/2010
Manhattan	KS	US	24	65	UV3Plus	11/15/2011
Wahiawa WWTP - Central Oahu	HI	US	6.5	65	UV3Plus	5/18/2012
Floyds Fork Replacement	KY	US	20.8	65	UV3Plus	5/24/2012
Richmond - Otter Creek	KY	US	24	65	UV3Plus	9/15/2009
Rock Creek WWTP	MO	US	16.7	65	UV3Plus	9/1/2010
Wyomissing - 2-channel option	PA	US	12	55	UV3Plus	9/6/2012
Sequim Replacement	WA	US	2.46	65	UV3Plus	7/2/2009
Deerfield	IL	US	27.5	65	UV3Plus	9/1/2011
Bozeman	MT	US	16.9	65	UV3Plus	8/20/2009
Sedalia - Southeast Plant	MO	US	13	65	UV3Plus	2/4/2013
Wilson Creek Alt	TX	US	30	65	UV3Plus	5/2/2011
Wilson Creek Regional WWTP	TX	US	30	65	UV3Plus	5/2/2011
Twin Falls WWTP BASE	ID	US	16.6	55	UV3Plus	8/15/2012
Little River WPCP - Expansion	GA	US	26.5	65	UV3Plus	(blank)
Western Beaches CSO	ON	CA	11.412	30	UV3Plus	6/22/2004
Herring Cove	NS	CA	11.412	40	UV3Plus	12/13/2007
Wentzville	MO	US	23.4	65	UV3Plus	11/21/2006
Fort McMurray	AB	CA	33.022	70	UV3Plus	11/15/2006
Valley Forge	PA	US	32.5	65	UV3Plus	2/25/2011
Meridian	ID	US	7.5	65	UV3Plus	9/24/2015
Altoona - Easterly	PA	US	35	65	UV3Plus	3/27/2012
Mesquite	NV	US	7.3	70	UV3Plus	6/26/2010
Farmington (18.79 mgd)	CT	US	18.79	65	UV3Plus	6/15/2017
Middletown	NY	US	23	65	UV3Plus	12/17/2009
Lake of the Pines	CA	US	3.62	65	UV3Plus	6/29/2007
Cedar Creek	KY	US	23.1	65	UV3Plus	3/6/2002
Waxahachie	TX	US	32	65	UV3Plus	12/2/2004
Noblesville	IN	US	20	65	UV3Plus	9/26/2008
Milford - Housatonic WWTP	CT	US	23.4	65	UV3Plus	12/15/2007
FAIRHAVEN	MA	US	16	65	UV3Plus	12/15/2003
Laie - Replacement	HI	US	2	75	UV3Plus	3/24/2016
Clarksville	IN	US	22	65	UV3Plus	9/24/2014
Charles City WPCP 58%UVT	IA	US	10.8	58	UV3Plus	9/1/2015
Sahuarita Expansion New 2nd Channel	AZ	US	2.85	60	UV3Plus	11/20/2008
South Kohala - 1.267MGD	HI	US	1.267	55	UV3Plus	10/1/2008
Spotsylvania Expansion - Phase 2	VA	US	12.6	65	UV3Plus	7/27/2011
Tehachapi State Prison	CA	US	1.8	55	UV3Plus	7/23/2009
Mt. Washington	KY	US	21	65	UV3Plus	7/18/2011
Discovery Bay Expansion	CA	US	4.8	65	UV3Plus	12/1/2016
Catasauqua	PA	US	6.33	50	UV3Plus	6/28/2013
Mount Vernon	WA	US	25.9	65	UV3Plus	8/18/2008
Oak Lodge	OR	US	22	65	UV3Plus	5/7/2012







Kings Regional	NS	CA	8.097	40	UV3Plus	3/15/2010
Mason City	IA	US	21.6	65	UV3Plus	3/29/2009
Mulberry WWTP	AZ	US	2.2	65	UV3Plus	7/20/2004
Winchester	KY	US	24	65	UV3Plus	11/21/2006
South Burlington - Airport Pkwy WWTF	VT	US	7.92	60	UV3Plus	2/10/2011
East Greenbush WWTP	NY	US	5.16	40	UV3Plus	7/2/2009
Orange Beach	AL	US	15	65	UV3Plus	5/3/2010
Walcomet	WI	US	20.4	65	UV3Plus	10/3/2008
O Fallon	IL	US	22	65	UV3Plus	2/28/2013
Fulton County - Little River WRF	GA	US	7.5	70	UV3Plus	12/12/2018
Foxwoods Expansion (Phase 2)	CT	US	5.7	70	UV3Plus	2/27/2008
Mount Laurel - Hartford Rd Exp.	NJ	US	15	65	UV3Plus	6/15/2014
Hollidaysburg Replacement	PA	US	15	65	UV3Plus	6/27/2013
Marana	AZ	US	3.7	65	UV3Plus	6/19/2008
Dominion - Option 5- combined	NS	CA	7.532	50	UV3Plus	7/3/2009
Diamondhead	MS	US	7.5	65	UV3Plus	11/8/2016
Star City (Morgantown)	WV	US	20.8	65	UV3Plus	12/19/2018
Marshall	TX	US	18	55	UV3Plus	6/11/2003
South Adams County Water	CO	US	15.2	65	UV3Plus	12/19/2014
Shelbyville	TN	US	15.544	65	UV3Plus	12/29/2011
Taylor Creek	OH	US	13.75	65	UV3Plus	2/15/2008
Jesup	GA	US	7.5	65	UV3Plus	12/27/2012
Medicine Hat	AB	CA	17.964	55	UV3Plus	6/19/2009
Wisconsin Rapids	WI	US	12.1	48	UV3Plus	3/15/2011
Missouri City - Steep Bank	TX	US	12	65	UV3Plus	3/1/2010
Maryland City - Anne Arundel County	MD	US	7.74	65	UV3Plus	9/29/2011
Marshalltown - 20 MGD	IA	US	20	57	UV3Plus	9/18/2013
Denton Creek	TX	US	25.2	65	UV3Plus	4/20/2009
Grand Haven Spring Lake	MI	US	15	60	UV3Plus	8/22/2013
Blacksburg Stroubles Creek	VA	US	30	65	UV3Plus	3/11/2013
Discovery Bay	CA	US	3.6	65	UV3Plus	4/1/2010
Atchison (55%UVT equipment for 60%UVT)	KS	US	8.4	55	UV3Plus	6/21/2012
Latrobe Replacement	PA	US	15	65	UV3Plus	8/25/2016
Waikoloa Resort Utilities	HI	US	2	65	UV3Plus	4/22/2011
Peppers Ferry WWTP - Radford	VA	US	18	70	UV3Plus	12/16/2011
Heber	CA	US	2.6	60	UV3Plus	6/29/2012
Port Washington	NY	US	7	65	UV3Plus	10/16/2009
Schofield	HI	US	4.2	65	UV3Plus	12/19/2005
Eagle River WWTF 4.43 MGD	AK	US	4.43	60	UV3Plus	8/1/2009
Healdsburg	CA	US	4	65	UV3Plus	6/26/2007
Kenora	ON	CA	12.02	50	UV3Plus	10/2/2009
East Moline	IL	US	28	65	UV3Plus	9/8/2011
Caldwell	NJ	US	15	65	UV3Plus	9/18/2009
Irvine Regional WWTP	KY	US	8	65	UV3Plus	6/30/2011





Lower Allen Township	PA	US	20	65	UV3Plus	5/16/2005
Shippensburg	PA	US	8	55	UV3Plus	12/14/2010
Williams	CA	US	2.32	55	UV3Plus	9/28/2010
Mountain Top	PA	US	16	65	UV3Plus	11/21/2006
Ville de Boisbriand	PQ	CA	12.046	40	UV3Plus	5/29/2006
North Haven	CT	US	10.7	65	UV3Plus	3/28/2016
Faribault	MN	US	12.04	60	UV3Plus	10/28/2010
Blue River Main WWTP	KS	US	24	65	UV3Plus	4/27/2006
Sutton	ON	CA	3.244	65	UV3Plus	2/2/2012
Red Deer	AB	CA	19.020	53	UV3Plus	11/17/2008
Wausau Alternate Bid	WI	US	19.987	55	UV3Plus	3/27/2012
Trenton	ON	CA	13.209	65	UV3Plus	12/15/2016
Billings Expansion - 3rd Channel	MT	US	20	65	UV3Plus	1/30/2020
Mill Creek WWTP Johnson Co.	KS	US	24	65	UV3Plus	1/22/2005
Cheshire (2 channels)	CT	US	11	65	UV3Plus	9/11/2014
casper	WY	US	23	55	UV3Plus	11/30/2005
Athens 14 mgd 2 channels 65 UVT	OH	US	14	65	UV3Plus	3/26/2014
Havre de Grace	MD	US	12	65	UV3Plus	9/22/2008
O'Fallon	MO	US	15	60	UV3Plus	11/24/2008
North Olmsted	OH	US	31.5	65	UV3Plus	12/17/2013
Orange	VA	US	8	65	UV3Plus	9/2/2009
St. Peters WWTP	MO	US	19	64	UV3Plus	6/2/2009
FREDERICKSBURG	VA	US	13.5	65	UV3Plus	8/13/2009
South Dearborn Replacement	IN	US	15	65	UV3Plus	3/30/2016
Rosemere - Per Aug 2003 Spec	PQ	CA	7.661	38	UV3Plus	5/10/2004
Valley Joint Sewer Replacement	PA	US	13.25	65	UV3Plus	9/26/2012
Yorktown Heights	NY	US	4.5	65	UV3Plus	11/15/2007
Hinesville - Fort Stewart (2 banks)	GA	US	14.3	65	UV3Plus	6/19/2014
Elkton	VA	US	3	35	UV3Plus	12/12/2011
Fort Dodge WWTP	IA	US	16	65	UV3Plus	8/30/2010
Bowling Green Replacement	OH	US	30	65	UV3Plus	1/5/2010
Belton	MO	US	16	65	UV3Plus	6/23/2011
Whiteriver	AZ	US	3	60	UV3Plus	2/18/2011
SARA - Martinez II	TX	US	9	65	UV3Plus	6/30/2011
Mount Clemens	MI	US	12.5	65	UV3Plus	2/24/2011
Kihei - Third channel Expansion	HI	US	2.5	75	UV3Plus	6/23/2015
Ames	IA	US	25	65	UV3Plus	11/1/2013
Athens - Cedar Creek WRF	GA	US	9	65	UV3Plus	1/15/2010
Central Berkeley	SC	US	7.5	60	UV3Plus	6/30/2011
Columbus - Two Channels	NE	US	12	65	UV3Plus	2/15/2011
Fitzgerald Creek WPCP Expansion	GA	US	15	65	UV3Plus	12/20/2007
Ellensburg	WA	US	15.28	70	UV3Plus	8/25/2016
Romeoville	IL	US	15	65	UV3Plus	7/17/2006
Pooler Expansion	GA	US	6	70	UV3Plus	12/8/2016
ABERDEEN	MD	US	6	65	UV3Plus	8/22/2005
Roswell	NM	US	16	60	UV3Plus	2/15/2006





Northglenn	CO	US	14	65	UV3Plus	2/22/2019
Watertown Replacement	SD	US	12	65	UV3Plus	1/15/2016
Poipu	HI	US	0.8	55	UV3Plus	5/16/2005
Westside Regional WWTP	BC	CA	6.657	65	UV3Plus	6/30/2011
Cumming	GA	US	20	65	UV3Plus	3/29/2007
Fillmore	CA	US	6	65	UV3Plus	3/27/2008
Sterling Creek WRF - Richmond Hill, GA	GA	US	10	70	UV3Plus	6/15/2015
Little Falls Run WWTP, Stafford Co.	VA	US	12	65	UV3Plus	12/17/2004
Fort Carson Replacement	CO	US	6	65	UV3Plus	3/18/2016
Moore's Creek WWTP - Rivanna Expansion	VA	US	16.66	65	UV3Plus	2/16/2011
Mercedes	TX	US	15	65	UV3Plus	11/17/2010
East Windsor (Millstone Road WPCF)	NJ	US	11.25	60	UV3Plus	9/16/2009
Springfield	MO	US	17	65	UV3Plus	12/16/2005
Victorville	CA	US	6.42	65	UV3Plus	3/19/2010
Salmon Arm WPCP	BC	CA	3.963	52	UV3Plus	5/17/2018
Loveland	CO	US	20.7	65	UV3Plus	1/28/2004
Leeds - System Replacement	AL	US	10.01	65	UV3Plus	8/2/2018
Bluffton WWTP	IN	US	13.65	65	UV3Plus	11/15/2012
Port Royal WWTP Beaufort Jasper	SC	US	12.5	65	UV3Plus	5/2/2005
Milton	ON	CA	6.604	65	UV3Plus	10/14/2005
Great Neck, District & Village	NY	US	8.3	65	UV3Plus	5/3/2011
Athol	MA	US	4.76	65	UV3Plus	4/25/2007
Moorestown Replacement	NJ	US	12	65	UV3Plus	12/18/2014
Lytle Creek	CA	US	2	55	UV3Plus	8/1/2005
Little River WPCP Columbia County	GA	US	13.25	65	UV3Plus	3/31/2004
Key West	FL	US	20	65	UV3Plus	9/6/2006
Corbin	KY	US	12.5	65	UV3Plus	7/27/2017
Hawkesbury	ON	CA	10.956	65	UV3Plus	12/15/2011
Ferndale	CA	US	1	55	UV3Plus	3/18/2011
Troy - Walnut Creek WWTP	AL	US	10	65	UV3Plus	2/27/2015
St. Ignace	MI	US	4	45	UV3Plus	5/1/2009
Kalispell Expansion	MT	US	22.09	65	UV3Plus	12/17/2007
Johnson City	TN	US	10	65	UV3Plus	8/14/2008
Reed Creek WPCP - Columbia County	GA	US	10.12	65	UV3Plus	5/15/2008
Joplin - Turkey Creek WWTP	MO	US	24	65	UV3Plus	9/24/2010
Kirkland Lake (ALC)	ON	CA	10.802	65	UV3Plus	11/28/2013
Burlington WWTP Improvements	WA	US	6.64	55	UV3Plus	9/29/2016
Upper Gwynedd - North Wales	PA	US	15.4	60	UV3Plus	8/8/2011
Massena Replacement	NY	US	12	65	UV3Plus	2/22/2017
Valleyfield	QC	CA	31.304	65	UV3Plus	12/12/2013
Washington County (secondary + primary)	NY	US	7.5	65	UV3Plus	10/15/2008
Mount Carmel Municipal Authority	PA	US	11.77	65	UV3Plus	1/27/2010





Boerne WTRC	TX	US	7	70	UV3Plus	5/15/2012
Carlsbad	NM	US	12.6	60	UV3Plus	9/28/2011
Vauxhall PCP (London)	ON	CA	9.151	65	UV3Plus	3/13/2002
Portage County - Streetsboro WWTP	OH	US	17.4	65	UV3Plus	2/12/2014
Washington	MO	US	12	65	UV3Plus	11/15/2008
Ruston	LA	US	13.5	60	UV3Plus	10/26/2006
Waynesboro	VA	US	18	65	UV3Plus	12/1/2009
Edna WWTP	TX	US	5.4	55	UV3Plus	12/30/2015
Perrysburg	OH	US	24	65	UV3Plus	11/8/2010
SCOTTSBORO	AL	US	15	65	UV3Plus	9/27/2006
Kihei - second channel (3 banks)	HI	US	2.5	75	UV3Plus	12/30/2010
Rolla - S.E. Plant	MO	US	10	60	UV3Plus	11/21/2013
Ingersoll WPCP Phase 2 Duplicate System	ON	CA	6.163	65	UV3Plus	10/27/2016
Beatrice Replacement - Two Bank 6.5 mgd	NE	US	6.5	60	UV3Plus	6/15/2012
Chilliwack	BC	CA	15.85	50	UV3Plus	6/10/2005
WCCD - Avon	IN	US	13	65	UV3Plus	(blank)
Tell City	IN	US	7.5	60	UV3Plus	12/15/2010
Huntington	NY	US	3.23	65	UV3Plus	6/16/2008
Clay Township - 2nd channel expansion	IN	US	7.65	65	UV3Plus	12/13/2012
Miamisburg	OH	US	15	70	UV3Plus	11/23/2016
Cherry Point - Marine Corps Air Station	NC	US	6.5	65	UV3Plus	10/29/2015
Walker	LA	US	3.75	48	UV3Plus	12/28/2011
Stevens Point WWTP Upgrade	WI	US	11.8	60	UV3Plus	3/15/2008
Gravenhurst Repl	ON	CA	3.643	65	UV3Plus	3/25/2015
Prince Albert	SK	CA	11.733	56	UV3Plus	5/15/2009
Colonial Beach	VA	US	6	65	UV3Plus	11/21/2008
Hurricane	WV	US	15	65	UV3Plus	12/1/2005
Eastern Band of Cherokee Indians	NC	US	9	65	UV3Plus	4/1/2015
Stayton Replacement	OR	US	10.2	55	UV3Plus	7/25/2011
Cresson	PA	US	7.75	65	UV3Plus	7/10/2002
Little Falls Run Stafford - Expansion	VA	US	8	65	UV3Plus	10/26/2009
Ingersoll WPCP	ON	CA	6.163	65	UV3Plus	11/9/2009
Culpeper - 3 Channel Option	VA	US	18	70	UV3Plus	11/14/2008
Charlottetown	PE	CA	19.781	60	UV3Plus	11/18/2005
Batesville	MS	US	3	65	UV3Plus	3/24/2014
Shakerag WRF	GA	US	3.3	70	UV3Plus	6/4/2015
Spotsylvania Exp	VA	US	12.6	65	UV3Plus	6/10/2002
Athens - Oostanaula WWTP	TN	US	12	65	UV3Plus	12/1/2004
Upper Trinity (Riverbend) 2nd Channel	TX	US	7	65	UV3Plus	1/30/2014
Sedalia - Central Plant	MO	US	7	65	UV3Plus	2/4/2013
Pembroke	ON	CA	11.412	65	UV3Plus	4/4/2005
Itasca	IL	US	12.1	65	UV3Plus	2/1/2011





St. Thomas	ON	CA	14.424	65	UV3Plus	4/9/2002
Port Lavaca	TX	US	7.66	65	UV3Plus	9/20/2019
Guntersville	AL	US	12	65	UV3Plus	6/21/2006
Cinco South - Second Channel	TX	US	4.5	65	UV3Plus	4/1/2011
Jeanette Expansion	PA	US	11.18	65	UV3Plus	9/9/2013
Saint John - Eastern WWTP	NB	CA	21.303	65	UV3Plus	3/15/2010
Hite Creek Upgrade	KY	US	8	65	UV3Plus	9/24/2015
Portage	PA	US	12.5	65	UV3Plus	9/9/2008
McCandless	PA	US	12.1	65	UV3Plus	6/1/2008
Benton	AR	US	12	65	UV3Plus	12/15/2008
Hutchinson	MN	US	7	60	UV3Plus	12/17/2007
Windber	PA	US	15	65	UV3Plus	2/1/2006
Sunnyside	WA	US	7.9	60	UV3Plus	7/25/2006
Northglenn	CO	US	10	65	UV3Plus	8/1/2005
Oak Valley	IL	US	6.3	55	UV3Plus	4/15/2008
Clinton	NY	US	6	65	UV3Plus	9/21/2016
Scott Air Force Base	IL	US	6	65	UV3Plus	4/29/2016
Douglas Co. - Side Stream Treatment Syst	GA	US	3.5	65	UV3Plus	(blank)
Picayune	MS	US	7	65	UV3Plus	6/1/2010
Port Wentworth	GA	US	6	65	UV3Plus	8/27/2010
Morehead City	NC	US	6.84	65	UV3Plus	2/18/2008
Marion	IL	US	10.6	65	UV3Plus	3/22/2012
TRA Red Oak	TX	US	15	65	UV3Plus	8/28/2008
Washington	IN	US	12	65	UV3Plus	9/26/2007
Northeast Public Sewer District	MO	US	10	65	UV3Plus	3/8/2009
Susanville	CA	US	3.3	65	UV3Plus	11/28/2011
Harold Street WWTP - Olathe	KS	US	6.4	55	UV3Plus	10/26/2007
Missoula	MT	US	13.8	65	UV3Plus	10/30/2002
Shediac	NB	CA	5.1	40	UV3Plus	4/1/2010
North Shelby WWTP	AL	US	10	65	UV3Plus	12/28/2015
Nevada	MO	US	10	65	UV3Plus	6/1/2009
Sidney	OH	US	17	65	UV3Plus	11/18/2016
Prescott	ON	CA	4.227	65	UV3Plus	4/23/2008
CFB Valcartier	PQ	CA	1.664	50	UV3Plus	3/18/2002
Lowell CSO	IN	US	12	65	UV3Plus	9/4/2012
Phoenixville	PA	US	14	65	UV3Plus	11/22/2005
Toppenish	WA	US	2.16	65	UV3Plus	12/1/2008
Musconetcong Sewerage Authority	NJ	US	6	65	UV3Plus	9/27/2006
Erie	CO	US	4.2	65	UV3Plus	6/10/2010
Tussing Road	OH	US	9	65	UV3Plus	1/15/2004
Bellevue Replacement	OH	US	10	55	UV3Plus	3/22/2013
Sussex	WI	US	17	70	UV3Plus	6/29/2007
Orillia	ON	CA	19.205	65	UV3Plus	11/22/2007
Upper Saucon	PA	US	9.5	65	UV3Plus	6/14/2005
Belgrave WPCD	NY	US	6	65	UV3Plus	9/7/2006
Farmington - East WWTP	MO	US	9.8	65	UV3Plus	8/26/2011



La Contenta	CA	US	0.85	55	UV3Plus	3/21/2008
Peninsula Upgrade	TX	US	8	65	UV3Plus	11/29/2016
Ronceverte	WV	US	10	65	UV3Plus	5/5/2016
Patchogue WWTP	NY	US	2.64	65	UV3Plus	7/6/2010
Storm Lake	IA	US	12.3	65	UV3Plus	5/30/2014
Strasburg	VA	US	10	65	UV3Plus	9/15/2015
Kona Airport Replacement - R1	HI	US	0.15	55	UV3Plus	12/13/2017
Lower Bird Creek WWTP (8 to 16 MGD)	OK	US	8	65	UV3Plus	2/15/2016
Mississippi Mills	ON	CA	4.4735	65	UV3Plus	4/25/2011
Jaffrey	NH	US	3.89	65	UV3Plus	3/25/2008
ABERDEEN	SD	US	9	50	UV3Plus	12/12/2005
Essex SW Sewage Works (Alt 1)	ON	CA	5.978	65	UV3Plus	3/30/2005
Braidwood	IL	US	7.75	65	UV3Plus	10/14/2011
Nassau County	FL	US	4	65	UV3Plus	(blank)
Redstone Arsenal Replacement	AL	US	9	65	UV3Plus	8/19/2014
St. Vrain	CO	US	5	65	UV3Plus	4/15/2009
Washougal	WA	US	5.6	65	UV3Plus	9/17/2015
Arizona City	AZ	US	1.5	65	UV3Plus	4/1/2003
Pendleton/Clemson WWTF	SC	US	5.6	65	UV3Plus	12/15/2010
Canton Replacement	CT	US	3	65	UV3Plus	3/5/2016
Oxford	OH	US	8	65	UV3Plus	3/2/2000
Fox Lake	IL	US	25	65	UV3Plus	3/11/2005
Winchester	TN	US	10	65	UV3Plus	12/20/2012
Antioch	IL	US	9.2	65	UV3Plus	12/19/2008
Douglasville - South Central WWTP	GA	US	12	65	UV3Plus	3/29/2007
Milford	NH	US	6.45	65	UV3Plus	7/18/2016
Van Buren Main Plant	AR	US	8	65	UV3Plus	8/1/2008
London	KY	US	15	65	UV3Plus	11/3/2003
Johnston County Expansion	NC	US	11.25	60	UV3Plus	11/20/2008
Hollister	MO	US	11	65	UV3Plus	12/8/2011
Colusa - Flowrate 1	CA	US	1.26	55	UV3Plus	5/22/2008
Riverview WWTP Birmingham	AL	US	7.4	65	UV3Plus	2/27/2008
Brainerd	MN	US	10.88	65	UV3Plus	3/1/2010
Suffield	CT	US	7.8	65	UV3Plus	3/15/2006
Grand Junction	CO	US	12.5	65	UV3Plus	11/1/2010
Elora	ON	CA	3.963	65	UV3Plus	6/27/2013
Pine Grove	PA	US	10.8	65	UV3Plus	5/16/2006
Brushy Creek Round Rock West WWTP	TX	US	6	65	UV3Plus	12/29/2011
Youngstown - Meadowbrook Ave	OH	US	4.032	45	UV3Plus	10/24/2012
Sun Prairie WWTP	WI	US	8	65	UV3Plus	1/11/2006
Meander Creek STP - Mahoning County	OH	US	8	60	UV3Plus	9/7/2011
Algona	IA	US	4.22	55	UV3Plus	3/29/2011
Miles City	MT	US	6	65	UV3Plus	9/8/2016
Archbald	PA	US	12	65	UV3Plus	9/11/2000





Butler Township	PA	US	7.2	65	UV3Plus	12/18/2008
Spring Hill	NS	CA	4.33	40	UV3Plus	2/15/2011
Kihei - 2 Banks	HI	US	2.5	75	UV3Plus	7/3/2009
Whitestown	IN	US	8	65	UV3Plus	12/30/2014
Prattville - Pine Creek WWTP	AL	US	9	65	UV3Plus	5/27/2015
Walkill Replacement	NY	US	10.5	65	UV3Plus	4/3/2015
Town of Eagle	CO	US	5.25	60	UV3Plus	6/19/2008
Moose Jaw	SK	CA	9.246	50	UV3Plus	8/15/2008
Elk River	MN	US	7	65	UV3Plus	5/27/2008
Springboro	OH	US	12	65	UV3Plus	9/15/2005
Pinery	CO	US	2	70	UV3Plus	11/30/2004
Wallaceburg Replacement	ON	CA	9.246	65	UV3Plus	10/23/2014
Burnet WWTP	TX	US	6.8	65	UV3Plus	12/12/2013
Boaz (Slab Creek WWTP)	AL	US	12	65	UV3Plus	2/17/2005
Copper Cove	CA	US	1	55	UV3Plus	6/23/2006
Radcliff (replacement)	KY	US	10	65	UV3Plus	4/26/2017
Brookings Municipal Utilities WWTP	SD	US	10.6	65	UV3Plus	3/28/2014
Bolivar	MO	US	6.5	60	UV3Plus	2/15/2013
Lincoln City	OR	US	11	65	UV3Plus	3/26/2012
Butte - Silver Bow WWTP	MT	US	5.5	65	UV3Plus	12/20/2009
Nantucket - Surfside WWTP	MA	US	7.71	65	UV3Plus	1/1/2008
Kingston	NY	US	13	65	UV3Plus	1/15/2008
Cherokee Black Squirrel	CO	US	6.25	65	UV3Plus	5/11/2009
Mid America East WWTP Pryor	OK	US	8	60	UV3Plus	2/7/2005
Belfair - WRF - MBR Option	WA	US	1	65	UV3Plus	11/30/2010
NYC Watershed - Carmel SD No. 2	NY	US	1.25	65	UV3Plus	11/15/2007
Iowa Great Lakes Sanitary District	IA	US	7	60	UV3Plus	6/13/2017
Ashland Replacement	VA	US	4	55	UV3Plus	6/22/2016
Canmore	AB	CA	9.246	65	UV3Plus	11/8/2005
Crete	NE	US	3.024	65	UV3Plus	10/29/2015
Bay City	MI	US	18	55	UV3Plus	8/31/2002
Crawfordsville	IN	US	6	55	UV3Plus	3/2/2006
Villa Rica	GA	US	5.37	65	UV3Plus	9/16/2009
Piedmont Regional WWTP	SC	US	4	60	UV3Plus	4/13/2012
Madison	IN	US	9	65	UV3Plus	3/15/2011
Warminster Plant #2	PA	US	5.4	65	UV3Plus	4/20/2005
Harrison	AR	US	9	65	UV3Plus	5/11/2009
Imperial - Replacement	CA	US	5.3	65	UV3Plus	4/24/2007
Fort Knox	KY	US	18	65	UV3Plus	9/21/2006
Swansboro WWTP	NC	US	1.5	65	UV3Plus	8/23/2007
ASHLAND	OH	US	10	65	UV3Plus	10/15/2002
Plainville Upgrade	CT	US	6	65	UV3Plus	3/24/2008
Tahlequah	OK	US	14	65	UV3Plus	11/9/2000
Banff WWTP - Earth Tech	AB	CA	8.454	70	UV3Plus	7/8/2002
Ohio County Regional	KY	US	7	65	UV3Plus	6/26/2007
Hawaii - Kai 70% UVT	HI	US	8	70	UV3Plus	4/1/2015





Riverhead Upgrade	NY	US	3.2	70	UV3Plus	9/10/2015
Monticello - Replacement	IA	US	2.7	55	UV3Plus	11/26/2010
Princeton	WV	US	12	65	UV3Plus	9/26/2011
West Hanover Twp Replacement	PA	US	6.336	65	UV3Plus	7/26/2012
Brockway Area Sewer Authority	PA	US	6	65	UV3Plus	9/1/2005
Mount Vernon	IN	US	9.2	65	UV3Plus	12/22/2011
FT Worth - Reuse Stream - 6 MGD	TX	US	6	65	UV3Plus	7/26/2011
Maryville 1+1 Design	MO	US	6	60	UV3Plus	6/17/2014
Greenport - Suffolk Co.	NY	US	1.3	65	UV3Plus	5/26/2011
Harris Cty MUD #5	TX	US	3.6	65	UV3Plus	6/29/2006
New Hanover Township	PA	US	7.7	65	UV3Plus	5/15/2007
Clarkston	WA	US	5.2	65	UV3Plus	5/24/2013
Rensselaer	IN	US	4	65	UV3Plus	12/29/2009
Blakely	GA	US	5	65	UV3Plus	8/4/2009
Grissom Aeroplex - Peru	IN	US	9	65	UV3Plus	1/15/2010
Odessa	MO	US	4	65	UV3Plus	5/27/2015
California	PA	US	9.6	65	UV3Plus	9/23/2013
Clarksdale	MS	US	7	65	UV3Plus	12/16/2013
Glenwood Springs Regional WWTP	CO	US	5.85	65	UV3Plus	4/1/2011
Palmer - Second Channel	AK	US	2	35	UV3Plus	2/20/2010
Nashville	AR	US	8	65	UV3Plus	5/5/2014
Santa Monica URRF	CA	US	0.75	55	UV3Plus	2/17/2000
Keyser	WV	US	10	65	UV3Plus	4/5/2016
Evans City WWTP	PA	US	6.8	65	UV3Plus	8/19/2014
Springville WWTP	NY	US	4.8	55	UV3Plus	3/15/2012
Orono	ME	US	5.65	65	UV3Plus	3/3/2008
Gulf Shores - two channel design	AL	US	6	65	UV3Plus	5/22/2015
Georgetown No. 1 Expansion	KY	US	5	65	UV3Plus	12/28/2007
Iroquois	ON	CA	7.294	65	UV3Plus	2/21/2013
Picton	ON	CA	3.487	65	UV3Plus	6/30/2010
Bowie	MD	US	5	65	UV3Plus	10/30/2009
Syracuse - Wetzel Road WWTP	NY	US	15.2	65	UV3Plus	11/1/2006
Lincoln, Honda Plant System Replacement	AL	US	5	65	UV3Plus	8/17/2023
Berea	KY	US	13	65	UV3Plus	10/29/2004
Delran Sewerage Authority	NJ	US	5	65	UV3Plus	11/2/2009
Shelton Rd. WWTP - Collierville	TN	US	12	65	UV3Plus	2/14/2008
Colfax WWTP	CA	US	0.5	55	UV3Plus	5/15/2008
Mason Expansion	OH	US	18	65	UV3Plus	8/1/2005
Waverly	IA	US	6.43	55	UV3Plus	7/18/2008
Mooreville	IN	US	7	65	UV3Plus	3/3/2009
Sackets Harbor	NY	US	5.4	65	UV3Plus	8/5/2016
Washington Wetland CSO	IN	US	10	65	UV3Plus	8/1/2011
Lexington	NE	US	3.4	50	UV3Plus	6/26/2006
Decorah	IA	US	8	65	UV3Plus	7/22/2004
Moundsville	WV	US	6.4	65	UV3Plus	9/16/2011
Huntsville (Robinson Creek)	TX	US	7.5	65	UV3Plus	4/15/2002







Bayou La Batre	AL	US	9	65	UV3Plus	4/2/2010
Upper Trinity (Riverbend)	TX	US	7	65	UV3Plus	9/3/2002
Checotah	OK	US	10	65	UV3Plus	5/25/2016
Wakarusa WWTP	KS	US	7.5	65	UV3Plus	10/14/2016
Lowmoor WWTP - Alleghany County	VA	US	3.312	65	UV3Plus	7/29/2016
Delmar	MD	US	3.85	65	UV3Plus	8/13/2010
Quantico NFEC First Channel	VA	US	4.2	65	UV3Plus	12/24/2012
Lake Havasu - North Regional WWTP	AZ	US	3.5	70	UV3Plus	11/22/2006
Fort Bend MUD #30	TX	US	6	50	UV3Plus	9/23/2005
Greenfield	IN	US	12	65	UV3Plus	1/12/2004
Renfrew	ON	CA	5.283	65	UV3Plus	7/23/2008
Gulf Shores - Second UV System	AL	US	6	65	UV3Plus	2/22/2016
Coppermine WRF Expansion	GA	US	2.75	65	UV3Plus	7/1/2008
Lake County - Madison WWTP	OH	US	15	65	UV3Plus	9/19/2013
Duncansville	PA	US	6.5	65	UV3Plus	9/1/2009
East St Paul	MB	CA	3.88	55	UV3Plus	10/15/2008
Fairchance Georges Upgrade	PA	US	8	65	UV3Plus	1/5/2006
Acton (2 channels)	ON	CA	5.37	65	UV3Plus	12/21/2018
Nappanee CSO	IN	US	5	60	UV3Plus	8/24/2017
Canton Replacement	TX	US	3.9	55	UV3Plus	12/17/2015
Snow Lake	MB	CA	2.378	50	UV3Plus	3/18/2013
Horsham Park Creek - Upgrade	PA	US	6.435	65	UV3Plus	3/27/2014
Nebo - Barstow	CA	US	0.45	65	UV3Plus	6/23/2006
Mount Forest	ON	CA	3.963	65	UV3Plus	12/1/2007
Atlantic	IA	US	4	65	UV3Plus	11/1/2011
Upper Monument Creek/Danala	CO	US	2.1	65	UV3Plus	8/15/2008
Victoria Harbour	ON	CA	3.686	65	UV3Plus	11/8/2016
Window Rock	AZ	US	2.25	65	UV3Plus	7/2/2015
Grafton	WI	US	6.45	65	UV3Plus	11/22/2011
Queen Annes County - Kent Narrows	MD	US	10.5	65	UV3Plus	7/10/2006
Rockaway WWTP	GA	US	10	60	UV3Plus	7/15/2003
James Creek WWTP	GA	US	3.9	70	UV3Plus	11/9/2017
Surf City	NC	US	1.5	65	UV3Plus	7/8/2008
Big Rapids	MI	US	4	50	UV3Plus	11/7/2005
Temperanceville - Tyson	VA	US	2.3	65	UV3Plus	4/30/2010
Bellefontaine	OH	US	15.75	65	UV3Plus	9/24/2010
Geneva-on-the-Lake	OH	US	6	65	UV3Plus	10/17/2016
East Dundee Expansion	IL	US	6.6	65	UV3Plus	5/23/2006
Santaquin City WRF	UT	US	1.48	65	UV3Plus	3/19/2013
Perdue Farms - Accomac	VA	US	4	65	UV3Plus	3/13/2007
Komoka	ON	CA	2.378	65	UV3Plus	4/26/2011
North Wilkesboro	NC	US	5	65	UV3Plus	6/15/2012
Black Hawk	CO	US	6.8	65	UV3Plus	7/5/2004
Avon WWTP	CO	US	8.6	65	UV3Plus	10/27/2006
Clifton	CO	US	6	65	UV3Plus	8/1/2007





Dumas WWTP	TX	US	6	65	UV3Plus	12/13/2012
Caroline County Expansion	VA	US	4.5	65	UV3Plus	5/24/2012
Morrisville	VT	US	4.68	60	UV3Plus	2/8/2009
Liberty	NY	US	6.6	65	UV3Plus	9/30/2016
Sparta	WI	US	4	50	UV3Plus	3/1/2005
Troy	AL	US	10	65	UV3Plus	8/29/2002
Danville	IN	US	7.8	65	UV3Plus	9/28/2005
Paddock Lake WWTP Upgrade	WI	US	5.6	65	UV3Plus	12/22/2011
Whitewater	WI	US	11	65	UV3Plus	11/15/2010
Buffalo WWTP	WY	US	6.2	65	UV3Plus	4/5/2010
Seward WWTP	NE	US	2.86	55	UV3Plus	1/24/2011
Las Animas	CO	US	0.5	45	UV3Plus	11/20/2014
Johnston County	NC	US	11.25	65	UV3Plus	6/7/2004
Fostoria Replacement	OH	US	12.7	65	UV3Plus	2/1/2016
Snyder-Replacement	TX	US	5.4	65	UV3Plus	12/21/2012
Red River WWA - Clay City_ Stanton	KY	US	4	60	UV3Plus	3/29/2013
Sikeston	MO	US	6	65	UV3Plus	12/2/2013
Table Mountain WWTF, Friant	CA	US	0.5	55	UV3Plus	7/26/2004
Owasso	OK	US	5.15	65	UV3Plus	9/30/2010
Yorkville	IL	US	10.46	65	UV3Plus	3/12/2007
Polson	MT	US	2.38	65	UV3Plus	4/25/2018
Hickman	NE	US	1.5	65	UV3Plus	6/7/2013
Rock Falls	IL	US	7.5	65	UV3Plus	2/1/2011
Milton	VT	US	4.6	65	UV3Plus	8/15/2005
Harrodsburg	KY	US	10	65	UV3Plus	12/22/2016
Erving	MA	US	1.02	65	UV3Plus	3/6/2009
Pen Argyl	PA	US	3.25	65	UV3Plus	7/2/2008
NSA Crane WWTP	IN	US	2.5	65	UV3Plus	9/13/2013
Dalles	OR	US	12.2	65	UV3Plus	8/31/2005
Lancaster	OH	US	6	65	UV3Plus	12/7/2009
Bridgewater	NS	CA	6.34	50	UV3Plus	11/25/2008
Sweetwater	TX	US	8	65	UV3Plus	3/1/2002
Hopedale Replacement	MA	US	2.5	65	UV3Plus	1/8/2018
Hartford White River Junction	VT	US	4.75	60	UV3Plus	6/7/2010
Easton	MD	US	7.8	65	UV3Plus	12/12/2005
Mount Joy	PA	US	3.83	65	UV3Plus	1/8/2010
Logan	OH	US	8.8	65	UV3Plus	12/9/2011
North Kent	MI	US	12	70	UV3Plus	9/21/2007
Hondo Replacement	TX	US	6	65	UV3Plus	3/31/2017
Cherry Point (Marine Corp Air Stn)	NC	US	3.5	65	UV3Plus	7/31/2002
Wisconsin Dells-Lake Delton WWTF	WI	US	11.25	65	UV3Plus	9/29/2005
Middleton	NS	CA	3.5	40	UV3Plus	6/30/2010
East Vincent Township	PA	US	2.54	65	UV3Plus	6/27/2013
BEDFORD	OH	US	6.4	65	UV3Plus	10/24/2011
New Haven	MO	US	0.5	35	UV3Plus	4/29/2011
Somerset - Pitman Creek	KY	US	12	65	UV3Plus	8/2/2010





BAYFIELD	CO	US	3	65	UV3Plus	3/27/2009
Shelby County	AL	US	10	65	UV3Plus	5/15/2000
Niles Ferry WWTP	TN	US	3.8	65	UV3Plus	(blank)
Queen Anne - Sudlersville WWTP	MD	US	1.5	65	UV3Plus	4/30/2015
Bellefonte	PA	US	6	65	UV3Plus	12/1/2008
Warrensburg	NY	US	0.89	45	UV3Plus	3/1/2011
Hanover Park Pilot	IL	US	0.5	65	UV3Plus	1/15/2009
HEBRON	IN	US	3.5	55	UV3Plus	2/25/2010
Hokulia	HI	US	0.2	55	UV3Plus	2/14/2003
DeRidder	LA	US	5.3	65	UV3Plus	9/30/2016
Jourdanton	TX	US	3.92	65	UV3Plus	6/25/2012
Lampasas	TX	US	2	65	UV3Plus	12/10/2015
Slippery Rock	PA	US	5.2	65	UV3Plus	12/20/2012
Carrizo Springs WWTP	TX	US	5.312	65	UV3Plus	8/18/2016
Robinson	IL	US	8	65	UV3Plus	9/29/2010
Rhineland	WI	US	4.97	60	UV3Plus	6/15/2010
Gimli	MB	CA	2.272	55	UV3Plus	12/11/2006
Harrison	OH	US	5.5	65	UV3Plus	11/4/2002
Jessup Mills (Creston NFH), MT	MT	US	4.32	80	UV3Plus	6/30/2004
Santa Claus	IN	US	4.46	65	UV3Plus	8/5/2002
Huntertown	IN	US	3.5	65	UV3Plus	3/27/2017
Forest City	IA	US	3.15	60	UV3Plus	11/3/2009
Ossian Replacement	IN	US	3.2	65	UV3Plus	2/23/2016
Byron	MN	US	3.7	65	UV3Plus	9/9/2013
Chestertown	MD	US	3.15	65	UV3Plus	10/26/2006
Goshen	NY	US	7.2	65	UV3Plus	9/28/2006
Georgetown - Perdue (Upgrade)	DE	US	2.25	65	UV3Plus	1/10/2005
Gallipolis	OH	US	7.2	60	UV3Plus	9/10/2015
Presidio	TX	US	1.6	45	UV3Plus	10/28/2010
Algoma	WI	US	3	65	UV3Plus	6/1/2017
Hite Creek Expansion	KY	US	8	65	UV3Plus	6/1/2004
Lubbock NW Recycling Plant	TX	US	6	65	UV3Plus	6/9/2016
Edwards WWTP	CO	US	6.1	65	UV3Plus	10/27/2006
Waterloo	NY	US	4.5	60	UV3Plus	8/21/2014
South Boston - Maple Ave WWTP	VA	US	12	60	UV3Plus	9/24/2012
Jomax Water Reclamation Facility	AZ	US	1.42	65	UV3Plus	3/29/2004
Boonville	MO	US	4	65	UV3Plus	7/29/2009
Jomax WRF Expansion (15 modules)	AZ	US	3.08	65	UV3Plus	3/25/2007
Lincoln, Honda Plant	AL	US	5	65	UV3Plus	12/29/2000
Granville	PA	US	3.168	65	UV3Plus	3/21/2016
Simsbury	CT	US	9	65	UV3Plus	11/1/2005
West Point	GA	US	5	65	UV3Plus	12/11/2008
Fruitvale STP	BC	CA	0.808	55	UV3Plus	12/16/2015
Ashley Valley	UT	US	9.4	65	UV3Plus	5/15/2014
Barbourville	KY	US	5	65	UV3Plus	12/23/2013
Cardington WWTP	OH	US	3	65	UV3Plus	3/22/2013





Dansville	NY	US	12	65	UV3Plus	5/16/2016
West Branch	MI	US	3	65	UV3Plus	4/15/2010
Ottawa Replacement	OH	US	5	65	UV3Plus	6/23/2011
Sturbridge	MA	US	2.7	65	UV3Plus	11/26/2010
Ayr WWTP (Expansion)	ON	CA	2.14	60	UV3Plus	2/15/2006
Goderich	ON	CA	7.925	65	UV3Plus	8/28/2009
Rocky Mount Replacement	VA	US	3	65	UV3Plus	7/12/2012
Pulaski CSD - Weeks Hollow WWTF	MO	US	8	65	UV3Plus	9/22/2016
Washington	IL	US	5.29	65	UV3Plus	3/9/2011
Myerstown	PA	US	6	65	UV3Plus	5/22/2008
Sabinal River	TX	US	1.36	65	UV3Plus	11/21/2010
Petrolia (two banks with expansion)	ON	CA	5.561	65	UV3Plus	11/24/2016
Barnesville	GA	US	6	65	UV3Plus	12/30/2013
Demopolis	AL	US	10	65	UV3Plus	4/28/2003
Corydon	IN	US	6.63	65	UV3Plus	3/1/2008
Westside Regional WWTP	BC	CA	7.386	65	UV3Plus	12/5/2004
Grafton Replacement	OH	US	9	65	UV3Plus	4/28/2014
Greencastle Upgrade	IN	US	16	65	UV3Plus	3/5/2015
Lamar	MO	US	2	50	UV3Plus	11/3/2011
Stonegate WWTP	CO	US	3.5	65	UV3Plus	7/31/2015
Perry/Willard Regional WTP expandable	UT	US	6	65	UV3Plus	4/21/2009
Hinesville	GA	US	5	65	UV3Plus	4/12/2007
Big Sister Creek	NY	US	14	65	UV3Plus	6/10/2005
Line Creek WWTP	GA	US	5	60	UV3Plus	9/18/2003
Jay	OK	US	10	65	UV3Plus	3/1/2001
Palmer	AK	US	2	35	UV3Plus	4/1/2002
Cinco Southwest Phase 2	TX	US	6	65	UV3Plus	12/13/2007
Mandan Replacement w exp option	ND	US	7	55	UV3Plus	12/19/2014
Cassville	WI	US	1.2	55	UV3Plus	11/19/2015
Dickinson	ND	US	9	65	UV3Plus	11/15/2013
South Stone County WWTF	MS	US	2.3	65	UV3Plus	12/15/2010
Greenfield	OH	US	5	65	UV3Plus	3/6/2009
Jefferson	WI	US	6	60	UV3Plus	3/1/2002
Fox River Grove	IL	US	3.5	65	UV3Plus	11/15/2006
Dawson City Vertreat MTP	YT	CA	1.057	65	UV3Plus	10/19/2010
Ridgetown	ON	CA	3.424	65	UV3Plus	5/28/2009
Pevely	MO	US	4.5	65	UV3Plus	6/30/2011
Milford - Beaver Brook	CT	US	6.15	65	UV3Plus	7/31/2007
Twin Cities Water and Sewer	OH	US	5	65	UV3Plus	6/10/2013
Mifflintown - Empire Kosher WWTP	PA	US	2.3	65	UV3Plus	1/26/2015
Charlestown	IN	US	5.5	65	UV3Plus	2/15/2002
SDEDA - Boxelder SD	SD	US	9.3	65	UV3Plus	11/22/2013
Pumpkinvine WRF	GA	US	5	70	UV3Plus	9/16/2009
Williamstown WWTP	KY	US	6	60	UV3Plus	4/15/2011
Newville Borough WWTP	PA	US	3.84	65	UV3Plus	3/20/2009
Hillsboro	OH	US	7	65	UV3Plus	9/27/2010





Red Oak	IA	US	4	55	UV3Plus	2/20/2011
Robertsdale	AL	US	4	60	UV3Plus	12/21/2015
Buffalo	MN	US	8	65	UV3Plus	12/1/2007
Long Hill Township	NJ	US	4.4	65	UV3Plus	9/25/2014
Olentangy Environmental Control	OH	US	12	65	UV3Plus	9/15/2015
Exceldor	PQ	CA	5.503	50	UV3Plus	2/28/2008
Batesville	IN	US	8	65	UV3Plus	12/18/2000
Paulding County - Pumpkinvine WRF	GA	US	2.5	70	UV3Plus	10/18/2007
Crown Point	IN	US	8.1	65	UV3Plus	8/13/2004
Spring Township - Train 2 Converted CCT	PA	US	3.2	65	UV3Plus	3/26/2012
Spring Township - Train 1	PA	US	3.2	65	UV3Plus	7/23/2012
Princes Lakes WWTP - Ninevah	IN	US	4	65	UV3Plus	7/22/2010
Mayville (2 banks)	WI	US	4	65	UV3Plus	4/1/2010
Solon Replacement	OH	US	15	75	UV3Plus	4/1/2004
Bicknell WWTP	IN	US	4.5	65	UV3Plus	4/12/2008
Salem Utility District	WI	US	6	65	UV3Plus	3/20/2007
Bargersville	IN	US	3.5	65	UV3Plus	6/14/2007
Richmond	MO	US	12.5	65	UV3Plus	6/26/2014
Enterprise	OR	US	2.44	65	UV3Plus	7/10/2008
St. Vrain Expansion	CO	US	6.25	65	UV3Plus	6/22/2012
Warren Township Replacement	NJ	US	2.8	65	UV3Plus	12/17/2015
Homer City	PA	US	4.6	65	UV3Plus	3/20/2012
Sullivan	IN	US	5.25	65	UV3Plus	10/25/2006
Fontana Walworth	WI	US	6.33	65	UV3Plus	9/1/2010
Doswell Replacement	VA	US	2	65	UV3Plus	2/16/2015
NYC Watershed - Mahopac WWTP	NY	US	0.547	65	UV3Plus	10/15/2013
St. Clair Township	IL	US	3.75	65	UV3Plus	11/18/2011
Vermillion WWTP	SD	US	4.2	60	UV3Plus	10/1/2005
Parry Sound	ON	CA	5.405	65	UV3Plus	1/30/2009
Palmyra	MO	US	3	65	UV3Plus	3/28/2013
Guilderland	NY	US	4.8	65	UV3Plus	11/5/2004
Emporium - Mid Cameron Authority	PA	US	6.6	65	UV3Plus	2/25/2008
Sellersburg	IN	US	8	65	UV3Plus	1/5/2006
Poplarville	MS	US	3.3	65	UV3Plus	3/31/2010
Malaga	CA	US	0.45	65	UV3Plus	8/4/2009
Nixa	MO	US	11.5	65	UV3Plus	9/20/2002
Frankenmuth	MI	US	3.5	65	UV3Plus	3/28/2013
Arcade	NY	US	3.4	65	UV3Plus	11/8/2016
Beauceville	QC	CA	3.149	60	UV3Plus	3/21/2011
Heber UT	UT	US	2	65	UV3Plus	6/27/2012
Linton	IN	US	6	65	UV3Plus	6/14/2013
Clay Township - Exp. II	IN	US	8.1	65	UV3Plus	8/16/2004
La Grange	KY	US	4.2	65	UV3Plus	3/7/2008
Liberty	KY	US	2.75	65	UV3Plus	10/18/2017
Case Farms - Winesburg	OH	US	1.5	65	UV3Plus	9/19/2016





Shiprock Replacement - New Construction	NM	US	1.9	55	UV3Plus	6/28/2012
Delta	OH	US	3.024	65	UV3Plus	3/27/2014
Shelbyville - Tyson	TN	US	1.61	65	UV3Plus	2/10/2012
Oldham County - Ohio River WWTP	KY	US	4.2	65	UV3Plus	9/14/2006
Smithfield - Souderton	PA	US	1.5	60	UV3Plus	2/23/2009
Fruita WWTP	CO	US	4.6	65	UV3Plus	4/1/2011
Thorndale	ON	CA	1.609	65	UV3Plus	9/30/2011
Sainte-Agathe-des-Monts	QC	CA	7.318	60	UV3Plus	5/13/2015
CFB Trenton, 8 Wing WPCP	ON	CA	2.378	60	UV3Plus	3/13/2001
Deer Lake	PA	US	3.2	65	UV3Plus	6/27/2013
Lakewood	IL	US	2.85	65	UV3Plus	12/19/2006
Langdon WWTP	AB	CA	5.075	55	UV3Plus	7/10/2008
Northeast Brunswick Regional WWTP	NC	US	6.19	65	UV3Plus	12/19/2012
Virginia	MN	US	6.9	60	UV3Plus	6/15/2012
Greenport - Columbia County	NY	US	2.5	65	UV3Plus	7/1/2009
Peebles	OH	US	3.3	65	UV3Plus	4/15/2009
Lewes	DE	US	2.25	60	UV3Plus	7/12/2006
Platte County	MO	US	7.5	65	UV3Plus	5/17/2007
Coalville WWTP	UT	US	1.54	60	UV3Plus	9/25/2014
Hinesville - Fort Stewart (3rd bank)	GA	US	14.3	65	UV3Plus	11/12/2015
Riddle - 60% UVT	OR	US	2.02	60	UV3Plus	12/19/2011
Crawford Creek WPCP - Columbia County	GA	US	2	65	UV3Plus	5/15/2008
Western Racine County	WI	US	7.6	65	UV3Plus	2/8/2005
Kleinburg WPCP	ON	CA	1.114	65	UV3Plus	4/21/2008
Port Royal WWTP Upgrade	SC	US	6.25	65	UV3Plus	11/15/2005
Ogallala	NE	US	2.2	65	UV3Plus	9/19/2011
Plymouth	IN	US	6.6	65	UV3Plus	3/11/2005
Somesville	ME	US	0.45	65	UV3Plus	11/12/2008
Waterford WWTP	NY	US	4.5	65	UV3Plus	4/15/2009
Brownsville	PA	US	5	65	UV3Plus	4/24/2006
Brazil Replacement	IN	US	2.5	65	UV3Plus	3/23/2015
Millville Pilot	NJ	US	2.4	30	UV3Plus	6/12/2012
Dothan	AL	US	6	65	UV3Plus	6/14/2001
Perdue Farms - Perry	GA	US	3.5	65	UV3Plus	3/1/2006
Kodiak USCG	AK	US	2	65	UV3Plus	12/11/2006
Burlington	WI	US	10	65	UV3Plus	4/14/2003
Richmond	KY	US	3	55	UV3Plus	8/15/2000
Collinsville - Koch Foods	AL	US	2	60	UV3Plus	1/20/2015
Athens - North Mouse Creek WWTP	TN	US	3	65	UV3Plus	12/20/2012
FRANKLIN	IN	US	7.5	65	UV3Plus	12/21/2000
Buford Southside WWTP	GA	US	5	65	UV3Plus	10/24/2005
Hardin - 4 lamp modules	MT	US	2	65	UV3Plus	4/1/2011
Wanaque Valley Sewer Authority	NJ	US	4	65	UV3Plus	12/11/2015
Dallas	GA	US	1.875	65	UV3Plus	12/18/2014





Schuylkill Valley	PA	US	2.16	65	UV3Plus	5/3/2005
Fabens	TX	US	3.7	65	UV3Plus	7/2/2009
Doylestown (Harvey Avenue)	PA	US	3.5	65	UV3Plus	7/16/2001
Fairfield	TX	US	6	65	UV3Plus	9/30/2004
Bucksport	ME	US	1	65	UV3Plus	7/21/2016
Pepperell	MA	US	4	65	UV3Plus	8/26/2004
Lafayette	TN	US	4.5	65	UV3Plus	6/1/2004
GRANBY	CO	US	4	60	UV3Plus	6/1/2007
Pulaski	TN	US	6	65	UV3Plus	5/20/2008
Yachats	OR	US	1.96	65	UV3Plus	5/15/2008
Fitzgerald Creek WWTP Cherokee County	GA	US	7.5	65	UV3Plus	6/15/2004
Charlotte WWTP	MI	US	4.86	65	UV3Plus	3/15/2015
Maidencreek	PA	US	3.2	65	UV3Plus	4/1/2002
Westport	CT	US	12.5	65	UV3Plus	3/27/2006
Swainsboro	GA	US	7.5	65	UV3Plus	11/28/2011
Fort Lupton - 55% 1900 fecal	CO	US	3.275	55	UV3Plus	11/13/2006
Leoni Township	MI	US	8	75	UV3Plus	8/21/2009
Sandwich	IL	US	3.75	65	UV3Plus	5/22/2008
Carignan	PQ	CA	1.651	50	UV3Plus	11/20/2009
Glasgow	MT	US	0.9	60	UV3Plus	11/14/2011
Granville	OH	US	3.1	65	UV3Plus	3/15/2012
Sumner	WA	US	9.51	60	UV3Plus	5/3/2004
Federalburg	MD	US	2.9	65	UV3Plus	9/8/2008
Three Rivers	TX	US	1.2	65	UV3Plus	4/15/2010
Flin Flon	MB	CA	2.483	60	UV3Plus	5/2/2005
Renville	MN	US	3.024	65	UV3Plus	8/23/2017
Topsail	NC	US	0.5	70	UV3Plus	6/29/2011
West Point	NE	US	5	60	UV3Plus	2/14/2005
Genesee County Expansion	MI	US	14.3	65	UV3Plus	8/31/2005
Humboldt WWTP	IA	US	3	65	UV3Plus	10/15/2009
Karnes City	TX	US	2.4	65	UV3Plus	9/15/2008
Marieville	PQ	CA	4.755	65	UV3Plus	3/18/2013
Laurel	MT	US	3.3	65	UV3Plus	11/21/2013
Willow Springs	MO	US	2.5	60	UV3Plus	3/18/2011
WARSAW	IN	US	10	45	UV3Plus	10/21/2002
Edgerton (one bank)	WI	US	4.032	65	UV3Plus	10/10/2016
Mid Centre County	PA	US	4	65	UV3Plus	7/7/2003
NYC Watershed - Michelle Estates	NY	US	0.073	77	UV3Plus	8/24/2009
CUMBERLAND	IN	US	4.75	65	UV3Plus	5/29/2002
Moab	UT	US	3	65	UV3Plus	10/19/2017
LaFollette	TN	US	5	70	UV3Plus	7/1/2009
Reedsburg	WI	US	5.01	60	UV3Plus	4/3/2006
Wilson	NY	US	1	65	UV3Plus	5/24/2013
Schuylkill Haven	PA	US	8	65	UV3Plus	1/11/2006
Jasper	IN	US	7	65	UV3Plus	10/15/2003





New Castle County - Water Farm No. 1	DE	US	2.5	65	UV3Plus	6/1/2005
Bethany WWTP	MO	US	2	65	UV3Plus	9/6/2017
Mexia	TX	US	8	65	UV3Plus	1/9/2003
Buchanan	MI	US	3.75	65	UV3Plus	1/15/2010
14 Mile Run STP - Unity Twp.	PA	US	4	65	UV3Plus	5/18/2007
Lebanon	VA	US	3.8	65	UV3Plus	2/19/2015
Henniker	NH	US	1.77	65	UV3Plus	10/23/2014
Beloit (Town of)	WI	US	2.5	65	UV3Plus	12/16/2015
Clarion	IA	US	3.065	65	UV3Plus	4/26/2016
NYC Watershed - Heritage Hills	NY	US	0.772	65	UV3Plus	2/1/2006
Rock Springs	WY	US	5	65	UV3Plus	10/7/2003
University of Mississippi (Ole Miss)WWTF	MS	US	3	65	UV3Plus	9/28/2016
Jamaica NY Pilot Study	NY	US	3.5	62	UV3Plus	6/12/2012
Alleghany Co. - Lower Jackson River WWTP	VA	US	7.6	65	UV3Plus	11/25/2010
Oakland City	IN	US	3	65	UV3Plus	11/11/2011
Mulberry Expansion	AZ	US	2.2	65	UV3Plus	12/27/2007
New Century	KS	US	4	65	UV3Plus	11/10/2003
Lewisburg	TN	US	6	65	UV3Plus	3/29/2012
Hamilton	MT	US	2.82	65	UV3Plus	10/2/2015
RAYMOND	WA	US	5.91	60	UV3Plus	12/15/2011
Montrose Veteran Admin WWTP	NY	US	0.6	55	UV3Plus	5/4/2017
Elmore	OH	US	1.87	65	UV3Plus	3/21/2013
Sainte Anne des Plaines	QC	CA	1.957	50	UV3Plus	9/28/2015
Wellsville	UT	US	3	65	UV3Plus	5/13/2013
MONTICELLO	KY	US	4.35	65	UV3Plus	5/30/2013
Savanna	IL	US	2.8	65	UV3Plus	4/24/2017
Castlegar	BC	CA	2.43	65	UV3Plus	12/6/2004
Wareham	MA	US	2	65	UV3Plus	4/17/2003
St. Michaels	MD	US	2.26	65	UV3Plus	7/28/2006
Slinger	WI	US	4.5	65	UV3Plus	4/1/2008
New Richmond - 2.8 MGD	WI	US	2.8	65	UV3Plus	6/16/2010
Platte City	MO	US	5.9	65	UV3Plus	3/16/2012
Wauconda	IL	US	6	60	UV3Plus	2/6/2006
Fergus	ON	CA	6.171	65	UV3Plus	5/29/2001
VERSAILLES	OH	US	6	55	UV3Plus	2/25/2010
Nappanee	IN	US	3	65	UV3Plus	3/29/2010
Livingston	MT	US	2.5	55	UV3Plus	7/7/2008
Tecumseh	NE	US	2.3	55	UV3Plus	7/1/2009
Oconto Falls	WI	US	1.83	55	UV3Plus	6/21/2012
Winebrenner	MD	US	2.1	65	UV3Plus	6/16/2015
Cannon Beach	OR	US	3.94	65	UV3Plus	3/30/2007
Rincon	GA	US	2.5	65	UV3Plus	12/4/2007
Bedminster	PA	US	1	65	UV3Plus	8/2/2004
Kimberley WWTP	BC	CA	3.766	55	UV3Plus	11/22/2013







Stevensville	MT	US	0.746	65	UV3Plus	9/22/2011
Hiawatha	KS	US	4.5	65	UV3Plus	4/1/2005
Put-In-Bay WWTP	OH	US	1.76	65	UV3Plus	8/27/2009
Clinton	MO	US	5.7	60	UV3Plus	6/25/2014
Marlette	MI	US	2.6	65	UV3Plus	6/27/2007
Lowell	IN	US	4	65	UV3Plus	10/10/2005
Atkins	IA	US	2	65	UV3Plus	5/15/2017
Three Forks Option 2	MT	US	0.695	55	UV3Plus	9/30/2015
James Creek WWTP Fulton County	GA	US	2	70	UV3Plus	6/30/2005
Bentonville	AR	US	10	60	UV3Plus	1/26/2006
Norfolk	NE	US	12	65	UV3Plus	4/1/2003
Kent Agassiz WWTP	BC	CA	2.853	60	UV3Plus	10/31/2012
Brookville	IN	US	2.315	65	UV3Plus	2/22/2006
Gold Beach WWTP	OR	US	3	65	UV3Plus	3/2/2012
Teeswater	ON	CA	3.469	65	UV3Plus	12/20/2012
Security Sanitation District	CO	US	4	54	UV3Plus	11/14/2003
Hartford (Quechee) WWTF	VT	US	0.855	60	UV3Plus	7/29/2010
Medford	WI	US	3.66	65	UV3Plus	10/23/2012
Cynthiana	KY	US	6.8	65	UV3Plus	12/21/2006
Smithville WWTP	MO	US	5.95	65	UV3Plus	10/28/2009
Grove City Expansion	PA	US	4.62	65	UV3Plus	12/17/2012
Doylestown (Green Street)	PA	US	3.3	65	UV3Plus	4/30/2002
Waynesville	MO	US	3.31	65	UV3Plus	12/1/2011
Swan Point	MD	US	1.46	65	UV3Plus	12/15/2005
Bisbee	AZ	US	2.45	55	UV3Plus	10/1/2005
Western Hancock Utilities Replacement	IN	US	1.75	65	UV3Plus	12/22/2016
Wasagaming	MB	CA	0.726	50	UV3Plus	1/29/2010
Forsyth	MO	US	1.9	65	UV3Plus	11/22/2010
McComb WWTP	OH	US	1.5	65	UV3Plus	3/1/2019
Allegan	MI	US	3	65	UV3Plus	10/28/2013
Scott	LA	US	2	65	UV3Plus	10/28/2013
Prairie Grove	AR	US	4	65	UV3Plus	2/1/2011
Coquille	OR	US	4.25	65	UV3Plus	3/29/2012
Oxford	NC	US	8.75	65	UV3Plus	5/10/2006
Flowery Branch	GA	US	2.5	65	UV3Plus	8/23/2000
Hancock	WV	US	1.75	65	UV3Plus	6/15/2009
Mt Morris	IL	US	2.66	65	UV3Plus	12/20/2012
Rock Springs - 2nd Channel	WY	US	5	65	UV3Plus	4/26/2006
Stanley	WI	US	1.64	65	UV3Plus	2/22/2017
Indian Creek WPCP Locust Grove	GA	US	3.75	65	UV3Plus	12/6/2004
Deep Creek Lake	MD	US	6.2	65	UV3Plus	7/10/2006
Hearne	TX	US	1.2	65	UV3Plus	1/31/2006
Rockville Replacement	IN	US	3.75	65	UV3Plus	10/22/2009
Las Vegas	NM	US	4	65	UV3Plus	7/15/2007
Weyauwega	WI	US	1.707	65	UV3Plus	12/1/2015
Logan County - Indian Lake	OH	US	4.6	65	UV3Plus	7/2/2009





Carrollton	KY	US	1.7	60	UV3Plus	4/11/2006
Tucker Prison	AR	US	3.6	65	UV3Plus	12/7/2011
Jasper	AB	CA	3.698	65	UV3Plus	11/29/2002
Wintersville	OH	US	3.25	55	UV3Plus	4/18/2013
St. James	MO	US	2	60	UV3Plus	11/14/2013
Plymouth	OH	US	2.88	65	UV3Plus	9/27/2010
East Berlin	PA	US	3.6	65	UV3Plus	6/28/2010
Los Alamos	NM	US	2.8	65	UV3Plus	7/13/2006
Canton	GA	US	7.92	70	UV3Plus	5/1/2003
Seal Harbor	ME	US	0.95	65	UV3Plus	9/12/2006
Hyndman WWTP	PA	US	2.304	65	UV3Plus	9/25/2012
Sainte-Ad?le, PQ	QC	CA	3.17	60	UV3Plus	10/21/2010
Clear Lake	IA	US	3.9	65	UV3Plus	8/29/2003
Marion	MA	US	1.2	65	UV3Plus	3/9/2006
Oakland	TN	US	5.184	65	UV3Plus	5/31/2006
Cresco	IA	US	4.68	65	UV3Plus	9/6/2006
Dousman	WI	US	2.2	70	UV3Plus	3/1/2010
Pickaway	OH	US	6.3	65	UV3Plus	11/28/2006
St-Alexandre-de-Kamouraska	PQ	CA	2.054	38	UV3Plus	9/29/2003
Harvest Monrovia	AL	US	2.52	65	UV3Plus	12/15/2006
Holtville	CA	US	1.6	60	UV3Plus	6/30/2003
New London	WI	US	6.35	65	UV3Plus	9/19/2002
Woodridge WWTP - Sullivan Co.	NY	US	1.6	65	UV3Plus	7/1/2010
Ellsworth	WI	US	2.16	65	UV3Plus	9/29/2011
Terra Cotta	IL	US	3	65	UV3Plus	6/14/2006
Beacon Falls WPCP	CT	US	2.5	65	UV3Plus	7/10/2006
Golden City	MO	US	1.15	55	UV3Plus	6/25/2014
Dallas - SCI	PA	US	2.94	65	UV3Plus	9/28/2010
Flemingsburg	KY	US	4	65	UV3Plus	3/17/2014
Liberty-Roper WWTF	SC	US	1.44	65	UV3Plus	12/20/2007
Lee	MA	US	3.96	65	UV3Plus	3/10/2007
Sandusky	MI	US	4	65	UV3Plus	3/20/2006
Acordis Mobile	AL	US	2	65	UV3Plus	6/8/2009
Galena	IL	US	4.57	65	UV3Plus	6/28/2002
Deseronto	ON	CA	2.658	65	UV3Plus	9/28/2015
Mukwonago	WI	US	4.5	70	UV3Plus	12/15/2011
Leipsic	OH	US	2.88	60	UV3Plus	4/16/2007
Houston	MO	US	3	65	UV3Plus	7/1/2010
Zerbe Township	PA	US	1.919	65	UV3Plus	9/23/2014
Marietta	PA	US	4.75	65	UV3Plus	3/3/2005
Rising Sun WWTP	MD	US	2.25	65	UV3Plus	11/21/2012
Winsted Rebid	MN	US	2	65	UV3Plus	3/25/2017
Allegan	MI	US	3	60	UV3Plus	5/21/2009
Mont Alto	PA	US	1.5	65	UV3Plus	5/31/2011
Pinckneyville	IL	US	1.44	65	UV3Plus	4/17/2014
Highspire	PA	US	4	60	UV3Plus	7/29/2004





Decatur	IN	US	7.5	65	UV3Plus	3/1/2004
Grove City	PA	US	4.63	65	UV3Plus	11/16/2009
Lolo	MT	US	1.01	65	UV3Plus	1/30/2009
Ayr WWTP	ON	CA	1.07	60	UV3Plus	1/9/2002
Odem	TX	US	1.9	65	UV3Plus	9/1/2008
West Montrose	CO	US	4.6	65	UV3Plus	5/1/2003
Nanty Glo	PA	US	4.35	65	UV3Plus	11/9/2006
Cochran	GA	US	2.5	65	UV3Plus	9/25/2014
Sabina	OH	US	4	65	UV3Plus	12/3/2012
Mount Pleasant Township	PA	US	1.7	65	UV3Plus	7/29/2011
Cape Charles Replacement	VA	US	0.75	75	UV3Plus	11/19/2010
Upper Tuscarawas	OH	US	10	65	UV3Plus	3/15/2004
Midway	KY	US	2.5	65	UV3Plus	12/21/2000
Asbestos	PQ	CA	3.566	65	UV3Plus	3/12/2008
Becker	MN	US	3.75	60	UV3Plus	5/3/2007
Headingley	MB	CA	1.376	55	UV3Plus	5/1/2010
Quantico NFEC 2nd Channel Exp	VA	US	4.2	65	UV3Plus	4/22/2013
Nashville	IN	US	1.82	65	UV3Plus	6/1/2011
Hicksville	OH	US	2.3	65	UV3Plus	4/13/2006
Fairview Twp	PA	US	1.78	65	UV3Plus	11/15/2012
Edinburgh	IN	US	3	65	UV3Plus	11/1/2004
Aspen	CO	US	4	65	UV3Plus	11/19/2007
Center-West JSA	PA	US	2.25	65	UV3Plus	5/3/2011
Burton	OH	US	1.3	65	UV3Plus	6/25/2019
Kihei - Third Bank	HI	US	2.5	75	UV3Plus	7/3/2009
Thayer	MO	US	3	65	UV3Plus	6/24/2010
Clintonville (one bank)	WI	US	2.38	65	UV3Plus	4/2/2015
Kulpmont-Marion	PA	US	2.7	65	UV3Plus	5/21/2004
Lexington	OH	US	1.5	65	UV3Plus	2/27/2009
Alvarado	TX	US	2.88	65	UV3Plus	12/18/2008
North Codorus Twp. - York	PA	US	1.38	65	UV3Plus	5/15/2006
Mount Gilead	OH	US	3.2	65	UV3Plus	8/24/2006
Whiteland	IN	US	2.5	65	UV3Plus	10/1/2002
Hudson	MI	US	1.3	65	UV3Plus	8/23/2018
Brocton	NY	US	2.88	65	UV3Plus	12/28/2011
Rogers City	MI	US	3	65	UV3Plus	5/14/2011
Cashmere	WA	US	2.64	65	UV3Plus	8/20/2013
Riviera Utilities	AL	US	4	65	UV3Plus	5/31/2007
Carrollton Expansion	KY	US	3.4	60	UV3Plus	5/1/2011
Seaforth	ON	CA	2.642	65	UV3Plus	9/26/2013
Deep River	ON	CA	3.283	65	UV3Plus	7/31/2003
Garden Hill First Nation WWTP	MB	CA	1.141	55	UV3Plus	8/15/2001
Hot Springs Southwest WTF	AR	US	2.56	65	UV3Plus	3/22/2007
Mead	CO	US	1	65	UV3Plus	8/1/2008
Darlington	WI	US	1.5	65	UV3Plus	3/31/2016
Northern Mineral County - Phase 1	WV	US	2.51	65	UV3Plus	11/15/2010





Glendale	OH	US	3	65	UV3Plus	11/1/2007
Ripon	WI	US	6.8	65	UV3Plus	10/1/2002
Richland Center	WI	US	2.75	60	UV3Plus	8/25/2015
Tobyhanna Army Depot	PA	US	1.8	65	UV3Plus	8/8/2013
Robinson Twp - Moon Run STP	PA	US	1.5	65	UV3Plus	1/29/2009
Earl Township	PA	US	2	65	UV3Plus	6/22/2017
Kearny WRF	AZ	US	0.25	65	UV3Plus	10/15/2014
Northern Lancaster County	PA	US	1.35	65	UV3Plus	3/6/2012
Brownstown	IN	US	2.678	65	UV3Plus	10/31/2001
Riviera Utilities Expansion	AL	US	4	65	UV3Plus	8/4/2008
Newcomerstown	OH	US	3	65	UV3Plus	4/15/2004
Deposit	NY	US	1.7	65	UV3Plus	6/30/2008
Fredonia System Replacement	KS	US	2.2	65	UV3Plus	9/19/2007
Rainier	OR	US	2.77	65	UV3Plus	5/29/2008
Plattsburg WWTP	MO	US	4	65	UV3Plus	10/29/2015
Saukville	WI	US	3.8	65	UV3Plus	7/30/2001
Hopewell Hamlet	NY	US	1.63	65	UV3Plus	7/29/2008
Sikeston Business & Technology Park WWTP	MO	US	0.8	60	UV3Plus	10/23/2014
Cuyama	CA	US	0.32	65	UV3Plus	3/4/2011
Schroon	NY	US	2.2	65	UV3Plus	9/27/2010
Lake Placid	NY	US	8	65	UV3Plus	4/18/2005
CFB Borden	ON	CA	2.054	60	UV3Plus	6/30/2005
Teton Valley Regional WWTP	ID	US	2.016	65	UV3Plus	6/15/2012
Tilbury	ON	CA	3.616	65	UV3Plus	6/29/2004
Rubes Creek WRF Woodstock	GA	US	1.5	70	UV3Plus	12/19/2003
Littleton	NH	US	3.88	65	UV3Plus	3/31/2005
Chanute	KS	US	4.5	65	UV3Plus	6/8/2001
Hartville WWTP	OH	US	2	65	UV3Plus	12/4/2013
Mountain View	AR	US	4	65	UV3Plus	3/1/2007
White Run	PA	US	2.5	65	UV3Plus	12/20/2001
Two Rivers	WI	US	7	70	UV3Plus	4/11/2000
Minooka	IL	US	5.8	65	UV3Plus	11/15/2005
East Troy	WI	US	2.83	65	UV3Plus	4/15/2008
Jamestown	OH	US	4.1	65	UV3Plus	4/7/2003
Gilberts	IL	US	3	65	UV3Plus	7/16/2001
Espanola	ON	CA	3.249	65	UV3Plus	12/17/2007
Chatham	NY	US	2	65	UV3Plus	6/1/2012
Louisiana	MO	US	2.25	65	UV3Plus	3/11/2013
Littlestown	PA	US	2.4	65	UV3Plus	8/14/2003
Cuba Upgrade	NY	US	2	65	UV3Plus	7/22/2010
Port Henry	NY	US	2.65	65	UV3Plus	11/16/2006
Holbrook	AZ	US	3	55	UV3Plus	10/31/2000
Conemaugh Township (Tire Hill STP)	PA	US	0.9	65	UV3Plus	8/11/2005
Union (replacement)	MO	US	3.2	65	UV3Plus	3/18/2016
Pompton Lakes Expansion - Phase 2	NJ	US	1.5	65	UV3Plus	5/15/2008





Union - Denmark Road STP	MO	US	1.9	65	UV3Plus	12/30/2009
Belmont	NY	US	2.04	65	UV3Plus	2/23/2012
Baldwin	WI	US	1.5	65	UV3Plus	1/18/2006
Trumansburg Replacement	NY	US	1	65	UV3Plus	12/15/2015
Pell Lake	WI	US	1.45	65	UV3Plus	8/1/2009
New Glarus	WI	US	2.512	65	UV3Plus	10/10/2008
Covi Douglas	PA	US	0.526	65	UV3Plus	6/1/2009
Pomeroy	OH	US	1.4	65	UV3Plus	11/15/2013
Lake Meade	PA	US	1.44	65	UV3Plus	1/15/2007
Saint-Jovite	PQ	CA	2.272	65	UV3Plus	7/13/2004
Pittsboro	NC	US	1.875	65	UV3Plus	6/2/2010
Huntsville	AR	US	1.8	65	UV3Plus	6/4/2008
Warsaw - Wiper Retrofit	IN	US	12	45	UV3Plus	9/15/2011
Sebastopol - Peco	MS	US	1.5	65	UV3Plus	3/23/2023
New Lenox	IL	US	2.28	60	UV3Plus	6/9/2003
Coeymans	NY	US	2	65	UV3Plus	4/30/2009
Blacklick	PA	US	1.2	65	UV3Plus	12/1/2002
Herculaneum	MO	US	3.45	65	UV3Plus	9/27/2007
Ravenna	OH	US	6.02	65	UV3Plus	2/10/2004
East Palestine	OH	US	4.75	65	UV3Plus	1/20/2005
SPENCER	MA	US	3.8	65	UV3Plus	1/20/2005
Cooperstown	NY	US	2.3	65	UV3Plus	6/15/2004
Alex Couture	PQ	CA	1.057	40	UV3Plus	10/1/2002
Mount Ebo (Watershed)	NY	US	0.3	65	UV3Plus	8/4/2005
Olentangy Environmental Control Exp.	OH	US	6	65	UV3Plus	6/24/2016
Ailsa Craig	ON	CA	1.065	65	UV3Plus	8/23/2006
New Maryland	NB	CA	1.268	65	UV3Plus	8/12/2004
West Liberty	KY	US	2.25	65	UV3Plus	2/22/2007
Cayuga - Aurelius WWTP	NY	US	0.72	65	UV3Plus	8/22/2014
Knox Replacement	IN	US	1.8	65	UV3Plus	6/24/2010
Saint-Cyrille-de-Wendover	QC	CA	0.799	50	UV3Plus	10/15/2014
Dyersville	IA	US	3.5	65	UV3Plus	9/12/2016
Richmond	IL	US	2.917	65	UV3Plus	7/13/2006
Burwell Road WWTP	AL	US	0.625	65	UV3Plus	12/12/2007
Pompton Lakes	NJ	US	1.5	65	UV3Plus	4/20/2000
Eddyville	KY	US	3	65	UV3Plus	1/17/2003
New Miami	OH	US	4	65	UV3Plus	7/19/2005
Rocky Fork WWTP (BCRSD)	MO	US	2	65	UV3Plus	4/24/2014
Portville	NY	US	1.2	65	UV3Plus	5/8/2006
Three Lakes	CO	US	3.5	65	UV3Plus	2/28/2002
St. Matthews	SC	US	1	65	UV3Plus	2/15/2004
Angola	IN	US	4	65	UV3Plus	2/20/2003
Athens	WV	US	2	65	UV3Plus	12/5/2004
Greenbrier	TN	US	2.1	65	UV3Plus	12/15/2000
Dunbar STP	PA	US	2.016	65	UV3Plus	6/1/2001
Johnsburg	IL	US	5	65	UV3Plus	4/2/2003



Dunlap WWTP	TX	US	2.85	65	UV3Plus	5/26/2006
Mason County - Lakin Camp Conley	WV	US	2	65	UV3Plus	6/3/2013
Brewster Heights Original	NY	US	0.3	65	UV3Plus	2/6/2004
Dunbar Township	PA	US	1.5	65	UV3Plus	8/1/2002
Chatfield	MN	US	1.6	65	UV3Plus	3/1/2006
Lunenburg	NS	CA	3	65	UV3Plus	10/11/2002
Hope	AR	US	2	65	UV3Plus	2/11/2004
Walcott	IA	US	2.4	65	UV3Plus	4/20/2007
Doylestown - Harvey Ave Module Expansion	PA	US	5.3	65	UV3Plus	11/16/2010
Munising	MI	US	3	65	UV3Plus	10/2/2008
Clocktower Commons (Watershed)	NY	US	0.05	65	UV3Plus	2/28/2006
Carignan Expansion	QC	CA	3.428	50	UV3Plus	8/9/2011
Blue River WWTP	CO	US	4	70	UV3Plus	7/24/2014
Ladysmith	WI	US	1.74	60	UV3Plus	2/23/2015
Alert Bay - Namgis First Nation WWTP	BC	CA	2.23	65	UV3Plus	7/21/2003
Beech Mountain WWTP	NC	US	1	65	UV3Plus	12/20/2006
Plain City	OH	US	3.7	65	UV3Plus	1/27/2006
Wickham Village	PA	US	1	65	UV3Plus	4/3/2001
Abbottstown	PA	US	1.1	65	UV3Plus	5/9/2002
Yough SA - Hollow Road	PA	US	1.4169	65	UV3Plus	9/28/2007
St. Michael	MN	US	3.6	65	UV3Plus	11/29/2000
Erath	LA	US	2	55	UV3Plus	1/25/2016
Wheelersburg	OH	US	3.5	65	UV3Plus	4/8/2003
Cave City	KY	US	1.8	65	UV3Plus	6/21/2007
Windmill Ranch Woodbine	TX	US	0.5	65	UV3Plus	1/11/2005
Runyan Acres	AR	US	1.3	65	UV3Plus	12/11/2003
Cumberland Township (South)	PA	US	1.3	65	UV3Plus	9/9/2002
Cumberland Township (North)	PA	US	1.3	65	UV3Plus	9/9/2002
Ste Anne de la Perade	PQ	CA	0.886	45	UV3Plus	10/20/2005
Mid American East WWTP Pryor Expansion	OK	US	8	60	UV3Plus	8/13/2007
Morysville (Berks-Montgomery)	PA	US	1	55	UV3Plus	11/3/2000
Grand Junction Expansion Modules	CO	US	1	65	UV3Plus	1/20/2011
Canton Wiper Upgrade	GA	US	7.92	70	UV3Plus	(blank)
Wabasha	MN	US	1.6	65	UV3Plus	2/27/2004
Leipsic Expansion	OH	US	4.32	60	UV3Plus	9/1/2012
Whiting	WI	US	1.5	65	UV3Plus	3/14/2005
Pompton Lakes Expansion	NJ	US	1.5	65	UV3Plus	5/6/2002
Lake Village	AR	US	1.5	65	UV3Plus	1/13/2000
Chilliwack Expansion	BC	CA	1	65	UV3Plus	4/4/2009
Hicksville Module Expansion	OH	US	2.7	65	UV3Plus	3/20/2008
Rubes Creek WRF Expn Woodstock	GA	US	2.5	70	UV3Plus	9/8/2004
Madison - Weir Replacement	IN	US	10.2	65	UV3Plus	3/3/2015
Solon (6 module expansion)	OH	US	0.5	75	UV3Plus	9/9/2004





## CORPORATE PROFILE AND QUALIFICATIONS

**6. Corporate Profile and Qualifications.** The following information should be included:

Proponents must have the requisite experience, resources, qualifications, and capacity to successfully meet the objectives of this RFP. Proponents are to provide sufficient information that clearly demonstrates their corporate and proposed team availability, experience, and qualifications to perform the Work.

Proponents are to provide the following in their proposal:

- (a) An outline of company background including number of employees, years in business, operating locations, nearest location to provide service to the City;
- (b) An outline of experience with completed projects of similar nature including specific equipment and processes proposed. Provide details regarding scope of supply and the dollar value of the equipment and/or processes similar to those proposed;
- (c) Methods to be used in providing support during the construction and warranty period;

**TROJAN'S RESPONSE:**

- a) Please see following pages for Trojan's company background.
- b) Please see following pages for Trojan's experience with completed projects of similar nature.
- c) Please see immediately below for information on Trojan provided support.

**FIELD SERVICE CAPABILITIES**

Technical service and support for Little River will be provided by Trojan. There are also more than 50 factory service technicians trained and certified by Trojan at various locations across North America. Construction and Post-installation technical services, warranty claims, spare parts and problem solving assistance are available to any customer, regardless of the location or size of the project. If the site problem is classified as a critical issue, a service technician can be at the site within 24 hours of notification.

For any warranty period problems Trojan has staff dedicated to warranty claims so they would be dealt with quickly and without issue.

For post-installation services, the Trojan Service Coordinator will arrange for a qualified technician and all required parts to be available.

For parts needs, factory operators can call our Trojan service toll-free number to purchase or order warranty parts as needed. Depending on the severity of the problem, parts can be shipped for next day delivery. Trojan currently has a spare parts warehouse from which we ship our products, located in London, Ontario.





For troubleshooting assistance, either in the warranty period or even after a Trojan service technician is available at the toll-free number 7 days a week free of charge. Trojan's call center is made up of five former field technicians who are qualified to answer any questions and help with troubleshooting.

#### STARTING THE SYSTEM

Trojan Technologies only allows certified service technicians to perform start-up procedures, from work to under warranty or post-warranty on UV equipment. Trojan-certified service technicians have a graduate degree, several years of experience, and at least 12 weeks of classroom or field training.

#### QUALIFICATIONS AND FUNCTIONS

Typical qualifications for Trojan service technicians are as follows :

- Post-secondary accreditation in an electrical/electronic discipline.
- 3 to 5 years of field experience
- Excellent written and verbal communication skills
- Officially trained in the maintenance of all components of Trojan's UV de-infection equipment, including electrical and mechanical systems, hydraulic and cooling systems, and control systems.

Functions :

- Provides on-site service during start-up, warranty and post-warranty phases for all Trojan equipment. On-site service work includes electrical, mechanical, microbiological and service reports, as well as the training of plant staff, contractor and consultant.
- Provide the necessary information to the engineer, contractor or owner to ensure that the site is prepared in accordance with the equipment specifications, including all relevant dimensions and requirements in terms of power, and perform and/or supervise equipment start-up procedures, as specified in the supply scope documents.
- Provide comprehensive training to the owner's staff at the equipment installation site. This study should cover topics relating to the theory of UV disinfection, the electrical and mechanical details of the installed system, microbiological effluent testing procedures, treated, system operation and maintenance, and basic troubleshooting and repair facilities.
- Diagnoses repairs to equipment installed in the field. Implement spare parts replenishment initiatives as required.
- Assess the nature of the repair work required - under warranty or billable to accounts receivable - and report on procedures.
- Prepare start-up and service reports for all field work.
- Train the staff of subcontractors, i.e. manufacturers' representatives, in the latest troubleshooting techniques, grounding regimes and/or general equipment operation problems.
- Develop and maintain over time effective working relationships in the field with client staff and contractors.

**Trojan Technical Support Center (TAC)**

**1-800-291-0213**

**7 days/week - 24 hours/day**



SPARE and WARRANTY PARTS

Trojan's main spare parts warehouse is located at:

Trojan Technologies

3020 Gore Road,

London, Ontario,

Depending on the severity of the problem, parts can be shipped for next day delivery.

Trojan offers 24/7 telephone technical support via our toll-free number 1-866-388-0488 or by email, [tac@trojanuv.com](mailto:tac@trojanuv.com). Trojan can provide in-person support from our local technicians. The response time of the local technician is generally 24 hours or less (subject to availability).



# COMPANY INFORMATION



We ensure great water confidence and environmental stewardship for people, industries and municipalities, improving the lives of over one billion people globally.

From the water we drink and the wastewater we produce to the processed water we use in our industries and in agriculture, water is a precious resource that touches every person on the planet in one way or another every single day.

As the world’s population increases, so too does the demand for this commodity. Given the fact that only one percent of the world’s water is fresh water and that only a small percentage of that is drinkable, the challenges in maximizing this resource for current and future generations are abundantly obvious.

## Trojan Technologies: Who We Are

**Our Vision:** To be a custodian of global water by engineering low-risk, innovative water technologies to ensure everyone has access to clean water.

**Our Mission:** We serve performance-driven municipal, industrial, and residential water treatment professionals by engineering solutions that enable our customers to meet their water quality objectives and improve the lives of more than one billion people globally.



Our products and services play vital roles in making the various stages of the water treatment process more effective and efficient. Applications and markets served include municipal wastewater, drinking water, environmental contaminant treatment; residential water treatment; ultra-purification of water used in food and beverage manufacturing, pharmaceutical processing and semiconductor applications; filtration and solids separation. **Product brands include TrojanUV, Aria Filtra, Aquafine, VIQUA, and Salsnes Filter.**

## Quick Facts



### INNOVATION

250 patents granted or pending



### QUALITY

Manufacturing operations in London & Guelph, Ontario; Cortland, New York; Salsnes, Norway



### EXPERIENCE

900 associates, operating from 25 locations in 16 countries



### HAPPY CLIENTS

More than 11,000 municipal UV installations on 6 continents, several hundred thousand municipal + industrial + residential installations in total



### SUPPORT

Global network of representatives and channel partnerships -- more than 200 offices in 90 countries on 6 continents

## First in our Field

Recognized as being the most experienced and knowledgeable professionals in the industry, Trojan scientists and engineers have introduced many of today's global innovations in UV technology:

- The first application of UV technology to treat reclaimed wastewater to stringent limits
- The first incorporation of electronic ballasts into low-pressure UV lamp technologies
- The first commercially successful medium-pressure UV lamp system (TrojanUV4000®) for high volume and lower-quality wastewater treatment
- The first integrated chemical and mechanical cleaning system for both low and medium-pressure UV lamp systems
- The first electronic ballast with extended control capacity for medium-pressure UV lamps in any application
- The first underwater UV lamp testing facility in the industry
- The first large-scale, monochromatic lamp-based UV system for the treatment of N-nitrosodimethylamine (NDMA)
- The first installation of UV-oxidation for the control of taste and odor-causing compounds + microbiological inactivation in municipal drinking water (Cornwall, Ontario, Canada)
- The first company to provide a system that received California's title 22 permit for water reuse



## An Operating Company of Veralto

Veralto™ launched in October 2023 as a \$5 billion global leader in essential technologies with a bold vision for creating enduring positive impact for the world. The operating companies are building on a long-standing legacy of success, innovation, and deep customer trust to create a safer, cleaner, more vibrant future.



The Water Quality companies manage, treat, purify, and protect the world’s waters, from municipal and wastewater treatment facilities to lakes, rivers, watersheds, and oceans. And the Product Quality and Innovation companies protect food, medicine, and essentials by tracking and authenticating the billions of goods that travel the global supply chain every day. Comprising a global team of 16,000+ committed to creating enduring positive impact and united by a powerful purpose: Safeguarding the World’s Most Vital Resources™.

Veralto was indelibly shaped as part of global science and technology innovator Danaher.

<b>16K</b>	<b>&gt;1,800</b>	<b>2,500+</b>	<b>45+</b>	<b>~\$5B</b>
Global team members	Scientists and engineers	Patents issued	Countries with operations	Annual revenue

**WATER QUALITY SEGMENT**











**PRODUCT QUALITY AND INNOVATION SEGMENT**








## MUNICIPAL WASTEWATER

The final step in municipal wastewater treatment is the inactivation process which is required to reduce microorganism populations in the wastewater before discharge into the receiving body of water. UV is an effective and reliable technology that treats microorganisms such as *E.Coli*, Fecal Coliform and *Enterococci*, as well as chlorine-resistant microbes including *Cryptosporidium* & *Giardia*. Protection against chlorine-resistant microorganisms is critical, as these receiving bodies of water may be relied on by communities as a source of drinking water and for recreational use.

	Chlorine Treatment	UV Treatment
No Treatment By-products (DBP's)	✘	✔
No Chemical Residue	✘	✔
No Chemical Spill Risk	✘	✔
Effective Against <i>Cryptosporidium</i> and <i>Giardia</i>	✘	✔
Well-Suited for Changing Regulations	✘	✔

Today, there are approximately 16,000 municipal wastewater treatment plants in the United States and roughly 50% of these plants use UV. This includes new plants as well as existing ones that have converted from chlorine.

### TrojanUV3000Plus

The TrojanUV3000Plus® is one of the reasons why UV is now a favored technology in wastewater treatment. It has demonstrated effective and reliable performance on six continents where more than 2,000 municipalities rely on it to treat over 30 billion gallons of wastewater every day.

Since its introduction, we have continued to invest in and evolve the technology and are excited to offer a new generation of the TrojanUV3000Plus product line. Built on the same infrastructure that makes it the proven system known today, the TrojanUV3000Plus offers new features to simplify operation and maintenance and help plant operators with modern-day treatment challenges. The new Integra™ lamp assembly reduces the time and complexity of lamp & sleeve replacement. Lamps and sleeves are preassembled and factory-sealed together as a single water-tight unit with an easy screw cap.



## TrojanUVSigna

The TrojanUVSigna® was the first large-scale UV wastewater system to utilize high-powered, high-efficiency amalgam lamps positioned in a staggered, inclined array. TrojanUV Solo Lamp® Technology reduce total cost of ownership and drastically simplifies operation and maintenance.

Integral bank walls optimize treatment performance by preventing bypass and eliminating stringent tolerances required on infrastructure. Light locks direct water through the system to control water levels and eliminate complex channel designs. The Automatic Raising Mechanism (ARM) allows easy access to the top of the bank for routine maintenance.



## The Chicago, Illinois Project

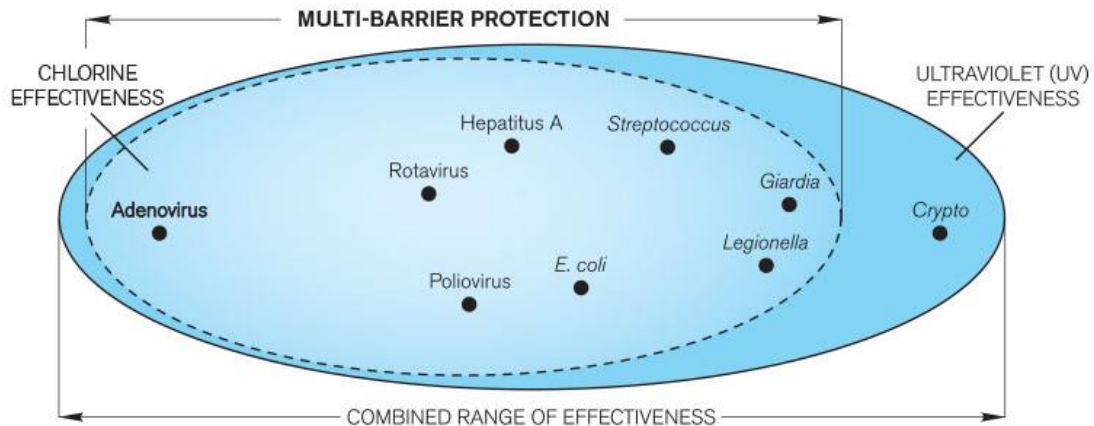
The Terrence J. O'Brien Water Reclamation Plant in Illinois serves over a million people and was the first among the top 10 largest wastewater plants in the U.S. to implement UV treatment. The TrojanUVSigna installed at this large plant treats a peak flow of 535 million gallons (2,025 million liters) of wastewater each day.





## MUNICIPAL DRINKING WATER

Stringent regulations, such as the Long Term 2 Enhanced Surface Water Treatment Rule (requiring the treatment of *Cryptosporidium*) and the Ground Water Rule in the U.S., often necessitate the use of UV to supplement existing treatment systems. This strategy is known as multi-barrier protection. A UV system is an ideal addition to a drinking water treatment plant’s multi-barrier strategy. It doesn’t create by-products or impact the taste or odor of the water, and it’s easily integrated into existing treatment processes.



In a multi-barrier strategy, UV is most often paired with chlorine. UV and chlorine naturally complement each other, as UV is effective against *Cryptosporidium* (a chlorine-resistant microorganism). UV is a viable solution that can be retrofitted into existing drinking water treatment plant systems. The contact time required for the UV treatment process is mere seconds, so the footprint required is relatively small – this ultimately reduces the need for large contact tanks.

### The World’s Largest UV Drinking Water Facility

New York City is home to the world’s largest UV drinking water facility. There are 56 custom-designed TrojanUV systems installed there and each of them is capable of delivering a 40 mJ/cm<sup>2</sup> dose to 40 million gallons of water per day. The treatment requirement, set by the NYC Department of Environmental Protection, allows for the delivery of greater than 3-log reduction of *Cryptosporidium* and *Giardia*. All told, the facility has the capacity to treat 2.02 billion gallons of water per day.



### TrojanUVSwift

Engineered and built for dependable performance, the TrojanUVSwift® requires a minimal number of lamps to treat a given flow and is serviceable from one side for easy maintenance.

Chambers can be configured for future expansion to cost-effectively meet increased capacity, system redundancy, or taste & odor treatment. The TrojanUVSwiftECT, provides year-round microbiological inactivation and treatment for seasonal taste & odor events.



### TrojanUVSwiftSC

These compact UV systems offer communities an economical solution for drinking water treatment. It's engineered and built to provide reliable performance, simplified maintenance, and reduced operating costs with innovative features like an optimized, "L-shaped" chamber, high-intensity amalgam lamps and optional automatic or manual sleeve wiping.

The compact chamber can be installed vertically or horizontally, and its low head loss design simplifies integration into existing processes while minimizing the need for additional pumps. Lamps and sleeves are serviceable from one side, allowing the system to be installed tight to walls, equipment, or in restrictive pipe galleries. Bioassay validated to inactivate *Cryptosporidium*, *Giardia*, and *Adenovirus*.



### TrojanUVFlex

The TrojanUVFlex® is designed with features to make installation and operation simpler, faster and more cost-effective than ever before. Built on the proven TrojanUV Solo Lamp Technology platform, TrojanUVFlex allows for energy-efficient high-intensity delivery of UV light in an extremely compact footprint.

It's cost-saving cross-flow lamp orientation reduces operating costs by allowing independently operated sections of lamps to be turned on/off in response to changing treatment conditions. Chambers can be manufactured with additional banks to accommodate future treatment capacity, ensuring the system meets your current requirements while also planning for future needs. The option to install chambers vertically or horizontally makes integration into existing piping straightforward and allows service access from any direction.



# Municipal Environmental Containment Treatment

## Drinking Water Remediation

Drinking water sources we rely upon every day are increasingly at risk of chemical contamination. Many of these contaminants have been proven harmful or carcinogenic and must be treated and removed in order for the water to be considered usable. Contaminants may come directly from human sources such as industrial manufacturing, agricultural run-off and wastewater discharge, or they may originate from natural sources, such as the taste and odor-causing chemicals in water generated by algae and bacteria blooms.

The UV advanced oxidation process (also known as UV AOP) is an established technology for the remediation of contaminants in groundwater and surface water. Our systems have been installed around the world to treat a variety of contaminants.

<p><b>Volatile Organic Compounds</b></p> <ul style="list-style-type: none"> <li>• 1,4-Dioxane</li> <li>• Trichloroethylene (TCE)</li> <li>• Tetrachloroethylene (PCE)</li> </ul>	<p><b>Taste and Odor Causing Compounds</b></p> <ul style="list-style-type: none"> <li>• 2-Methylisoborneol (MIB)</li> <li>• Geosmin</li> </ul>
<p><b>Pesticides</b></p> <ul style="list-style-type: none"> <li>• Metaldehyde</li> <li>• Atrazine</li> </ul>	<p><b>Algal Toxins</b></p> <ul style="list-style-type: none"> <li>• Anatoxin</li> <li>• Microcystin</li> </ul>
<p><b>Explosives</b></p> <ul style="list-style-type: none"> <li>• Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)</li> </ul>	<p><b>By-products</b></p> <ul style="list-style-type: none"> <li>• N-nitrosodimethylamine (NDMA)</li> </ul>
<p><b>Hazardous Substances</b></p> <ul style="list-style-type: none"> <li>• Cyanide</li> </ul>	

## World's Largest 1,4-Dioxane Treatment Initiative

Communities on Long Island in New York State rely on extracting groundwater for most of their drinking water supply. After monitoring by the USEPA, it was determined that approximately 70% of wells extracting groundwater for public supply contained 1,4-dioxane - a probable human carcinogen - above the designated limits. Our advanced oxidation process (AOP) solutions, the TrojanUVFlex and TrojanUVPhox®, are installed at multiple well sites across the Island to break down 1,4-dioxane.



## Wastewater Reuse

Meeting the demand for clean water has never been more challenging. Communities around the world are facing a growing water stress – an insufficient supply, in terms of water quality or water quantity – and often both. Climate change, growing populations, aging infrastructure, and natural and man-made contaminants are contributing factors making it challenging for municipalities to meet the increasing demands for clean water. Many water providers are turning to reuse as the solution to their water supply and quality challenges.



Our involvement in water reuse began back in the 1990's when we invested and participated in research initiatives to understand the science of UV for wastewater reuse. These studies helped lay the groundwork for industry and public acceptance of UV and advanced oxidation treatment. We are proud to have partnered with the early adopters of UV technology for reuse – and are humbled by hundreds of municipalities around the world who, since then, have installed TrojanUV systems. Today, we continue to focus on the advancement of regulations, design guidance, validation and permitting requirements.

### **The Orange County, California Project**

The Groundwater Replenishment System (GWRS) in Orange County, California is the largest indirect potable reuse project of its kind in the world, and the TrojanUVPhox plays an important role in the facility's treatment train. The GWRS treats and reuses wastewater that, in the past, had been discharged to the ocean. The treated water replenishes aquifers, helping to prevent seawater intrusion and to provide Orange County with a drought-proof, sustainable water supply.



### TrojanUVFlexAOP

The TrojanUVFlexAOP performs the UV advanced oxidation process for potable reuse and drinking water remediation applications. It's advanced controller processes multiple real-time inputs including flow rate and UV transmission. Critical water characteristics including scavenging demand and alkalinity as well as other system parameters such as lamp data are all computed together to evaluate real-time performance.

The system computes delivered contaminant reductions with either hydrogen peroxide or free chlorine oxidants and compares performance against desired treatment requirements. This advanced control process optimizes operating costs by modulating UV output and oxidant delivery to match treatment conditions.



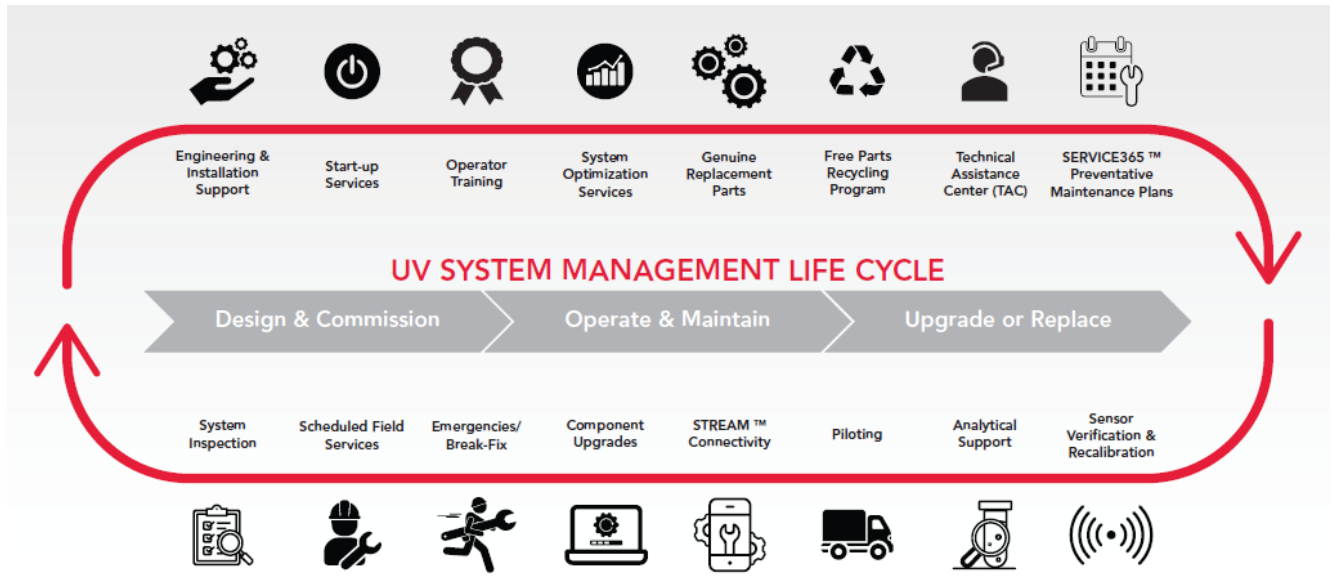
### TrojanUVSwiftECT

The TrojanUVSwiftECT employs sophisticated controls to optimize the treatment of environmental contaminants. The broad light spectrum of light emitted makes it extremely well suited for the treatment of certain contaminants, particularly some pesticides and taste and odor-causing compounds found in surface waters.

It's ultra-compact footprint and large flow capacity makes it an excellent system for use as part of a multi-barrier system in large municipal applications (hundreds of millions of gallons per day). In such an application, the TrojanUVSwiftECT breaks down contaminants such as pharmaceuticals and taste and odor-causing compounds while providing microbiological inactivation of for *Cryptosporidium* and *Giardia*.



## Services to Maximize the Life and Performance of your TrojanUV System



### Local Field Service

Our municipal UV system installation base is supported by a global team of certified service technicians that work for Trojan or our network of trusted channel partners. This strong distribution structure allows us to provide unparalleled levels of service and support to customers regardless of where they are located.

### Customized Service

On-site services can be packaged and tailored to meet the specific requirements of your UV system. We can help with as little or as much as you'd like; from system inspections to full-service preventative maintenance.

### Certified UV Experts

Technicians go through extensive training to become Trojan Certified experts. Their certification means that they are fully prepared to not only carry out the necessary repair services on your TrojanUV system but they can recommend ways to maximize its performance while minimizing energy consumption and operating costs.

---

## Benefits that Come with Genuine TrojanUV Parts

### **Lifetime Performance Guarantee**

When you use genuine TrojanUV parts, we guarantee that your system will meet the performance requirement specified at purchase, provided that the system's original design parameters haven't changed (e.g., flow rate, UV transmittance) and maintenance is completed per the UV system's O&M manual. Should you experience an issue, our service technicians will work with you to resolve it as fast as possible.

### **Access to our Technical Assistance Center (TAC)**

We provide over-the-phone technical support from our TAC in London, Ontario, Canada. All service technicians have field experience and are thoroughly trained to provide installation support, startup assistance, and equipment troubleshooting.

### **Warranty Coverage**

We offer comprehensive warranties on our lamps, lamp drivers and UV sensors.

### **Validated Equipment and Components**

Our UV systems, including components, have been developed through extensive research and are designed to work together. They have also gone through testing by a third party to confirm and validate their performance.

### **Safety Certifications**

Our UV systems, together with their parts and components, have been accredited by safety standards organizations UL, CE and CSA. Exchanging your system's parts with non-TrojanUV parts may void UV system safety certifications and could create unsafe conditions for operating and servicing your equipment.

### **Free Recycling Program**

For municipal treatment plants in North America using TrojanUV parts, we arrange and cover the cost for your used lamps, lamp drivers and electronic boards to be picked up and shipped to an approved recycling facility.



## Sustainability at Trojan

We are committed to building a sound company dedicated to improving the health of our global environment. As an organization, we are responsible for annual reporting to Veralto on both our environmental consumption and performance. We are consistently working toward reducing our environmental impact as an organization. An overarching component of the company’s environmental practices is communication to encourage awareness and participation by our employees to take individual action.

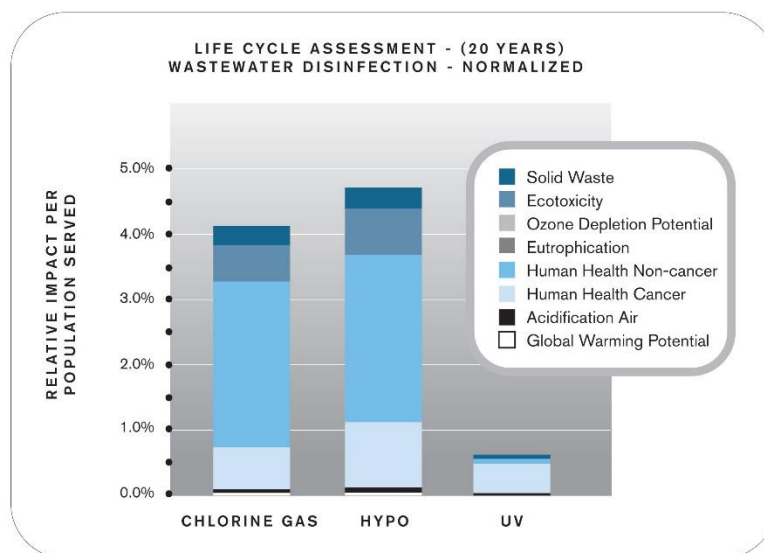
### EcoVadis Gold Medal for Sustainability

We are proud to have been recognized by EcoVadis for our commitment to sustainability, labor and human rights, ethics and sustainable procurement. Being awarded an EcoVadis Gold Medal reminds us of the meaningful and impactful work that we continue to perform to ensure everyone has access to clean water.



### Life Cycle Assessments

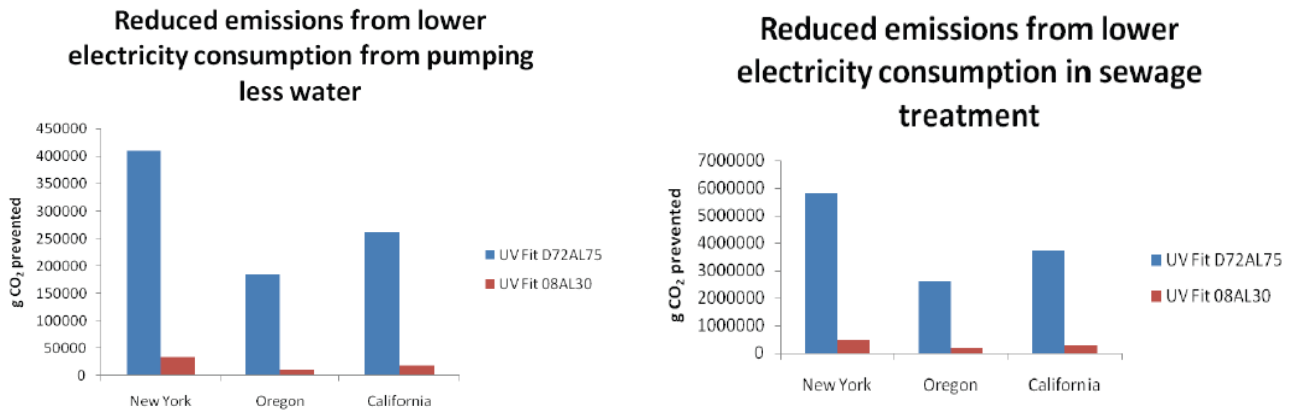
We partnered with the University of Western Ontario to study the environmental impact (including carbon footprint) of various technologies. These studies evaluated the life cycle of various treatment technologies to allow us to better understand the environmental impacts of our products (e.g. Ecotoxicity, Ozone Depletion, Eutrophication, Human Health Effects, Acidification, and Global Warming Potential). Through this research, we demonstrated that UV technology has a lower environmental impact than chemical treatment (e.g. chlorine).



*This graph is an example of a Life Cycle Assessment study that was performed on a wastewater treatment plant. The results showed that UV had a significantly lower environmental impact than other technologies.*

## Green Validation

We are constantly researching novel methods of reducing the environmental impact of our products and processes. The validation of UV chambers is an important part of our business because it provides empirical data on a chamber’s performance. In partnership with HydroQual, we have demonstrated that a re-circulating validation method is equivalent to a flow-through validation (study has been completed and final report has not been published). The re-circulating validation allowed for a significant reduction in water consumption (and therefore reduces the environmental footprint of bioassay validations).



*Because the TrojanUVFit was validated using a re-circulating validation method instead of a flow-through method, significant amounts of greenhouse gas emissions were prevented by eliminating emissions from transportation and water consumption*

## Economic Sustainability

We strive to design and supply products that will assist customers in meeting their economic sustainability goals. This is accomplished by supplying product with the lowest total cost of ownership (including capital cost, installation cost, operating and maintenance costs). Our solutions are developed to be energy efficient and to minimize power consumption, protecting the customer from volatility in operating expenses.

As an organization, we report to parent company – Veralto who utilizes key and consistent metrics to monitor the economic health of their companies. We have consistently met Veralto’s expectations with respect to financial health and growth metrics – both key to ensuring longevity of the organization.

## Product Development

During all product development initiatives, we strive to design the highest-efficiency solutions in order to minimize power consumption thereby reducing greenhouse gas emissions. Some of these innovations include:

- Automatic cleaning systems to decrease fouling. Fouled sleeves result in wasted energy. By leading the industry with chemical/mechanical sleeve cleaning technologies (ActiClean™), we lower the environmental footprint of every end user employing ActiClean-equipped systems. Clean sleeves result in maximized use of UV energy, higher sensor readings, and lower input electrical energy, every minute the system is operational.
- High efficiency lamps that maintain high output at end of lamp life. We are leading the world's conversion to high efficiency UV lamps. Medium pressure lamps convert between 10% and 17% of electrical energy to UV light. Trojan LPHO and Solo® Lamp technologies convert between 30% and 35% of input electrical energy to usable UV light, resulting in more environmentally-responsible UV.
- Advanced chamber design. By hydraulically- and optically-optimizing the design of UV chamber, we maximize the usage of generated UV energy.

We are also committed to utilizing electronic components that comply with RoHS directives (Restriction of Hazardous Substances). This means that components are lead free and meet recycling and recovery targets.

## Procurement Practices

During procurement, we make an effort to source components locally in order to minimize transportation of components. Before partnerships are formed with suppliers and sub-contractors, we ensure that their business practices are sound including labour, safety and environmental practices. The company's economic health is also scrutinized at length in order to ensure long-term availability of parts from that supplier and to understand the depth of research and engineering departments at partner companies and suppliers.

## Recycling at Trojan

We recycle materials used in the office and manufacturing facility, including:

- Office paper
- Batteries
- Metal
- Copper wire
- Plastics
- Wood
- Food waste
- E-waste
- Cardboard
- Glass
- Office furniture
- UV lamps

---

### **Sustainability Initiatives (Social)**

We are active in the London, Ontario community in promoting social health. We support a variety of charitable organizations and strive to educate our employees on ways in which they can minimize their personal environmental footprint. For example:

- Health and Safety policy for all employees with training on various topics
- Veralto has a thorough Integrity and Compliance program for all employees (including Part-time, contract, international positions). The program includes annual training, and telephone/online reporting available for associates to report potential integrity/compliance violations. We are committed to building our enterprise with integrity, and we have a reputation for dealing honestly and fairly with our investors, business partners, customers, associates and competitors. Our commitment to integrity and our reputation is the foundation for Veralto's success.

Trojan is actively involved with a number of local wider-reaching charities and organizations including, but not limited to:

- Ronald McDonald House
- Canada Blood Services
- London Food Bank
- Salvation Army – Mission Services
- Oxford Children's Water Festival
- Reforest London
- Movember – Changing the Face of Men's Health
- Habitat for Humanity
- Thames River Clean Up
- Terry Fox Run
- Orange County Water District's annual Children's Water Education Festival

### **Miscellaneous**

- Implemented reusable packaging programs, materials and freight line consolidation
- Packaging materials such as bubble wrap cardboard and skids are re-used to package other items to ship to customers
- Re-usable water bottles are provided to all new associates in order to eliminate the use of disposable bottles and cups

- Meet all legal environmental initiatives such as hazardous waste disposal (HWIN), Transportation of Dangerous Good Training, and Emergency Response. As well, we are currently in the process of applying for our Certificate of Approval for Air
- Environmental Health and Safety Suggestion Form for all associates so they can express environmental ideas and suggestions to be implemented at Trojan

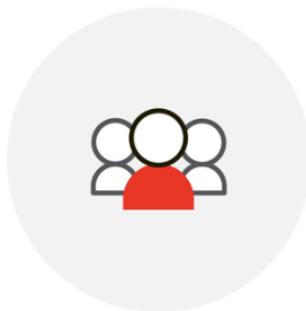
## Diversity, Equity, and Inclusion

By creating a culture where everyone is heard, valued, and encouraged, there are no limits to the innovative solutions and breakthrough thinking we can achieve.



### Ongoing Awareness

Day of Understanding  
 Reverse Mentorship Program  
 Workshops, seminars, and lunch-and-learns  
 Women's Leadership & Development Book Study Group  
 Social and volunteer activities



### Associate Resource Groups

Asian Descent + Friends  
 Black + Friends  
 LatinX + Friends  
 LGBTQ + Friends  
 Women + Friends



### Continuous Improvement

Career Development Programs  
 Unbiased Evaluation and Selection Process  
 Leadership Training  
 Regular Associate Engagement Surveys to Drive Change

Every person on the Trojan Technologies team is unique, shaped by who they are, their experiences, and their beliefs. But all of us have something in common: the need for clean water. We firmly believe that by bringing together our diverse ideas, perspectives, and backgrounds - and providing a space where everyone feels safe to share their ideas - we can solve the complex water problems of our changing world.

-XXX-

An outline of experience with completed projects of similar nature including specific equipment and processes proposed.

**Trojans Response:** Please see list below, all but one of these are in Ontario, and all re-used existing infrastructure:

- i. Galt WWTP UV – **Conversion of TrojanUV3000™ → TrojanUV3000™Plus**
  1. The design process here was a little more involved, as the hydraulics of the 3000 “classic” system are different than that of the UV3000Plus that replaced it. As such, the support of Trojan’s drafting and hydraulics teams were critical in ensuring that the new design was able to fit within the bounds of the existing hydraulic grade line of the facility. Further, in order to meet the Region of Waterloo’s programming standards, custom programming was provided on the controller.
- ii. Craigleith WWTP – **Conversion of Competitor System → TrojanUV3000™Plus**
  1. Civil works were somewhat challenging as this was a conversion of an existing system and the building is a bit tight. The conversion to the UV3000Plus was explored and accepted. The added benefit to the end-user of the current 3000 Plus system is the cleaning system, compact footprint/lamps, and the controls are now able to pace the power level and number of UV banks that are in operation based on an external flow signal.
- iii. Port Washington, WI – **Conversion of Trojan UV 2000 → TrojanUV3000™Plus**
  1. Retrofitted an existing 8 lamp 2000 to a 6 lamp 3Plus, the same as being proposed at Little River. The conversion to the UV3000Plus allowed more flow through less lamps as the lamps are now more powerful and it also included the benefit of the cleaning system. Controls were upgraded and one channel taken out of service and now used as a bypass.
- iv. Elmira WWTP UV – **Conversion of existing TrojanUV3000™ → TrojanUV3000™B**
  1. Civil works were limited, as this was a conversion of an existing TrojanUV3000™ “classic” system to its closest modern equivalent, the TrojanUV3000™B. The conversion to the UV3000Plus was explored but rejected as the civil works involved would have been more extensive. The added benefit to the end-user of the current 3000B system is that the controls are now able to pace the number of UV banks that are in operation based on an external flow signal.
- v. Sarnia WWTP UV – **Conversion of TrojanUV4000™ → TrojanUVSigna™**
  1. As with all UV4000 conversions, the civil works involved are a little more extensive, as the UV4000 design included a frame that is formed into the surrounding concrete wall. The UVSigna is the successor to the UV4000 design,

so the overall channel dimensions are roughly equivalent. Trojan's drafting and hydraulics teams were instrumental in ensuring that the design of the new system met with the client's needs and on-site conditions.

- vi. Collingwood WWTP UV – **Conversion of TrojanUV4000™ → TrojanUVSigna™**
  - 1. See ii above, as the challenges are similar. On this project, Trojan also supplied a temporary UV treatment trailer to handle UV disinfection throughout the construction period.
- vii. New Hamburg WWTP UV – **Conversion of TrojanUV3000™ → TrojanUV3000™B**
  - 1. See i above, as the themes are similar. A limitation on the standard microprocessor-based controller for the 3000B systems is that it can only handle up to a maximum of 2 channels, and given the 3 channels at New Hamburg, three (3) separate UV controllers were supplied, and additional assistance was provided to ensure that the required controls functionality was met via careful integration with the plant's SCADA.
- viii. St. Jacobs WWTP UV – **Conversion of TrojanUV3000™ → TrojanUV3000™B**
  - 1. See i above, as the themes are similar.
- ix. Paisley WWTP UV – **Conversion of chlorine contact tank → TrojanUV3000™B**
  - 1. This project involved the conversion of an existing chlorine contact chamber to a UV disinfection system. The design process here was a little more involved, as the support of Trojan's drafting and hydraulics teams were critical in ensuring that the channel design was able to fit within the bounds of the existing hydraulic grade line of the facility.
- x. Richard's Landing WWTP UV – **Conversion of chlorine contact tank → TrojanUV3000™B**
  - 1. See vi above, as the themes are similar.
- xi. Alvinston WWTP UV – **Conversion of TrojanUV3000™ → TrojanUV3000™B**
  - 1. See iii above, as the themes are similar.

Methods to be used in providing support during the construction and warranty period

### **Trojans Response:**

#### **FIELD SERVICE CAPABILITIES**

Technical service and support for Thornbury will be provided by Trojan and/or H2Flow. There are also more than 53 factory service technicians trained and certified by Trojan at various locations across North America. Construction and Post-installation technical services, warranty claims, spare parts and problem solving assistance are available to any customer, regardless of the location or size of the project. If the site problem is classified as a critical issue, a service technician can be at the site within 24 hours of notification.

For any warranty period problems Trojan has staff dedicated to warranty claims so they would be dealt with quickly and without issue.

For post-installation services, the Trojan Service Coordinator will arrange for a qualified technician and all required parts to be available.

For parts needs, factory operators can call our Trojan service toll-free number to purchase or order warranty parts as needed. Depending on the severity of the problem, parts can be shipped for next day delivery. Trojan currently has a spare parts warehouse from which we ship our products, located in London, Ontario.

For troubleshooting assistance, either in the warranty period or even after a Trojan service technician is available at the toll-free number 7 days a week free of charge. Trojan's call center is made up of five former field technicians who are qualified to answer any questions and help with troubleshooting.

#### **STARTING THE SYSTEM**

Trojan Technologies only allows certified service technicians to perform start-up procedures, from work to under warranty or post-warranty on UV equipment. Trojan-certified service technicians have a graduate degree, several years of experience, and at least 12 weeks of classroom or field training.

#### **QUALIFICATIONS AND FUNCTIONS**

Typical qualifications for Trojan service technicians are as follows :

- Post-secondary accreditation in an electrical/electronic discipline.
- 3 to 5 years of field experience
- Excellent written and verbal communication skills
- Officially trained in the maintenance of all components of Trojan's UV de-infection equipment, including electrical and mechanical systems, hydraulic and cooling systems, and control systems.

Functions :



- 
- Provides on-site service during start-up, warranty and post-warranty phases for all Trojan equipment. On-site service work includes electrical, mechanical, microbiological and service reports, as well as the training of plant staff, contractor and consultant.
  - Provide the necessary information to the engineer, contractor or owner to ensure that the site is prepared in accordance with the equipment specifications, including all relevant dimensions and requirements in terms of power, and perform and/or supervise equipment start-up procedures, as specified in the supply scope documents.
  - Provide comprehensive training to the owner's staff at the equipment installation site. This study should cover topics relating to the theory of UV disinfection, the electrical and mechanical details of the installed system, microbiological effluent testing procedures, treated, system operation and maintenance, and basic troubleshooting and repair facilities.
  - Diagnoses repairs to equipment installed in the field. Implement spare parts replenishment initiatives as required.
  - Assess the nature of the repair work required - under warranty or billable to accounts receivable - and report on procedures.
  - Prepare start-up and service reports for all field work.
  - Train the staff of subcontractors, i.e. manufacturers' representatives, in the latest troubleshooting techniques, grounding regimes and/or general equipment operation problems.
  - Develop and maintain over time effective working relationships in the field with client staff and contractors.

### **Trojan Technical Support Center (TAC)**

**1-800-291-0213**

**7 days/week - 24 hours/day**

#### SPARE and WARRANTY PARTS

Trojan's main spare parts warehouse is located at:  
Trojan Technologies  
3020 Gore Road,  
London, Ontario,

Depending on the severity of the problem, parts can be shipped for next day delivery. Trojan offers 24/7 telephone technical support via our toll-free number 1-866-388-0488 or by email, [tac@trojanuv.com](mailto:tac@trojanuv.com). Trojan can provide in-person support from our local technicians. The response time of the local technician is generally 24 hours or less (subject to availability).



## TEAM ORGANIZATION AND EXPERIENCE



**7. Team Organization.** The following information should be included:

Proponents to provide team members proposed for this project. Provide the qualifications of each team member to demonstrate sufficient experience on projects similar to the LRPCP UV Disinfection Upgrades Project. Each Team member will be evaluated based on years of experience, number of similar projects, and roles on previous projects with similarity to the project requirements for the LRPCP.

Proponents shall:

a) Provide an organization chart that clearly defines the organizational and reporting structure of the project team specific for the LRPCP UV Disinfection Upgrades.

At a minimum, Proponents are to provide information for the following key staff:

- a. Project manager, minimum 10 years' experience;
- b. Site verification support staff, minimum 7 years;
- c. Design engineers (structural, mechanical, and electrical), minimum 10 years;
- d. Installation support staff, minimum 10 years;
- e. Field service representative, minimum 7 years; and
- f. Commissioning and start-up support staff, minimum 10 years.

b) Provide, for each resource in the team organization;

- a. Role and responsibilities on this project;
- b. A brief description of professional qualifications and expertise, including total number of years' experience (differentiate between design and working in the field);
- c. Number of years they have worked for the Proponent;
- d. Their geographic work location;
- e. Their recent related project experience (list similar project within the last 5 years); and
- f. Resume with current list of licenses/certificates.

c) Describe how the team will be managed, including overall communication and coordination for delivery of a successful project;

d) Describe how the resources function within the team; and,

e) Confirm the availability of each team member during the term of the future construction contract. It is anticipated the project will be awarded to the General Contractor in June 2024 with construction completion date anticipated to be Spring of 2025.

**TROJAN'S RESPONSE:**

- a) Please see following pages for Trojan organizational chart. Additionally please see below key staff for the LRPCP UV Disinfection Upgrades.



## Project Team

Position	Name	Years of Experience	Qualifications & Experience	Work Location	Reference Contact Availability	Reports To:
Project Manager	Mike Bartram	17	DW, WW, AOP,PCS	London	Project Engineer Manager 519-457-3400 M-F 7-5	Rod Black Director of Project Managment 519-457-3400
VP Innovation and technology	Katrina Williams	23	DW, WW, AOP,PCS	London	Product Director 519-457-3400	Tom Siller CEO 519-457-3400
Lead Programmer (System Integrator)/Controls	Steve Smydo	20	DW, WW, AOP,PCS	London	Controls Leader 519-457-3400 M-F 8-5	Rod Black Director of Project Managment 519-457-3400
Lead Supervisor <i>(for supervision services during installation startup and commissioning)</i>	Steve Birbaumer	26	DW, WW, AOP,PCS	London	Service Tech 519-457-3400 M-F 8-5	Kevin Spehr VP of Sales/Service 519-457-3400
Lead Trainer <i>(for Operation and Maintenance (O&amp;M) of supplied equipment)</i>	Steve Birbaumer	26	DW, WW, AOP,PCS	London	Service Tech 519-457-3400 M-F 8-5	Kevin Spehr VP of Sales/Service 519-457-3400
Main Local/Regional Technical Support Representative	Paul Matthews Nick Gavican Matt Kemp Ben Zwart	25 22 25 30	DW, WW, AOP,PCS	London Vaughan	Service Tech 519-457-3400 M-F 7-5 or on emergency	Kevin Spehr VP of Sales/Service 519-457-3400
Preventative Maintenance Service Staff	Paul Matthews Nick Gavican Matt Kemp Ben Zwart	22 20 24 30	DW, WW, AOP,PCS	London/ Vaughan	Service Tech 519-457-3400	Kevin Spehr VP of Sales/Service 519-457-3400
Regional Sales Manager	Rob Jansen	18	DW, WW, AOP,PCS	London	Sales 519-457-3400 M-F 7-7	Josh Richardson Director of Sales 519-457-3400
Municipal Designer	Monica Harrington	20	DW, WW, AOP,PCS	London	Sales 519-457-3400 M-F 7-7	Josh Richardson Director of Sales 519-457-3400

**President, Trojan Technologies**  
CAN - London - Trojan Technologies - FCN22

**Global Director, Engineering and R&D**  
DEU - Schenefeld - Trojan Technologies Deutschla...

9 See Page 2

**Global Operations and Supply Chain Director**  
CAN - Remote

12 See Page 3

**Vice President, Veralto Enterprise Systems**  
USA - Remote

2 See Page 4

**Director, Customer Experience & Product Manag...**  
USA - Remote

5 See Page 5

**VP and Chief Financial Officer**  
CAN - London - Trojan Technologies - FCN22

9 See Page 6

**VP, Innovation & Technology**  
CAN - London - Trojan Technologies - FCN22

14 See Page 7

**Vice President, Global Sales and Customer Exper...**  
CAN - Remote

14 See Page 8

**Director of Sales - Americas**  
USA - Remote

8 See Page 9

**Vice President, Human Resources**  
CAN - London - Trojan Technologies - FCN22

5 See Page 10

**Vice President, Operations**  
CAN - London - Trojan Technologies - FCN22

9 See Page 11

**Vice President, Marketing & Product Strategy**  
CAN - London - Trojan Technologies - FCN22

5 See Page 12

**Executive Assistant to the President & SMT**  
CAN - London - Trojan Technologies - FCN22

**Vice-President, Corporate Development**  
CAN - London - Trojan Technologies - FCN22

Global Director, Engineering and R&D  
DEU - Schenefeld - Trojan Technologies Deutschla...

See Page 1

Manager, Global Software Engineering  
USA - Remote

6 

Product Engineer, Principal  
USA - Remote

Process Engineer  
CAN - London - Trojan Technologies - FCN22

Electrical Designer  
CAN - London - Trojan Technologies - FCN22

Mechanical Designer  
CAN - London - Trojan Technologies - FCN22

Senior Innovation Process Engineer  
CAN - London - Trojan Technologies - FCN22

Process Engineer  
USA - Remote

Research & Development  
CAN - London - Trojan Technologies - FCN22

Process Engineer  
CAN - London - Trojan Technologies - FCN22

Global Operations and Supply Chain Director  
CAN - Remote

See Page 1

Manager of Business Operations & Projects  
ITA - Remote

2 

Project Execution Leader  
CAN - London - Trojan Technologies - FCN22

3 

Sr. Manager, Project Management  
USA - Remote

7 

Logistics and Warehouse Supervisor  
USA - Remote

5 

Senior Manager, Quality and Operational Excellence  
CAN - London - Trojan Technologies - FCN22

4 

Contingent Worker - Indirect Labor.  
CAN - Remote

Supply Chain Manager  
CAN - Guelph - Viqua

Contingent Worker - Indirect Labor.  
CAN - London - Trojan Technologies - FCN22

Sr. Procurement Specialist  
CAN - Mississauga - Multiple OpCo

Buyer II  
USA - Remote

Outsourcing Assembly Lead/Senior Buyer  
CAN - Remote

Buyer 2  
CAN - London - Trojan Technologies - FCN22



Vice President, Veralto Enterprise Systems  
USA - Remote

See Page 1

---

Commercial VES Leader

CAN - London - Trojan Technologies - FCN22

VES Leader

CAN - London - Trojan Technologies - FCN22



Director, Customer Experience & Product Manag...

USA - Remote

See Page 1

Customer Success Leader

CAN - Remote

3 

Mobile Operations Leader

USA - Remote

2 

Americas Field Service Manager & EHS Lead

USA - Remote

15 

Assistant Manager AriaFiltru America's Service

CAN - Remote

3 

Global Product Manager

CAN - London - Trojan Technologies - FCN22



**VP and Chief Financial Officer**  
CAN - London - Trojan Technologies - FCN22

See Page 1

**Dir, Finance**  
CAN - London - Trojan Technologies - FCN22

6

**Finance Manager, Working Capital**  
CAN - London - Trojan Technologies - FCN22

3

**Global IT Director, Business Systems**  
CAN - London - Trojan Technologies - FCN22

21

**Global Business Systems and ERP Project Manager**  
CAN - London - Trojan Technologies - FCN22

13

**Global Controller, Aria Filtra**  
**USA - Remote**

6

**Global Controller, Financial Systems**  
CAN - London - Trojan Technologies - FCN22

**Senior Manager, Global Tax & Compliance**  
CAN - London - Trojan Technologies - FCN22

**Compliance Specialist**  
CAN - London - Trojan Technologies - FCN22

**Sr Business Analyst**  
CAN - London - Trojan Technologies - FCN22

**VP, Innovation & Technology**  
CAN - London - Trojan Technologies - FCN22

See Page 1

**Engineering Team Leader**  
CAN - London - Trojan Technologies - FCN22

2

**Dir, Research**  
CAN - London - Trojan Technologies - FCN22

2

**Director, Technology Development**  
CAN - London - Trojan Technologies - FCN22

13

**Engineering Manager**  
CAN - London - Trojan Technologies - FCN22

7

**Manager, Product Development**  
CAN - London - Trojan Technologies - FCN22

6

**Director, Innovation & Product Planning**  
CAN - London - Trojan Technologies - FCN22

3

**Scientist E**  
CAN - Remote

9

**Manager**  
CAN - London - Trojan Technologies - FCN22

8

**Manager, Product Engineering**  
CAN - London - Trojan Technologies - FCN22

10

**Mechanical Designer**  
CAN - London - Trojan Technologies - FCN22

**Senior Mechanical Engineer**  
CAN - London - Trojan Technologies - FCN22

**Senior Mechanical Engineer**  
CAN - London - Trojan Technologies - FCN22

**Scientist E**  
CAN - London - Trojan Technologies - FCN22

**Global Applications Manager**  
CAN - London - Trojan Technologies - FCN22

Vice President, Global Sales and Customer Exper...

**CAN - Remote**

See Page 1

**Manager, Inside Sales Europe**

ESP - Remote

4

Director, Rep Network Relations & Key Projects

CAN - London - Trojan Technologies - FCN22

1

**Director, Commercial Operations**

CAN - London - Trojan Technologies - FCN22

5

Director of Global Business Development

**ITA - Remote**

4

**Sr Director, NA Sales**

CAN - Remote

14

Customer Service Manager - UV

CAN - Guelph - Viqua

8

**Mgr., Sales Europe**

IRL - Remote

7

EMEA Director of Service & Customer Care

GBR - Kidderminster - Trojanuv Technologies UK Li...

2

**Director, Field Service**

CAN - London - Trojan Technologies - FCN22

9

Mgr., Sr Scientist, Core Applications

CAN - London - Trojan Technologies - FCN22

8

Sr Director, Sales & Service - EMEA & Asia

**ITA - Remote**

7

**Director, Service Sales**

CAN - London - Trojan Technologies - FCN22

5

Senior Account Manager, Residential Europe

**PRT - Remote**

**Service Product Manager**

CAN - London - Trojan Technologies - FCN22



Director of Sales - Americas  
USA - Remote

See Page 1

Aftermarket Sales Manager  
USA - Remote

3

Applications Engineering Manager  
USA - Remote

7

Business Development Manager  
USA - Remote

Regional Sales Manager - Municipal  
USA - Remote

Regional Sales Manager  
USA - Remote

Regional Sales Manager - Municipal  
USA - Remote

Business Development Manager  
USA - Remote

Regional Sales Manager  
USA - Remote



Vice President, Human Resources  
CAN - London - Trojan Technologies - FCN22

See Page 1

Sr. HR Business Partner  
CAN - London - Trojan Technologies - FCN22

1

Manager, Human Resources  
CAN - London - Trojan Technologies - FCN22

2

Senior HR Business Partner  
DEU - Duesseldorf - Multiple OpCo

Senior HR Business Partner  
CAN - Guelph - Viqua

Senior HR Business Partner  
CAN - London - Trojan Technologies - FCN22

**Vice President, Operations**  
CAN - London - Trojan Technologies - FCN22

See Page 1

**Senior Operations Manager**  
CAN - London - Trojan Technologies - FCN22

4

**Senior Manager, Operations**  
CAN - London - Trojan Technologies - FCN22

4

**Director of Operations and Finance, Salsnes**  
NOR - Namsos - Salsnes Filter AS

4

**Global EHS Manager**  
CAN - Guelph - Viqua

2

**Director, Program Management & Engineering**  
CAN - London - Trojan Technologies - FCN22

13

**Director, Global Supply Chain & Logistics**  
CAN - London - Trojan Technologies - FCN22

7

**Director of Operations**  
CAN - London - Trojan Technologies - FCN22

7

**OPS SME**  
CAN - London - Trojan Technologies - FCN22

**Operations Excellence**  
CAN - London - Trojan Technologies - FCN22

Vice President, Marketing & Product Strategy  
CAN - London - Trojan Technologies - FCN22

See Page 1

Global Director, Product Management  
CAN - London - Trojan Technologies - FCN22

6 

Director, Water Reuse  
CAN - London - Trojan Technologies - FCN22

0 

Director, Marketing  
CAN - London - Trojan Technologies - FCN22

7 

Director, Digital Solutions  
CAN - London - Trojan Technologies - FCN22

10 

Global Pricing Manager  
CAN - London - Trojan Technologies - FCN22





# PROJECT IMPLEMENTATION AND APPROACH



**8. Project Implementation and Approach.** The following information should be included:

The Proponent shall provide a written description of the approach that will be employed in undertaking the project. This includes the methodology by which the Proponent intends to meet the project objectives in accordance with their understanding of the project, outlined below:

**a) Design and Shop Drawings Submittals:**

Proponents shall describe their understanding with respect to the scope of work involved in this RFP. The Proponent shall provide a short description of their approach and methodology to coordinate with the City and Consultant in gaining an understanding of the LRPCP and in the design of the UV disinfection equipment in accordance with the technical specifications. This shall include:

- a. How the design process will flow into the shop drawings submittals;
- b. Constructability and compatibility with existing infrastructure: Proponents shall provide a general drawing and short description of how their proposed UV Disinfection equipment would be implemented within the existing UV channel concrete structures with the modifications to be made by the General Contractor to the existing UV facility;
- c. Proponents are to provide at least two (2) project applications with similar constructability and compatibility considerations to that proposed for the LRPCP. The City and Consultant will critically evaluate the constructability and compatibility associated with each submittal;
- d. Provide a brief description of work to be completed by the General Contractor not already listed in the Technical Specification but required to install the UV disinfection equipment and create a fully functional system; and
- e. Clearly list any deviations or exceptions from the Technical Specifications. If none exist, then clearly indicate "No Deviations or Exceptions from the Technical Specifications" in the approach section of your proposal.

**b) Quality Management Plan.** The Proponent shall describe their quality management plan:

- a. Quality assurance and quality control procedures for shop drawing submissions and the manufacturing of the equipment; and
- b. A listing of certifications and standards that will be used in the design and manufacturing of the equipment.

**c) Supervision of Installation Plan.** The Proponent shall describe their services to be provided during both installation and functional testing of equipment.**d) Training Plan.**

The Proponent shall describe their plan for training the City's operation and maintenance staff.

The Proponent shall provide the following:

- o Proposed training plan and training schedule for this project;
- o Training team roles and responsibilities;
- o Description of classroom training, including curriculum, training methods and techniques and training aids. Provide examples of a typical presentation of a classroom session; and
- o Description of hands-on training, including how training will incorporate the use of the equipment provided under this contract.



e) Testing and Commissioning Plan.

The Proponent shall describe the plan for checking-out, start-up, initial operation and performance of the equipment in accordance with the Technical Specifications. The Proponent shall provide the following:

- a. Commissioning team roles and responsibilities;
- b. Description of check-out of equipment, including factory acceptance and field acceptance test procedures;
- c. Description of start-up and initial operation, including roles and responsibilities of the Proponent's staff and expectation of the City's staff; and Decision of the performance testing, monitoring and reporting of the system during the commissioning period.

**TROJAN'S RESPONSE:**

- a) Please see following pages for the "Design and Shop Drawings Submittals".
- b) Please see following pages for the "Project Quality Management Plan".
- c) Please see following pages for the "Supervision of Installation Plan".
- d) Please see following pages for "Operator Training Package".
- e) Please see following pages for the "Commissioning plan".



**A) Design and Shop Drawings Submittals:**

Proponents shall describe their understanding with respect to the scope of work involved in this RFP. The Proponent shall provide a short description of their approach and methodology to coordinate with the City and Consultant in gaining an understanding of the LRPCP and in the design of the UV disinfection equipment in accordance with the technical specifications. This shall include:

- a. How the design process will flow into the shop drawings submittals;
- b. Constructability and compatibility with existing infrastructure: Proponents shall provide a general drawing and short description of how their proposed UV Disinfection equipment would be implemented within the existing UV channel concrete structures with the modifications to be made by the General Contractor to the existing UV facility;
- c. Proponents are to provide at least two (2) project applications with similar constructability and compatibility considerations to that proposed for the LRPCP. The City and Consultant will critically evaluate the constructability and compatibility associated with each submittal;
- d. Provide a brief description of work to be completed by the General Contractor not already listed in the Technical Specification but required to install the UV disinfection equipment and create a fully functional system; and
- e. Clearly list any deviations or exceptions from the Technical Specifications. If none exist, then clearly indicate "No Deviations or Exceptions from the Technical Specifications" in the approach section of your proposal.

**TROJAN'S RESPONSE:**

- a) Trojan has the advantage of truly understanding the scope of work as we are replacing one of our older generation systems in which we know all of the details on. We have also done this same transition/retrofit in dozens of sites so our approach will be to learn from our previous upgrades and build off of those while taking the site specific details of Little River into account. To keep things streamlined, organized, and to maintain accountability coordination with the City and Consultant will be mainly through 2 contacts: Sales and Project Management. Those 2 will bring in our Engineering, Drafting, Controls, and CFD teams as needed.
- b) The design process – Will be mostly Sales with background support from the other teams and will flow into the shop drawings submittals, where the PM will be the main lead and continue to be the lead through submittals, delivery, commissioning, and warranty. Trojan shall provide a general drawing showing how our proposed UV Disinfection equipment would be implemented within the existing UV channel concrete structures with the modifications to be made by the General Contractor to the existing UV facility;
- c) We have provided a few project applications with similar constructability and compatibility considerations to that proposed for the LRPCP in different sections, but again we have done dozens of these and can provide more if necessary.
- d) A brief description of work to be completed by the General Contractor not already listed in the Technical Specification but required to install the UV disinfection equipment and create a fully



functional system is provided in our scope of supply and is clearly laid out for roles and responsibilities.

- e) Any deviations or exceptions from the Technical Specifications are also noted in our scope of supply.





# **PROJECT QUALITY MANAGEMENT PLAN**

---

Version 1.0

Please be advised that the Project Quality Management Plan summarizes the current processes in place at Trojan Technologies. These processes are subject to change based on continuous improvement activities, regulatory requirements, certification body requirements, etc.

---

# VERSION HISTORY

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	<i>Bob Parker</i>	<i>07/17/17</i>	<i>Bob Parker</i>	<i>07/17/17</i>	<i>Initial release</i>

---

# TABLE OF CONTENTS

<b>INTRODUCTION.....</b>	<b>4</b>
1.1 Purpose of The Project Quality Management Plan .....	4
1.2 Quality Management System .....	5
1.3 Environmental Management System.....	6
1.4 Health & Safety Management System.....	7
<b>PROJECT QUALITY MANAGEMENT OVERVIEW .....</b>	<b>8</b>
1.5 Organization, Responsibilities, and Interfaces.....	8
1.6 Tools, Environment, and Interfaces .....	9
<b>CALIBRATION OF TEST INSTRUMENTS.....</b>	<b>9</b>
<b>PROJECT QUALITY MANAGEMENT.....</b>	<b>11</b>
1.7 Quality Planning.....	11
1.7.1 Project Quality .....	11
1.7.2 Measure Project Quality .....	11
1.7.3 Packing and Shipping of Product.....	12
1.7.4 Document Control and Record Retention .....	12
1.7.5 <i>Factory Acceptance Test Procedures</i> .....	12



### 1.1 PURPOSE OF THE PROJECT QUALITY MANAGEMENT PLAN

The Project Quality Management Plan documents the necessary information required to effectively manage project quality from project planning to delivery. It defines a project's quality policies, procedures, criteria for and areas of application, and roles, responsibilities and authorities.

The Project Quality Management Plan is created during the Planning Phase of the project. Its intended audience is our customer's project manager, project team, project sponsor and any senior leaders whose support is needed to carry out the plan.

At Trojan Technologies we are dedicated to maintaining and building upon our high level of customer satisfaction in the UV water treatment industry, through the efforts of our associates and quality management systems built into all our products and processes.

To achieve this we are committed to:

- Managing our performance against defined objectives, through our Corporate Performance Management processes
- Involvement of all associates in ensuring our quality objectives are achieved
- Meeting or exceeding statutory and regulatory requirements, and the requirements of applicable product standards such as, but not limited to; NSF, DVGW, CSA, UL, and CE and product material compliance standards such as, but not limited to; RoHS, IMERC and Proposition 65.
- Compliance to ISO9001 requirements and our quality management system
- Continuous improvement of our products, services and processes

This document introduces the internal and external processes used by Trojan to achieve quality in our products and to ensure customer requirements are met.

Key processes include:

- Trojan's Quality Management System & Quality Policy
- Trojan's Environmental Policy
- Trojan's Health & Safety Policy
- Quality Assurance
- Project Management
- Vendor Management
- Manufacturing Assembly and Test
- Factory Acceptance Test
- Packaging and delivery

The quality plan for the TrojanUV system designed for the City of Pullman will incorporate these processes as well as addressing the project specific requirements.

---

## 1.2 QUALITY MANAGEMENT SYSTEM

Trojan Technologies is an ISO9001 registered company, retaining continuous certification with its registrar BSI Inc. since 1998. Certificate reference is FM 63961.

### **Quality Policy**

At Trojan Technologies we are dedicated to maintaining and building upon our high level of customer satisfaction, in the UV water treatment industry, through the efforts of our associates and quality management in all our products and processes.

To achieve this we are committed to:

- Managing our performance against defined objectives, through our Corporate Performance Management processes
- Involvement of all associates in ensuring our quality objectives are achieved
- Meeting or exceeding statutory and regulatory requirements, and the requirements of applicable standards, including ISO 9001:2008
- Continuous improvement of our products, services and quality management system

---

## 1.3 ENVIRONMENTAL MANAGEMENT SYSTEM

Trojan Technologies Group ULC is an ISO14001 registered company, obtaining certification with its registrar BSI Inc. in 2016. Certificate reference is EMS 633149.

### **Environmental Policy and AODA Policy**

Water is a precious resource that touches every person on the planet, in one way or another, every single day. Guided by integrity, commitment and innovation, Trojan creates and offers lasting solutions that build the level of confidence people have in their water.

#### **Environmental Policy**

As a company that is committed to improving the health of our global environment, Trojan Technologies will minimize the carbon footprint and waste streams of our business activities and products, as we continue to develop and service quality products which address global water quality issues. We will achieve these environmental protection goals through:

- Meeting or exceeding applicable environmental rules and regulations
- Setting goals for maximizing energy efficiency and minimizing the waste streams of our operations and products, taking action and monitoring our progress against those goals
- Designing products that minimize resource consumption and improve the environmental impact of our customers
- Achieving optimal carbon footprint and waste reduction throughout our value chains
- Minimizing or eliminating the use of hazardous substances in our operations and products
- Providing Goods and Services to People with Disabilities

Trojan is committed to excellence in serving customers and ensuring full compliance with the Accessibility Standards for Customer regulation enacted under the Accessibility for Ontarians with Disabilities Act, 2005 (the “AODA”).

---

## 1.4 HEALTH & SAFETY MANAGEMENT SYSTEM

Trojan Technologies Group ULC is an OHSAS18001 registered company, obtaining certification with its registrar BSI Inc. in 2016. Certificate reference OHS633150.

### **Health & Safety Policy**

Trojan Technologies is strongly committed to the health and safety of its associates. Trojan will make every effort to provide a safe and healthy work environment. All leaders and associates must be fully dedicated to eliminating the risk of workplace-related injury and committed to the continual improvement of our health and safety management system and performance.

Trojan is ultimately responsible for the health and safety of its workers. As the President of Trojan, I give you my assurance that every reasonable precaution will be taken for the protection of our associates, we will comply with all applicable legal requirements and set and review all established Health and Safety objectives.

Leaders will be held accountable for the health and safety of associates under their supervision. Leaders are responsible for ensuring that machinery and equipment are safe and that associates work in compliance with the established safe work practices and procedures. Associates must receive training in their specific work tasks adequate to protect their health and safety.

Every associate must also take appropriate steps to protect his or her own health and safety as well as the health and safety of their fellow associates, by working in full compliance with the law and with safe work practices and procedures established by Trojan.

It is expected that all parties will properly ensure adequate health and safety protection in every corporate activity. Active commitment to health and safety is a non-negotiable responsibility of every Trojan associate.

## 1.5 ORGANIZATION, RESPONSIBILITIES, AND INTERFACES

### Project Management

Trojan's project management team is responsible for ensuring that:

1. The customer's requirements can be met
  - a. Working with the customer early in the Project Scope and Customer Requirements Definition Process to determine customer needs, and refining those requirements in light of safety, fiscal, schedule, and other constraints; considers the cost/benefit of all quality improvements.
  - b. Serving as the prime contact both internally and externally through to substantial completion
2. Defining the project planning requirements
  - a. Documenting customer expectations and consensus quality management objectives at a project-level that supports the implementation of the project plan
  - b. Managing project schedules and budget
  - c. Ensuring activities and resources across operational departments are sufficient to implement according to plan
3. Coordinating the custom design elements & execution.
  - a. Utilizing the expertise of their project delivery teams (Design & Operations) to determine the process necessary to achieve the target level of quality
  - b. Working with Service to achieve substantial completion (customer takeover) and contract close out
  - c. Managing the transition to Trojan's After Market Parts and Service team (AMPS team)

The Project Manager follows the Order Fulfillment process from design, through manufacturing, testing shipping and to delivery at agreed upon destination. The Order Fulfillment process is standard work for Municipal projects and includes a set of integrated tools, procedures and quality checks.

Systems are designed to specific agreed upon customer requirements and are detailed in the Trojan Engineering Submittal provided for customer approval. This includes drawings which reference the relevant standards and customer specific requirements.

The Manufacturing and Inspection Plan further details the fabrication requirements and required quality assurance and control measures. This may include activities at Supplier, Trojan and customer sites. Together, the approved Submittal, Manufacturing and Inspection plan and contract requirements (if applicable) represent the basis for product inspection and acceptance.

---

## 1.6 TOOLS, ENVIRONMENT, AND INTERFACES

### Facility

Home to Trojan Technologies is a 90,000 sq. ft. facility located in London, Ontario, Canada. 45,000 sq. ft. of this space is dedicated to product manufacturing and test activities. The manufacturing area is a well-organized, environmentally-controlled manufacturing environment, utilizing skilled employees to ensure control over the quality and delivery aspects of our systems.

### Associates

Associates of Trojan Technologies are trained in appropriate disciplines, skills and activities prior to performing work at Trojan Technologies.

### Tools

Appropriate tools are defined for assembly and test activities, any measurement or testing device has been evaluated for application and included in our gauge & measurement process, if used in a capacity where measurable criteria is required or a pass/fail criteria is determined.

#### Calibration of Test Instruments

Inspection and measurement equipment is managed according to an Internal Calibration Procedure to ensure accuracy and reliability in product measurement. This applies to any monitoring and measuring devices used in Labs, Service, Receiving Inspection and Manufacturing that could affect the quality of the product supplied to the customer.

This includes equipment that is used to:

- Verify purchased product against requirements
- Perform qualification of supplier samples
- Develop specifications
- Perform measurement of samples provided by a customer
- Determine acceptable performance
- Evaluate manufactured product intended to be received by a customer

Measuring equipment meeting the above criteria shall be calibrated or verified at specified intervals or prior to use against measurement standards traceable to international or national measurement standards. The standards used by Subcontracted Calibration Labs include NIST and NRCC.

Historical calibration records are stored in the Quality Assurance Lab, and kept for the life of the instrument.

---

## Methods

All Trojan Technologies products are produced using defined, standard methods. These methods are documented and the knowledge transfer is introduced to Trojan associates performing the activity by subject matter experts, under formal conditions.

## Supplier Selection

Material used in Trojan Technologies product is provided by suppliers that have been evaluated and approved through the Vendor Management process to provide material based on their ability to meet Trojan's high level of quality, delivery and cost expectations.

## Purchased Product

Trojan Technologies' part qualification process promotes a clearer understanding of the requirements of manufacturers and suppliers. Part qualification helps ensure that the processes used to manufacture parts can consistently reproduce the parts required to meet routine production requirements.

Purchased components of custom parts have been verified through Trojan's part qualification process, where parts are evaluated for:

1. **Dimensional compliance** - Confirmation of compliance to any of the required physical or spatial properties of size, length, width, angles, thickness and any other measurements specified.
2. **Material** - Confirmation of a component's chemical makeup and/or physical properties, to ensure conformance to specification. Evidence can be a mill cert, certificate of analysis, XRF scan, etc.
3. **Mechanical** - Determination of mechanical properties and behavior of material, structures and assemblies. Typically, this involves applying a type of stimulus and measuring a response and/or reliability evaluation. Examples include functional operation evaluation (cycles, operating time), surface finish, NDT, visual expectations, etc.
4. **Manufacturability** - Manufacturability addresses the design complexity to ensure the supplier is able to reproduce the part consistently. Evidence of compliance can be a control plan or capability analysis. Supplier should provide feedback during the initial production phase if they are unable to produce successfully after accepting the PO. Formal evidence of compliance can be in the form of a control plan or capability analysis. (see process control)
5. **Process Control** - Confirmation that the 'right' process yields the 'right' output. Examples include 'control plans', procedures, associate qualifications, SPC data, capability studies, material testing, etc.
6. **Regulatory** - Confirmation that a purchased component meets specified regulatory compliance. This can be obtained through 3<sup>rd</sup> party certification or internal certification/declaration.
7. **Traceability** - Confirmation that a product or material traceability program is in place that has the ability to verify the history, location, or application of an item by means of documented recorded identification.

- 
- \* Qualification plans for custom components may differ based on the complexity and requirements of the component. Each component is assessed individually by a team consisting of a Quality Assurance Specialist and a Product Engineering representative.
  - \* Custom 'one-off' material will not go through a qualification process, as this process is to verify that material will be produced consistently by a given supplier. One-off designs will be evaluated for conformance by the value-stream QA Technician prior to incorporation into a given project.

## PROJECT QUALITY MANAGEMENT

### 1.7 QUALITY PLANNING

Project specific custom design follow the engineering change management process to ensure specifications are reviewed and approved to meet all project specific design requirements and Trojan specific product integration requirements.

#### 1.7.1 Project Quality

- Prior to use in any given project, previously-qualified material may be inspected by the value-stream Quality Technician. The nature and frequency of inspection depends on a number of factors including but not limited to, customer requirements, degree of customization of the product, and complexity of the product. This process is controlled through Trojan's MRP system. Any component required documentation is retained and stored based on product and/or project requirements.
  - Purchase Orders generated by Trojan's Purchasing department indicate where Material Certificates are required for specific components. Material Certificate requirements are also cross referenced with the Item Master Data information housed in the Trojan MRP system.
  - Alternative procurement activities include the use of a visual material replenishment process.
  - Project specific requirements are captured on the project build sheet, while material requirements are captured on production orders (bill of materials). Production orders are sent to production based on a pre-determined schedule based on customer delivery requirements and capacity planning.
  - A given project is made up of assemblies and sub-assemblies, these assemblies are tested individually and as a system, to defined requirements and parameters.
- \* Due to the size and complexity of some products, not all projects are tested as a system.

#### 1.7.2 Measure Project Quality

- Each project will be evaluated based on pre-determined product quality requirements. Any additional custom testing requirement will be communicated by



---

the project manager and documented on the project test report. Each project will have its operational and quality objectives captured on the project test report. This documentation is retained with all other pertinent project specific documentation.

- Any component and/or assembly that fails to properly assemble, fails to operate/function to specification requirements or meet product specifications will be captured in our internal nonconformance system. Any resolution to the nonconforming condition will require verification of the system or sub-assembly prior to approving the system.
- After successfully testing the system, the system is scanned into Trojan's Product Identification and Traceability database. The Product Identification and Traceability database houses unique identification of some key components and/or assemblies within a given project.

### **1.7.3 Packing and Shipping of Product**

The Traffic department is responsible for determining the appropriate packing, shipping and delivery methods of product lines and for ensuring that all items on the project 'Ship List' are accounted for. This department also manages the logistics related with importing, exporting goods around the globe as well as management of Trojan's carrier in accordance with applicable rules and regulations.

Packing requirements and design are determined by a multidisciplinary team as part of the Product Development Process. To minimize damage during transit, custom packaging designs may be developed to accommodate the specialized nature of Trojan equipment. The Traffic team will review and address project specific requirements related to packing and shipping.

### **1.7.4 Document Control and Record Retention**

Quality records are controlled documents and are managed in accordance with Trojan's defined process requirements.

Customer specific project requirements may include:

- Production photos
- Calibration Certificates (UV Intensity sensors)
- Testing results for the major UV equipment assemblies
- Lift Load certificates for the Lifting Devices
- Material verification documents

### **1.7.5 Factory Acceptance Test Procedures**

If required by the customer, factory acceptance testing and witnessing by the customer or designated third party is arranged on a project by project basis according to the specific

---

requirements. A detailed test plan shall be submitted and approved prior to testing at Trojan or supplier location as may be applicable.

The Factory test is generally designed to demonstrate the functionality and the communication and control system for the project. As it is not always possible to test the full system in the Factory, a representative selection of equipment will be determined for testing actual conditions or simulated events depending on the requirements.

Test records, certificates and finished goods may also be available for inspection at the time of the Factory testing depending on the requirements and project schedule.

Based on Trojan's quality process, a detailed Factory Acceptance Test plan will be prepared and submitted for the selected design. This will include inspection points and timing based on the mutually agreed project schedule.

### Supervision of Installation Plan

The Proponent shall describe their services to be provided during both installation and functional testing of equipment.

- **TROJAN'S RESPONSE:** Our installation services and commissioning checklist are below, please refer to the project team list for more details, but the installation and commissioning will be done by a certified Trojan technician.

#### **Supervise and Install**

Confirm elevations as per Trojan UV Layout Drawing

UV Equipment located in place as per UV Layout Drawing

UV Equipment is secured

Confirm Electrical Power Source and Wiring

Confirm Water level device is of correct elevations and installed properly and ready for water

Confirm safety Devices are installed and within reasonable distance

Light locks are in good shape

Low Water Level Control Box is correct elevation and can be accessed

Main power's disconnect

Confirm Trojan parts and spare parts are accounted for and are ok and safe

Confirm UV Modules connections and secure and tight

Discuss flow and review flow process

Review and inspect Plant process and record on Trojan records



## Training Plan:

The Proponent shall describe their plan for training the Town's operation and maintenance staff. The Proponent shall provide the following:

- Proposed training plan and training schedule for this project;
- Training team roles and responsibilities;  
-Description of classroom training, including curriculum, training methods and techniques and training aids. Provide examples of a typical presentation of a classroom session; and
- Description of hands-on training, including how training will incorporate the use of the equipment provided under this contract.

- **TROJAN'S RESPONSE:** A brief outline of the training topics are directly below and a more detailed overview on the following pages. Please refer to the project team list for more details on staff, but the training will be done by a certified Trojan technician.

### **Training**

UV Theory

UV Theory Test

UV Theory Discussion

UV Safety Review in Class and at the UV

O&M Review

HMI Layout and Screen accesses

UV Maintenance

Troubleshooting

UV System Configurations

Electrical Review at UV with Electrical Drawings



Please **sign** beside your name and **return** completed form to the Trainer

		System Type:	
Trainer:		Project Name:	
Date:		Project Number:	

Primary Onsite Contact for Municipality/Owner			
Name:		Phone Number:	
		Email:	

Name (please print clearly)	Signature	Company/Position	Telephone Number	Email Address

<b>Name (please print clearly)</b>	<b>Signature</b>	<b>Company/Position</b>	<b>Telephone Number</b>	<b>Email Address</b>

<b>TASKS</b>	
<b>Phase I – Introduction</b>	
<b>Introduction</b>	<b>Completed</b>
1. Introduction of Trainer & Trojan Equipment	
2. Review Training Agenda	
3. Basic UV Theory – Definition and Basic Concepts	
• UV Light	
• UV Disinfection	
• UV Dose	
• Factors Affecting UV Disinfection	
• UV Transmittance	
• Retention Time	
4. Safety Issues	
• UV Light	
• Electrical	
o Lock-out Tag-Out Procedure	
<b>Demonstration:</b> Lock-out & Tag-out power to PDC	
• Mechanical	
• Chemical	
<b>Phase II - System Operation and Maintenance</b>	
<b>System Overview</b>	<b>Completed</b>
1. Component Function & Identification	
• Module	
• PDC	
• HSC	
• SCC	
• Water Level Controller – ALC / MWG (If supplied)	
• Online UVT (If supplied)	
2. System design – Site Specific Information	
<b>Module</b>	<b>Completed</b>
1. Component Identification & Maintenance Procedures	
• Lamp/Sleeve Assembly	
o R&R Lamps	
<b>Demonstration:</b> Remove Lamp from top Sleeve	
Remove Sleeve from Module Leg	
• Wiper Carriage Assembly	
o Home Position	
o Hydraulic Cylinder Maintenance	
o R&R Wiper Canister	
o Filling Cleaning Solution	
<b>Demonstration:</b> Remove Top Wiper Canister	
• Ballast Enclosure	
o R&R Ballast	
<b>Demonstration:</b> R&R Ballast Tray Assembly & Identify Components	
• Cleaning Quartz Sleeves Manually	
• Module Installation	
o Module Orientation	

TASKS	
PDC	Completed
1. Component Identification	
• Module Receptacles	
• Hydraulic Manifolds	
• Relay boards	
o Fuse size	
• Communication Control Board	
o Communication LED's	
• Bank Selector switches	
o Bank Local Operation	
<i>Demonstration:</i> Turn Bank ON in Local	
SCC	Completed
1. Component Identification & Function of SCC	
2. Function, Description, & Operation of each Operator Interface Screen	
• Main Menu	
• Bank Control Screen	
o Module Enable/Disable	
<i>Demonstration:</i> Enable the previously Disabled Module	
o Module Reset	
o Bank Operating Status	
<i>Demonstration:</i> Change from Local to Remote Manual	
o Bank Manual Mode Operation	
<i>Demonstration:</i> Change Manual Power Level	
o Bank Auto Mode Operation	
• UV Dose	
o Dosepacing	
o Online or Entered UVT	
<i>Demonstration:</i> Use "Entered Value" function to alter flow value	
Use "Entered Value" function to alter UVT value	
• System Overview Screen	
• Bank Status Screen	
o Reset Lamp Hours	
• Gate Control Screen (optional)	
• Alarms Screens	
o Alarms Status	
o Alarms History	
o Alarm Definitions	
o Responding to Alarms	
<i>Demonstration:</i> Disconnect a module to create a Module Fault alarm	
• System Settings Screen	
• Help	
• UV Intensity	
• Wiper Control Screen (optional)	
o Wiper Operating Status	
<i>Demonstration:</i> Change from Local to Remote on HSC selector switch	
o Wiper Operation	
<i>Demonstration:</i> Perform Remote Sequence	

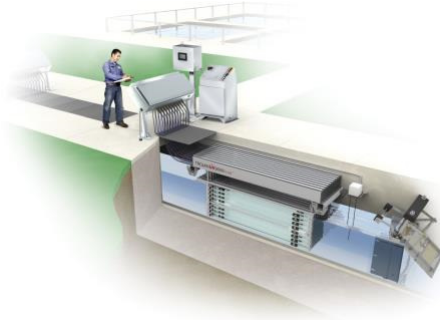


<b>TASKS</b>	
<b>Hydraulic System Center</b>	
	<b>Completed</b>
1. Component Identification & Maintenance Procedures	
• Hydraulic Pump Assembly	
• Hydraulic Filter	
• Pressure Gauge	
• Fluid Level Gauge	
2. Operational Modes	
• Local Control	
<b>Demonstration:</b> Perform Local Sequence & Monitor Fluid Pressure	
<b>Water Level Sensor</b>	
	<b>Completed</b>
1. Function, Operation & Maintenance Procedures	
• Low Water Level Shutdown Operation	
• Cleaning Sensor Rods	
<b>UV Intensity Sensor</b>	
	<b>Completed</b>
1. Function, Operation & Maintenance	
• Positioning in middle of Bank	
• Cleaning Sensor Sleeve	
<b>Online UVT (Optional Equipment)</b>	
	<b>Completed</b>
1. Function, Operation & Maintenance	
• Theory of Operation, Water Flow, Calibration Procedure	
• Maintenance Schedule & Cleaning Procedures	
<b>Demonstration:</b> Perform System Cleaning & Calibration	
<b>Water Level Control (Optional Equipment)</b>	
	<b>Completed</b>
1. Function, Operation & Maintenance	
• Theory of Operation	
• Maintenance Schedule & Cleaning Procedures	
<b>Other Information</b>	
	<b>Completed</b>
1. Spare Parts	
2. System Warranty	
3. Parts & Service Contact Information	
<b>Phase III – Fault Troubleshooting</b>	
<b>Troubleshooting Techniques (For Electrical Technicians Only)</b>	
	<b>Completed</b>
1. Module Troubleshooting	
• Swapping Module Power Cables, Ballast Replacement,	
2. PDC Troubleshooting	
• CCB replaceable components, Relay Board	
3. HSC Troubleshooting	
• Pressure Relief valve, Pressure Switch	
4. SCC Troubleshooting	
• Controller Components, System I/O & SCADA interface	
<b>Phase IV – Evaluation</b>	
<b>Signatures / Quiz / Trainer Feedback</b>	
	<b>Completed</b>
1. Operation & Maintenance Quiz	
2. Operation & Maintenance Training Reaction Sheet	
3. Operation & Maintenance Training Sign-up Sheet	

TROJAN **UV**3000**PLUS**™

**OPERATION & MAINTENANCE  
TRAINING**

Refer to Trojan's Operation and Maintenance Manual (O&M) for more detailed information



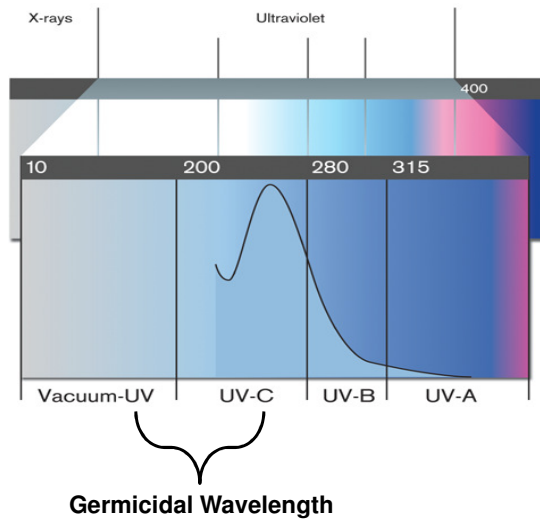
April 2020

1

**UV Light**

2

- 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
- Trojan lamps use 254nm

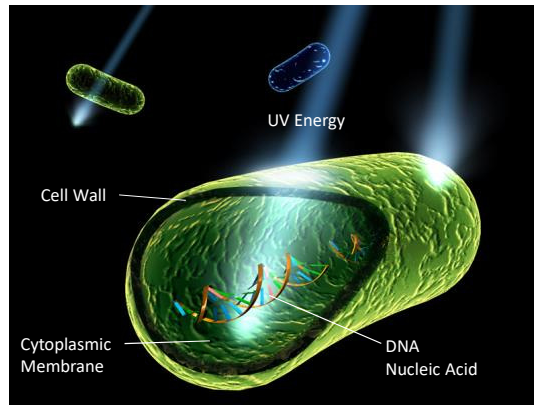


2

### How does UV disinfect?

3

- 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 and the microorganisms resistance to UV

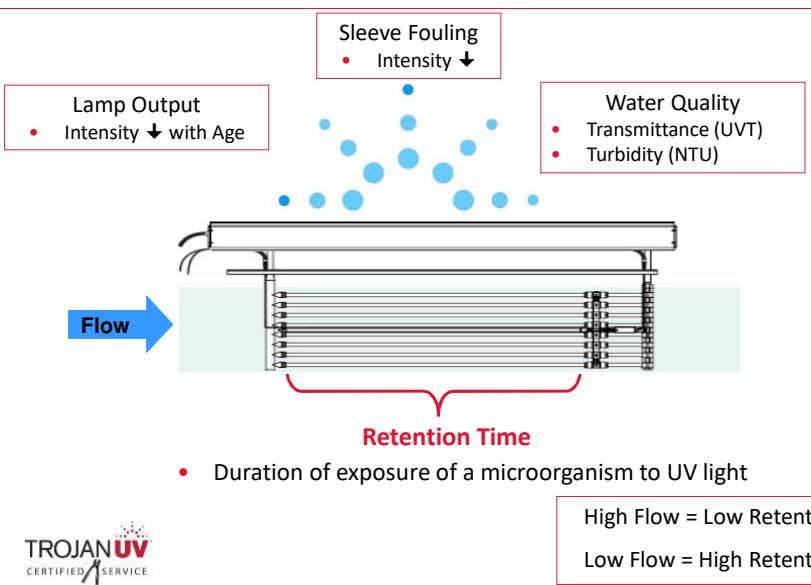


3

### UV DOSE CALCULATION CONTROL METHOD

4

$$\text{UV DOSE} = \text{Intensity} \times \text{Retention Time}$$



4

## UV DOSE Dose Pacing

5

- During system design, a dose value is calculated to meet the disinfection permit requirements of the customer.
- This dose is calculated based on third party validation process.
- As effluent quality changes throughout the day (Flow rate, UVT) Dose Pacing causes the UV system to adjust the lamp power level and turn on or off additional UV banks to maintain disinfection while reducing the amount of equipment as much as possible for efficiency.
- The primary factors that affecting UV Dose:
  - Flow, which affects the Retention Time
  - UV Intensity from lamps which is primarily affected by:
    - UVT
    - Sleeve Fouling

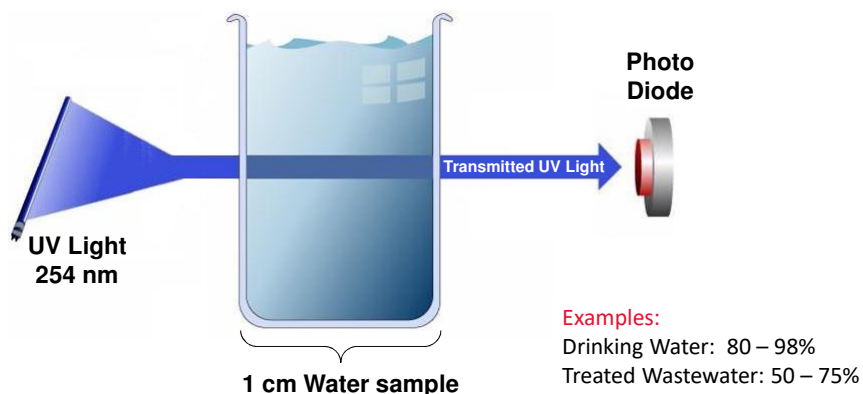


5

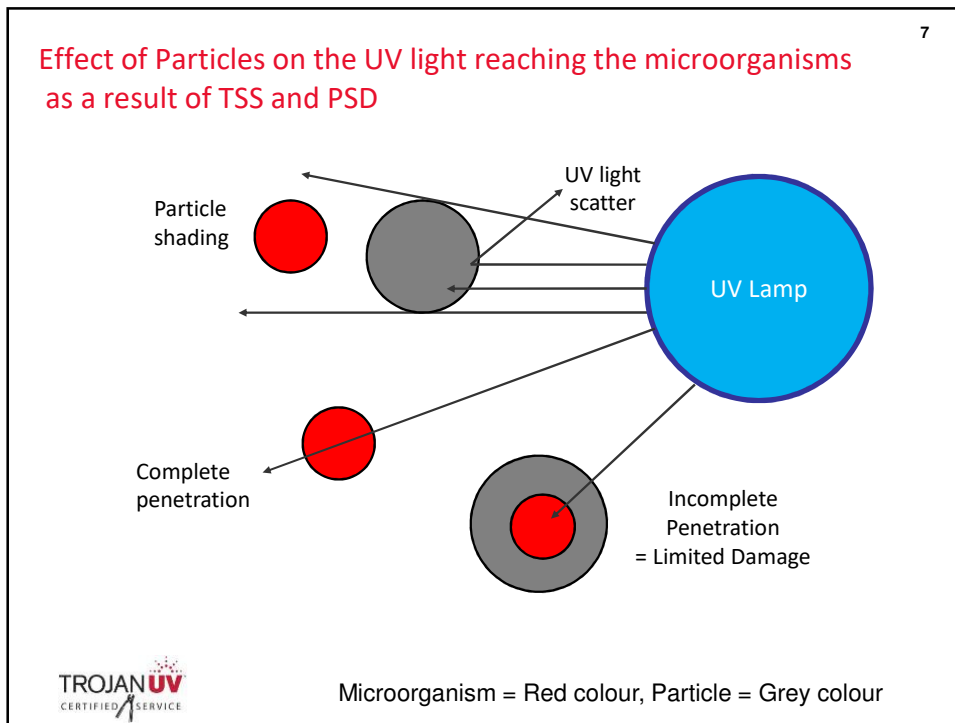
## UV Transmittance

6

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



6







7

8


### Safety Precautions

- UV Light Hazard - Use protective face shield and clothing**

⚠ CAUTION	
 	<p><b>UV Light Hazard.</b></p> <ul style="list-style-type: none"> <li>Failure to follow these instructions may result in serious burns to unprotected eyes and skin.</li> <li>ALWAYS use UV protective gear, including gloves and clothing and face shield, when UV light is present.</li> <li>NEVER look directly at illuminated UV lamp, even with protective gear.</li> <li>NEVER illuminate UV lamp if personnel may be directly exposed to UV light.</li> </ul>
- Electrical Hazards - Follow Lock-out Tag-out procedures!**

⚠ DANGER	
 	<p><b>Arc Flash and Shock Hazard - Live Electrical Circuit Present.</b></p> <ul style="list-style-type: none"> <li>Failure to follow these instructions will result in electrical shock, injury or death from electrocution.</li> <li>Lockout tag out all sources of power before performing any inspection, repair, or maintenance. <i>There may be more than one source of power!</i></li> </ul>

TROJAN UV  
CERTIFIED SERVICE


**NOTE:** Refer to the O&M Manual for detailed information 

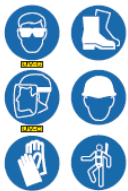
8

## Safety Precautions

9

- **Movement Hazards and PPE - Slips, Trips and Falls**

<b>⚠ CAUTION</b>	
	<p><b>Slip and Fall Hazard.</b></p> <ul style="list-style-type: none"> <li>• Failure to follow these instructions may result in injuries from slip and fall.</li> <li>• ALWAYS ensure safe footing.</li> <li>• ALWAYS clean up spills promptly.</li> <li>• ALWAYS comply with site-specific safety protocols and procedures.</li> </ul>

<b>NOTICE</b>	
	<p><b>Personal Protective Equipment Required.</b></p> <ul style="list-style-type: none"> <li>• ALWAYS use appropriate eye, hand, and foot protection.</li> <li>• ALWAYS wear UV-C safety glasses when around equipment or a UV-C faceshield with safety glasses or safety goggles when inspecting open running equipment.</li> <li>• ALWAYS follow plant safety procedures and protocols.</li> <li>• ALWAYS take all necessary precautions when working around, operating, or working on this equipment, if contamination of components is expected within this application due to effluent biological or chemical contaminants.</li> </ul>



**NOTE:** Refer to the O&M Manual for detailed information




9

## Safety Precautions

10


- **Mechanical Hazards – Hot Surfaces, Body Crush, Cuts, Fluid Pressure**


<b>⚠ CAUTION</b>	
	<p><b>Burn Hazard.</b></p> <ul style="list-style-type: none"> <li>• Failure to follow these instructions may result in minor or moderate injury due to burns.</li> <li>• NEVER touch hot surface.</li> <li>• Allow UV lamps to cool for a minimum of 10 (ten) minutes before handling.</li> </ul>

**NOTE:**

Refer to the O&M Manual for detailed information



<b>⚠ WARNING</b>	
	<p><b>Body Crush Hazard.</b></p> <ul style="list-style-type: none"> <li>• Failure to follow these instructions could result in serious injury or death due to improper lifting procedures, underrated lifting equipment, and moving parts.</li> <li>• ALWAYS secure with safety device.</li> <li>• ALWAYS stay clear of elevated loads.</li> <li>• ALWAYS comply with local safety regulations.</li> </ul>

<b>⚠ DANGER</b>	
	<p><b>Depressurize Device, Fluid Injection Hazard.</b></p> <ul style="list-style-type: none"> <li>• Failure to depressurize hydraulic circuit before servicing will result in serious injury or death due to high pressure hydraulic fluid.</li> <li>• NEVER physically inspect, repair or do maintenance unless hydraulic circuit has been depressurized by competent personnel.</li> <li>• Protect hands, face and body before disconnecting hydraulic or other lines.</li> <li>• If accidental skin injection occurs, seek immediate medical attention.</li> </ul>




10

## Safety Precautions

11

- **Chemical / Biological Hazards**

- Lamp Contents, Effluent, Cleaning Acids

NOTICE	
	<p><b>Mercury Chemical</b></p> <ul style="list-style-type: none"><li>• UV lamps contain a small amount of mercury in either elemental or bound amalgam state, depending on lamp type. These lamps are similar to fluorescent and compact fluorescent lamps (CFL). Always comply with local regulations governing the disposal of lamps containing mercury and the waste associated with breakage.</li><li>• NEVER use a vacuum cleaner to clean up broken lamps containing mercury. Vacuuming could spread mercury-containing powder or vapor.</li><li>• Thoroughly collect broken glass and trace amounts of mercury and place into a sealable bag or container. For further reference see the U.S. EPA guidelines <a href="http://www.epa.gov/cfl/cleaning-broken-cfl">http://www.epa.gov/cfl/cleaning-broken-cfl</a>.</li><li>• If you have further questions about the safe clean-up of mercury containing lamps, contact the TrojanUV Technical Assistance Center at <a href="mailto:tac@trojanuv.com">tac@trojanuv.com</a>.</li></ul>
NOTICE	
Contamination of components is expected due to contact with effluent biological or chemical contaminants.	
NOTICE	
Only use Trojan Technologies approved cleaning solutions on the lamp sleeves. Use of unapproved chemicals may result in damage to the equipment. For a list of approved cleaning solutions refer to <a href="#">Table 9</a> .	



**NOTE:** Refer to the O&M Manual for detailed information



11

## UV Light Safety

12



- UV light levels generated by UV equipment greatly exceed levels found in nature
- Immediate or prolonged exposure to UV light can result in eye injury, skin burn or other more serious effects
- Individuals who work with or in areas where UV sources are used are at risk for UV exposure if the appropriate shielding and Personal Protective Equipment (PPE) are not utilized



12

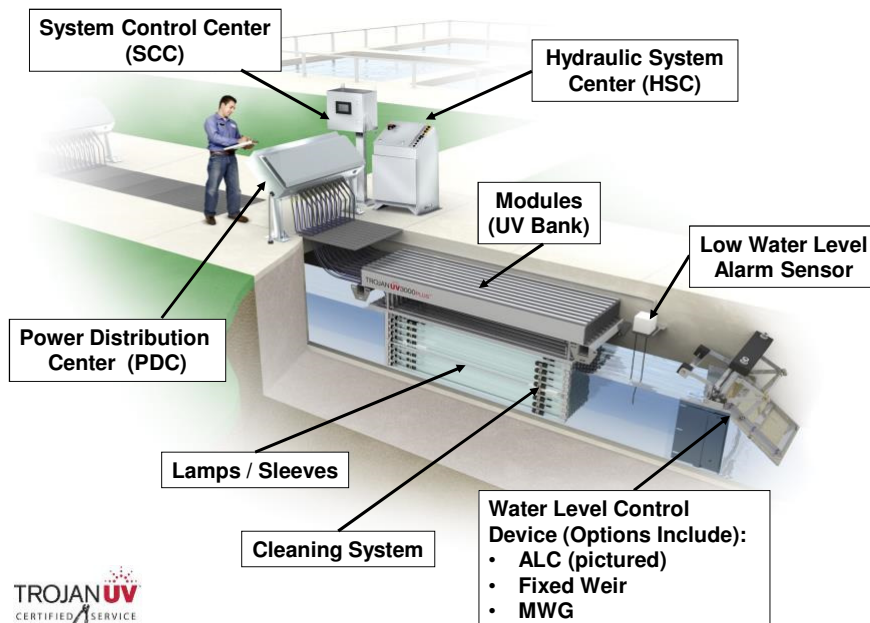
## UV Light Safety Precautions

- **Never energize UV lamps out of the channel or reactor.**
- Safety glasses must be UV resistant (polycarbonate material & ANSI Z87.1/CSA Z94.3 rated).
- When servicing the UV equipment with the **lamps energized**, protective gloves, long sleeve shirt, UV resistant safety goggles or safety glasses, and a face shield must be worn.
- When servicing the UV equipment when the lamps **are not energized**, protective gloves and UV resistant safety goggles or safety glasses must be worn. This serves to protect against sleeve / quartz breakage and cleaning chemicals being used.
- When in the area of the UV equipment under normal operation, as a minimum, UV resistant safety glasses or goggles must be worn.
- Never look directly at UV light, even if wearing the appropriate PPE.



13

## TROJAN UV3000PLUS Overview



14



## Project Specific System Information

15

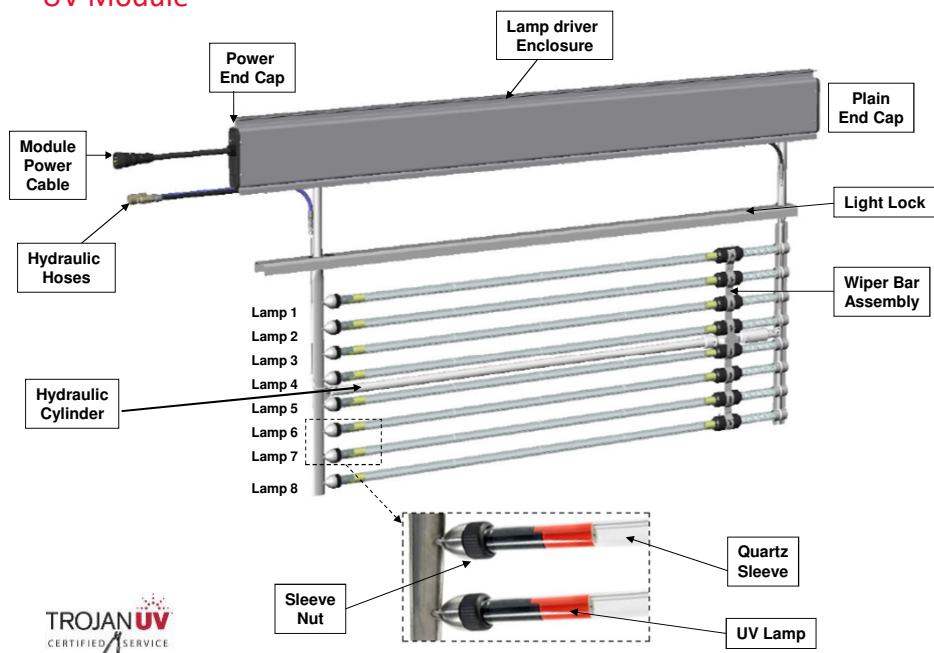
System Serial #	
# of Channels	
# of Banks/Channel	
# of Modules/Bank	
# Lamps/Module	
Design Peak Flow	
Design UVT	
Design Max TSS	
Disinfection Limit	
Target Design Dose (mWsec/cm <sup>2</sup> )	



15

## UV Module

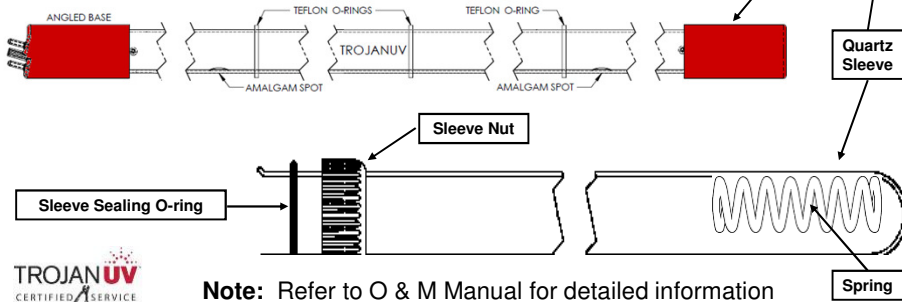
16



16

### Lamp and Sleeve

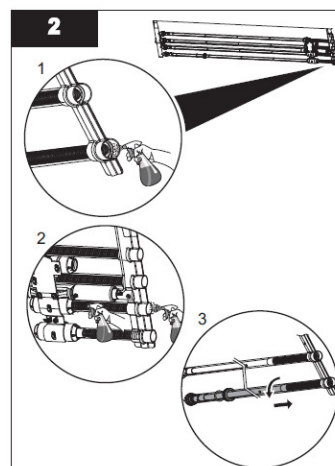
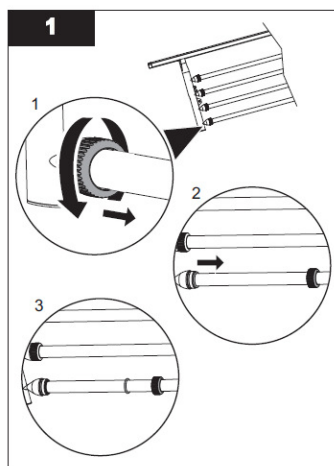
- Low Pressure High Output amalgam lamp (LPHO)
- End Of Lamp Life rated for 12000 hours
- Amalgam deposits (spots) must be positioned at the bottom of lamp
- Replace O-ring at every lamp change
- Use clean cotton gloves to handle lamps or non-latex (powder-free) rubber gloves



Note: Refer to O & M Manual for detailed information

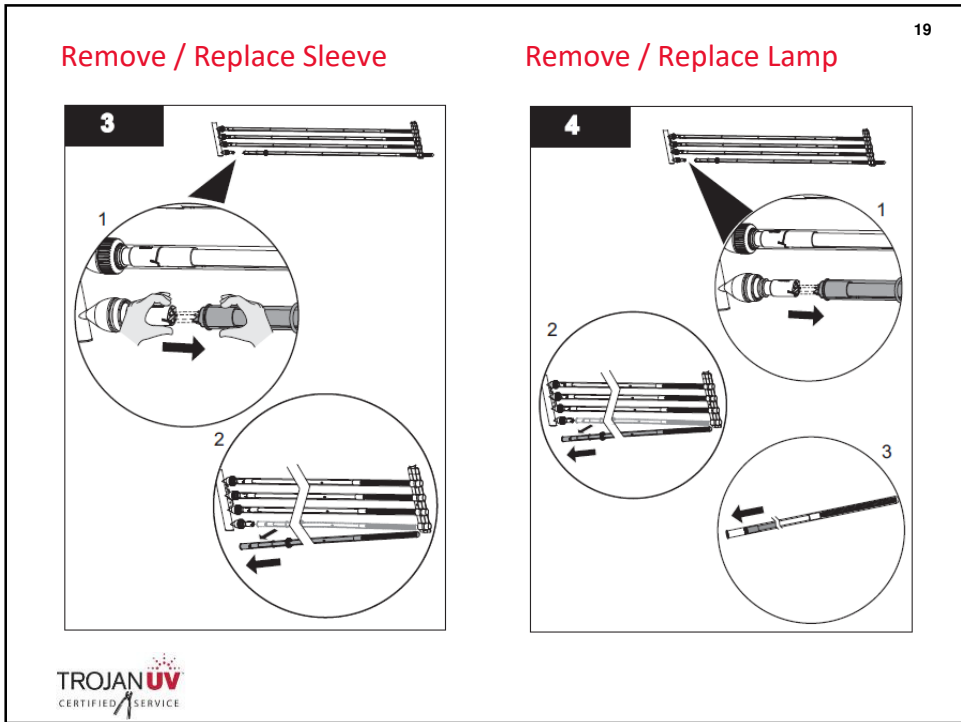
### Lamp and Sleeve Removal Images form O&M

Materials:

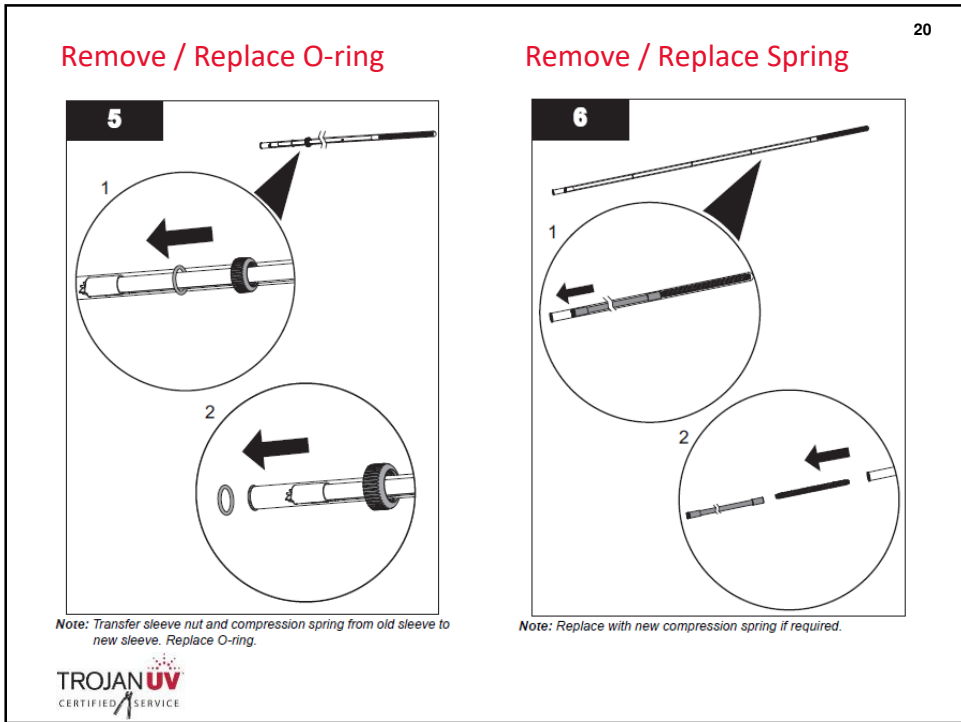


Note: Wet the lamp sleeve and slide it along with UV lamp through the bottom wiper canister and out of the module leg.





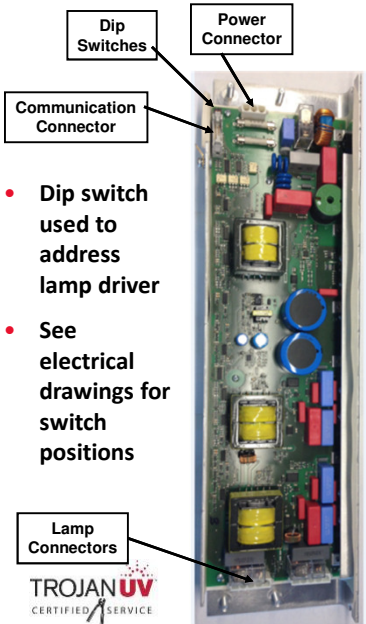
19



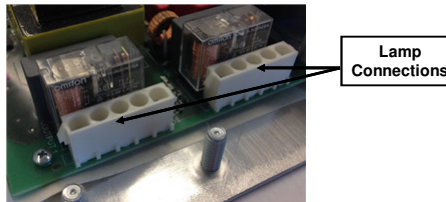
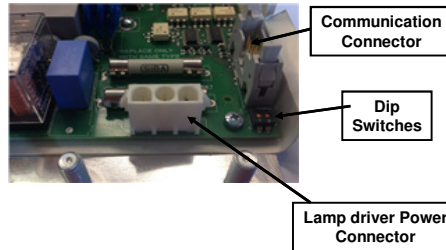
20

## Lamp Driver

21



- Dip switch used to address lamp driver
- See electrical drawings for switch positions



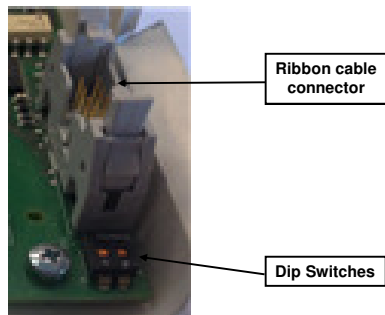
TROJAN UV  
CERTIFIED SERVICE

21

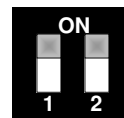
## Lamp Driver Dipswitch

22

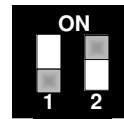
- Located beside ribbon cable connector
- Provides addressing for lamp driver



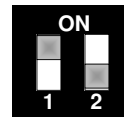
Lamp Driver 1



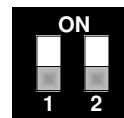
Lamp Driver 2



Lamp Driver 3



Lamp Driver 4



**Note:**  
White on  
Switches  
Indicate  
Switch  
position

TROJAN UV  
CERTIFIED SERVICE

**Note:** Refer to O & M Manual for detailed information

22

### Module End Cap

23

- 2 piece design plus 4 screws
  - Molded cap
  - Silicone Seal
- Formed lip seal compresses on inside extrusion
- 6P certified (submersible for 24 hours)
- Seal replaced after each entry

U-Cup Type Silicone Seal

Molded Cap

Dow Corning 111 Silicone

TROJAN UV  
CERTIFIED SERVICE

23

### End Cap Installation

24

- Keys to ensure the end cap seals well:
  - Remove any scratches, sharp edges and burrs from seal area of enclosure
  - Clean the seal and the enclosure
  - Apply thin coat of silicone lubricant on the seal
  - Insert end cap slowly and evenly into the enclosure ensuring the seal is not pinched
  - Install screws until their heads contact the enclosure, and then turn ½ turn more only

Dow Corning 111 Silicone

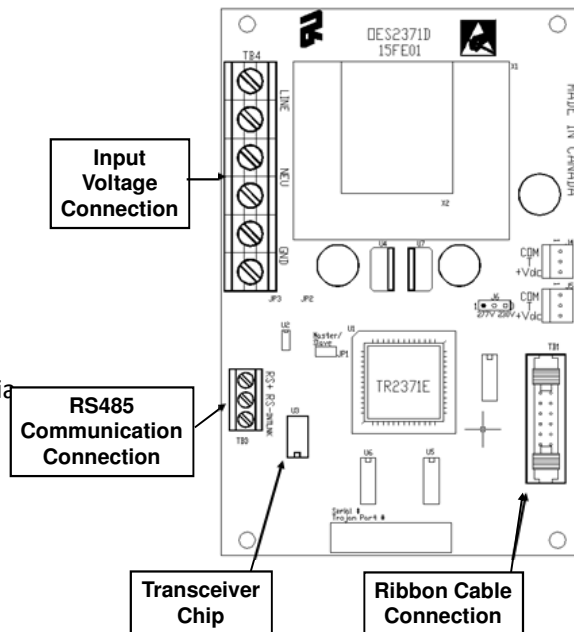
TROJAN UV  
CERTIFIED SERVICE

24

## Module Board

25

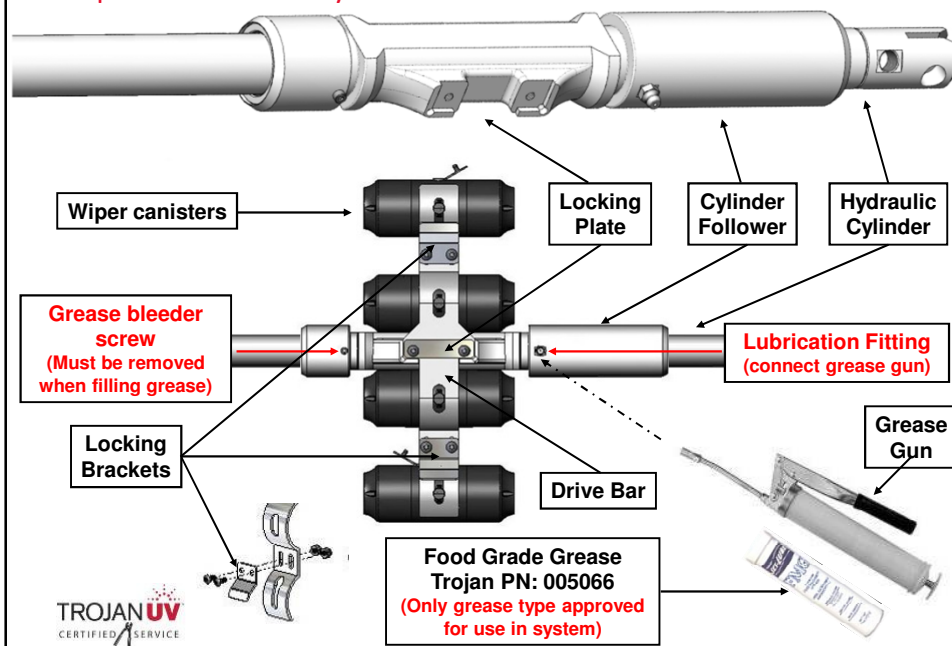
- Controls lamp driver ON/OFF
- Communicates lamp driver/lamp status to CCB
- 220 – 277 VAC input voltage
- Connects to lamp driver via ribbon cable



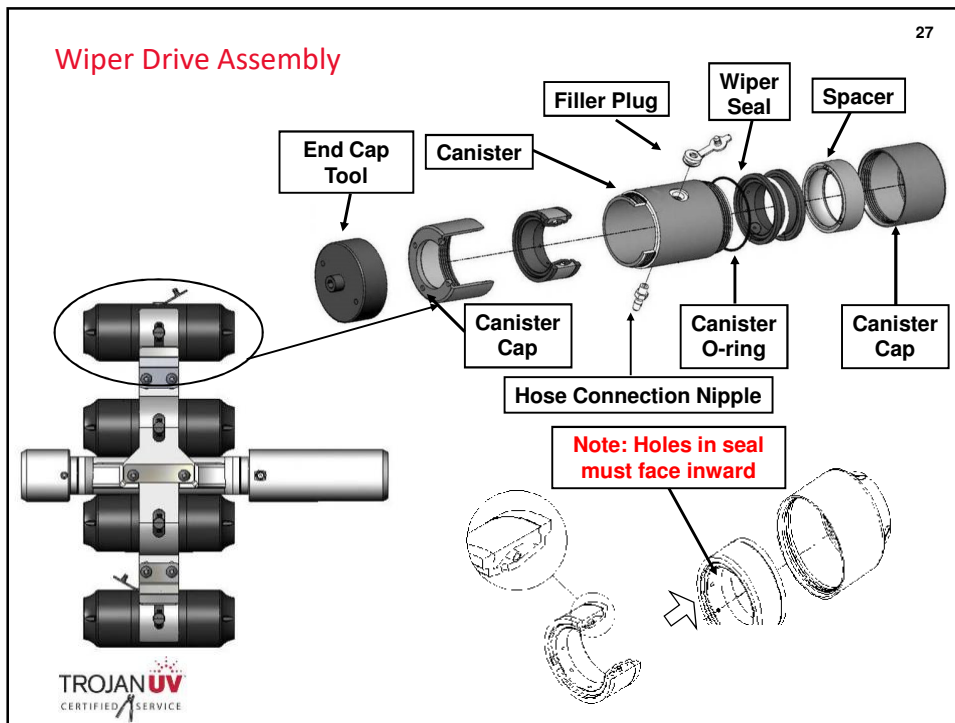
25

## Wiper Drive Assembly

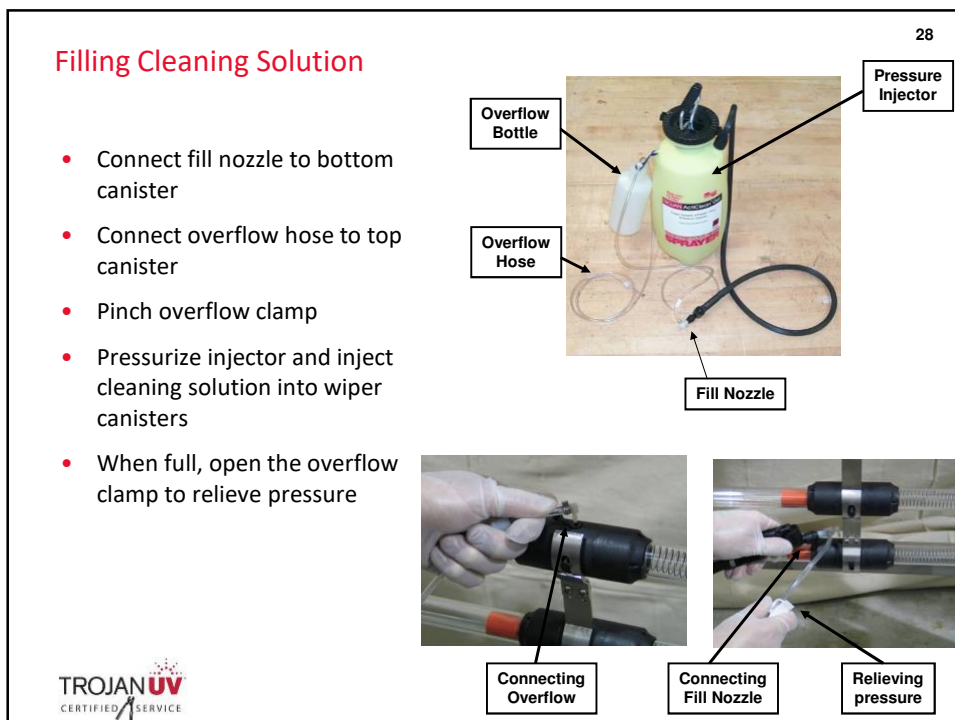
26



26



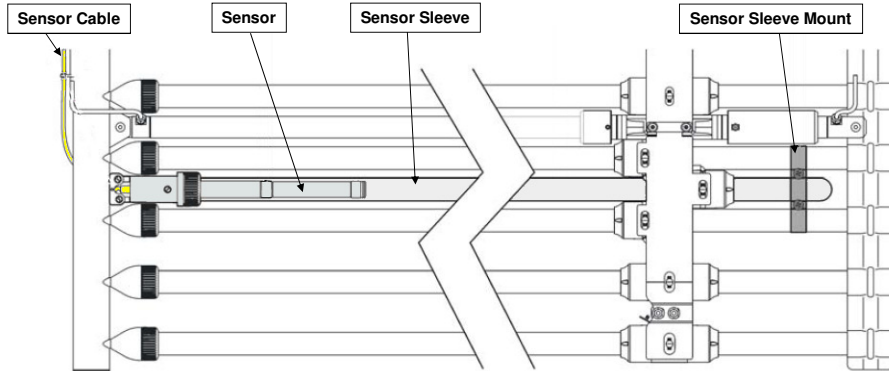
27



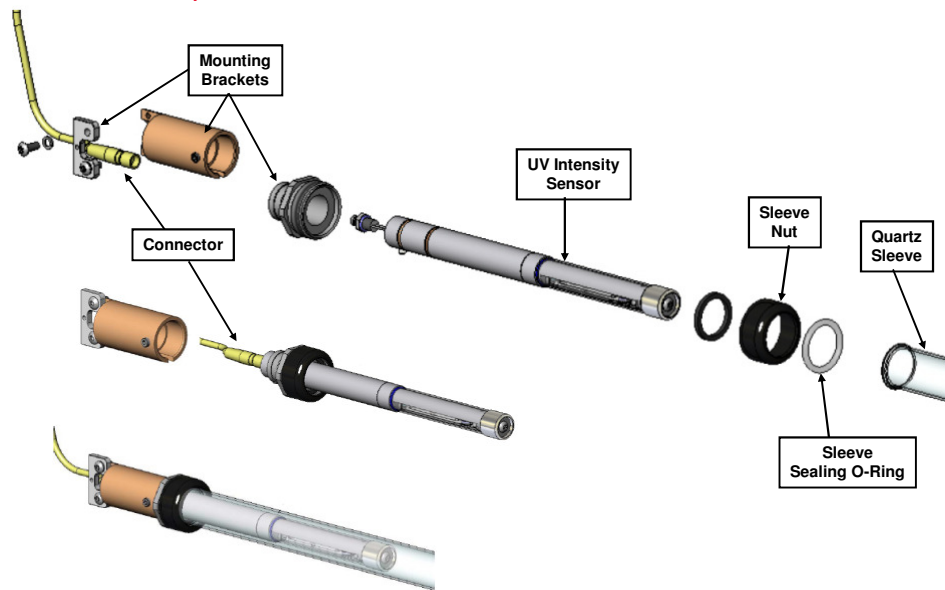
28

### UV Intensity Sensor

- Measures UV intensity of the lamp mounted directly below
- Used for feedback on sleeve cleanliness and representation of system operation. **Does not control system operation in any way.**
- 4-20mA signal
- 1 Sensor per bank, typically the center module in a bank



### UV Intensity Sensor

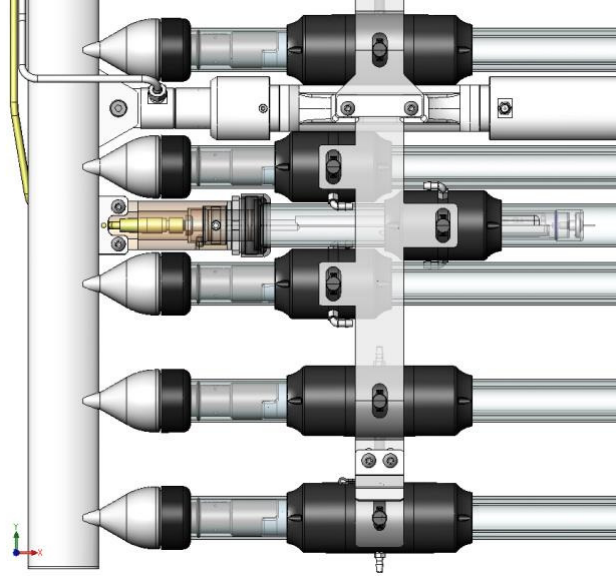




## UV Intensity Sensor

31

- Mounts on lamp connection end of module
- Uses underwater wire connector
- On 8 lamp modules the sensor looks directly at lamp 6
- Module with sensor is positioned in center of the bank of modules



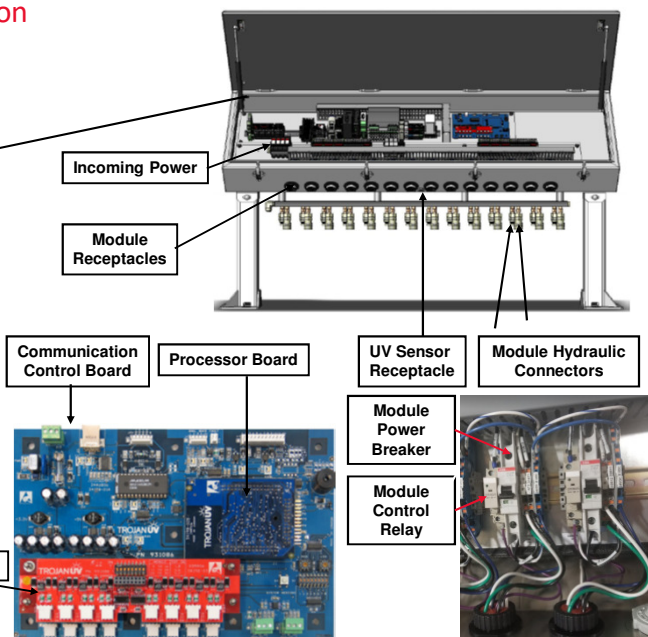
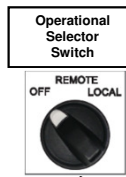
TROJAN UV  
CERTIFIED SERVICE

31

## Power Distribution Center - PDC

32

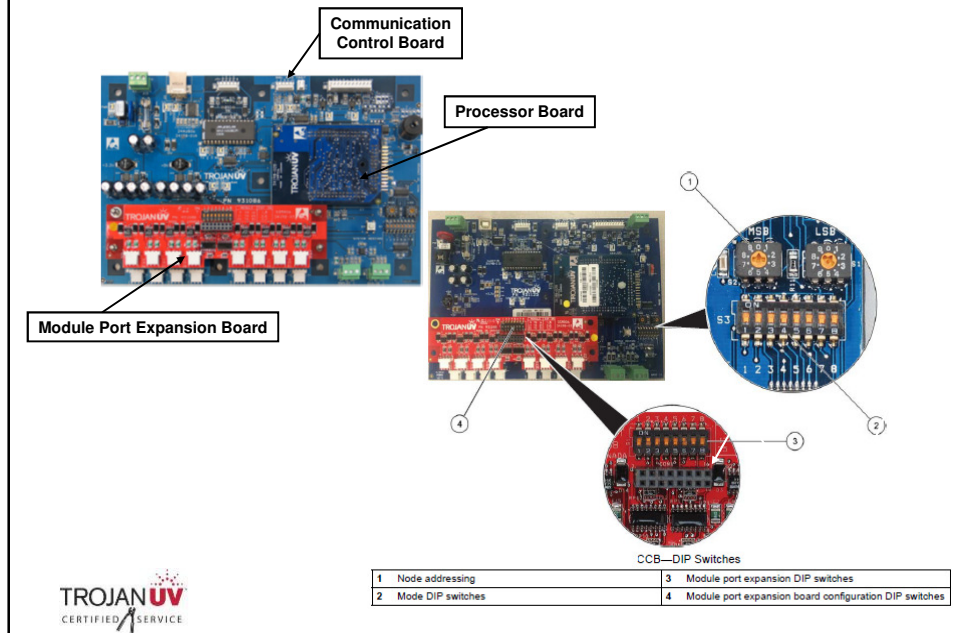
- ON – Turns Bank ON @ 100% Power
- REMOTE – Allows SCC to operate banks operation



TROJAN UV  
CERTIFIED SERVICE

32

## Power Distribution Center – Communication Control Board (CCB) Addressing



33

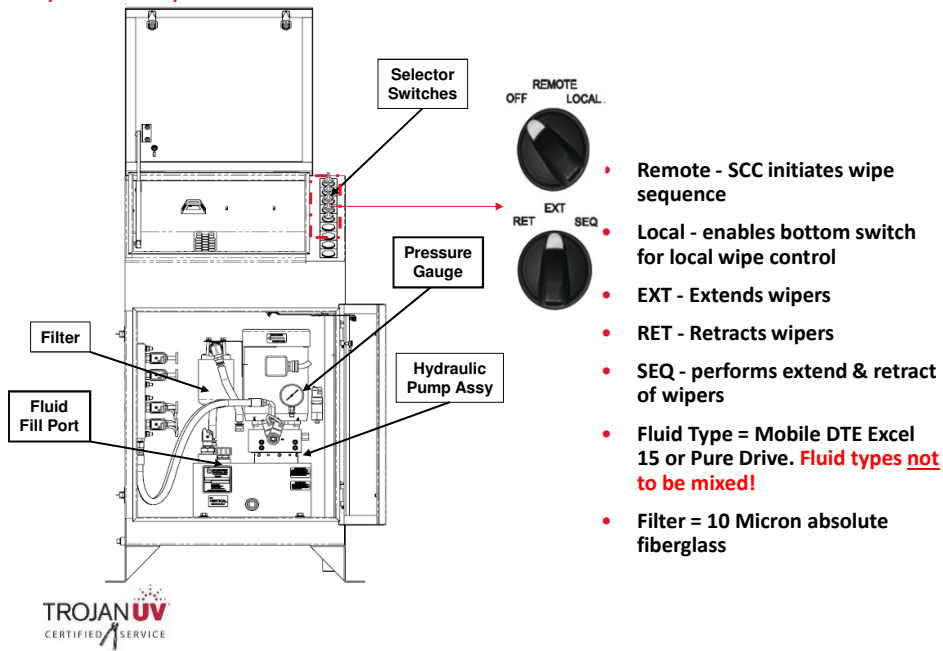
## Operation Modes for the UV Banks of Lamps

- REMOTE AUTO:** This allows the controller to operate the system and dose pace accordingly. [The system ALWAYS wants to be in Auto!!!!](#)
- REMOTE HAND:** This will turn the lamps ON, and the user must choose the power level. This would typically be used during troubleshooting or maintenance and is not considered to be dose pacing.
- REMOTE OFF:** This turns the lamps OFF from the controller and they will not come back on remotely unless the bank is put back into Auto or Hand.
- LOCAL ON:** This turns the lamps ON at 100% via the selector switch on the PDC. The controller will have no control of the system until the switch is put back into REMOTE. This is typically used if the controller fails and you must still operate the lamps.
- LOCAL OFF:** This turns the lamps OFF via the selector switch on the PDC. The controller will have no control until the selector switch is placed back into REMOTE. This would only be used when the user does not want a particular bank of lamps to come on.

34

## Hydraulic System Center - HSC

35

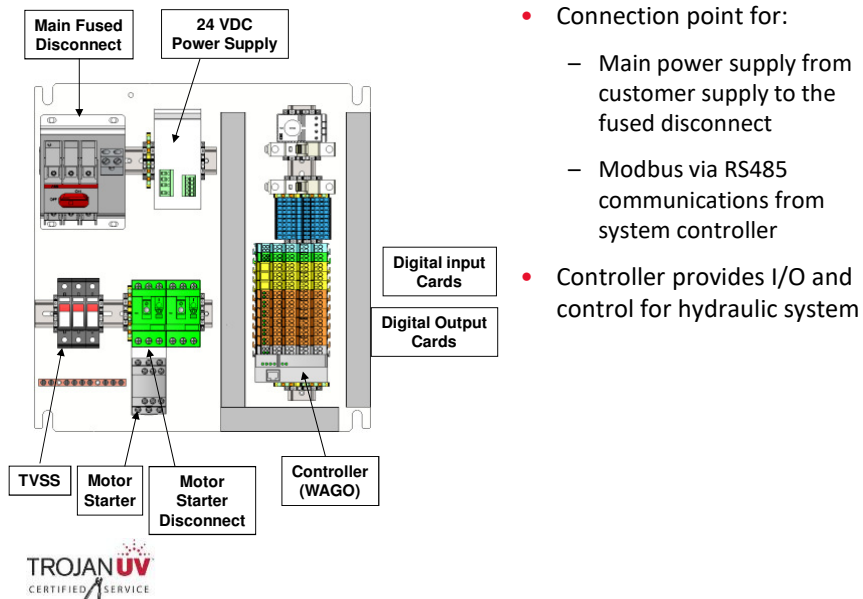


35

36

## Hydraulic System Center - Controls Enclosure

36



36

## Operation Modes of the UV Wiper Groups

- REMOTE:** This allows the controller to command the timed wiper sequences on the wiper group. The wipers ALWAYS want to be in REMOTE!
- OFF:** This turns the wiper group OFF and will not allow these wipers to operate. This would be used for maintenance.
- LOCAL (ON):** This turns the wiper group ON, and allows the user to choose whether to RETRACT, EXTEND, or SEQUENCE (extend then retract) the wiper group. Only one wiper group at a time should be in LOCAL. The top selector switch only works in LOCAL as follows:

**RET:** (RETRACT) This will RETRACT all of the wipers in the wiper group.

**EXT:** (EXTEND) This will EXTEND all of the wipers in the wiper group.

**SEQ:** (SEQUENCE) This will first EXTEND then RETRACT all of the wipers in the wiper group like a normal wiper sequence.

The pump will eventually turn off after each operation in LOCAL mode.

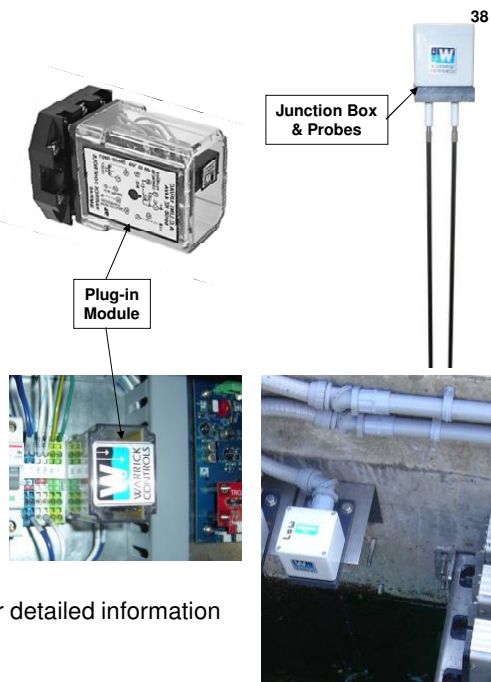


37

## Low Water Level Sensor

- Plug-in conductivity module mounted on PDC back plate. Mounted in last PDC in each channel
- Signal is daisy-chained through each PDC in the channel
- Junction box and probes mounted in channel downstream of bank
- Inspect and clean probes monthly

**Note:** Refer to O & M Manual for detailed information



38

## System Control Center - SCC

39

- Manages all operations of the UV3000™Plus System  
PLC Controller



HMI (Human Machine Interface)



39

## Icon Based Screen Navigation – PLC HMI

40

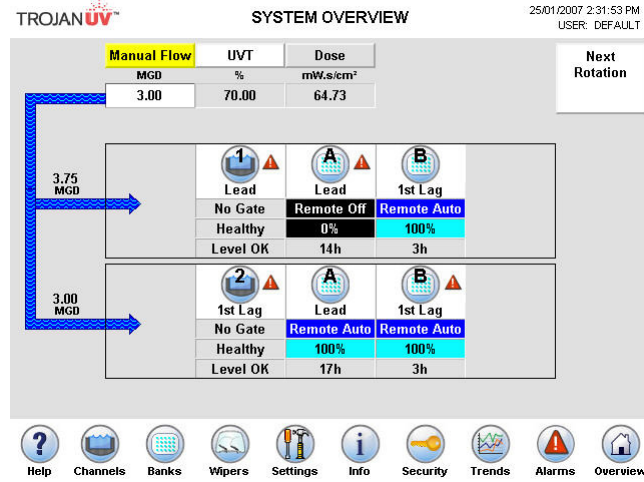
- Displays System Overview with Bank & Channel Status & operator controls functions
- Displays Bank Overview status & control
- Displays Wiper Overview status & control
- Flow, UVT & UV Dose Trend display for 24 hours
- Displays Active Alarms & Historical Alarms
- System Settings access when properly logged in
- Displays Login & Logout buttons to allow security level access
- Displays screen Help information
- Displays System Info. & allows access to change time
- Displays Channel Overview status and control



40

## PLC Based HMI – System Overview

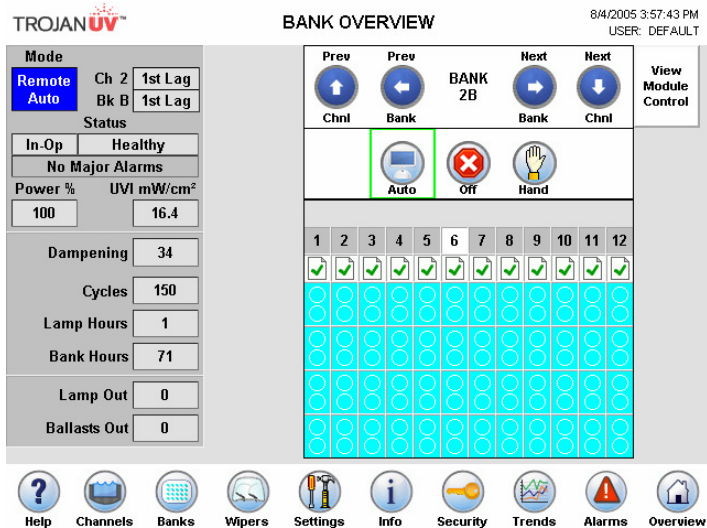
41



41

## PLC Based HMI – Bank Overview – Bank control

42



42

## PLC Based HMI – Wiper Overview – Wiper control

43

TROJAN UV WIPER OVERVIEW 2008-12-03 08:32:35 USER: OP1

Enabled Disable

Prev HSC Prev Wiper Next Wiper Next HSC

HSC 2 WPR 1

Wipe Requested

Status Enabled

Mode Remote

FLOW LIMIT FOR WIPING OK

WATER LEVEL OK

COMMUNICATION OK

WIPER IN REMOTE

PRESSURE OK

MOTOR RUN OK

WIPER FLUID LEVEL OK

Retracting

Wipe In Progress

Next Wipe 3:24

Help Channels Banks Wipers Settings Info Log Out Trends Alarms Overview

TROJAN UV  
CERTIFIED SERVICE

43

## PLC Based HMI – Active Alarms

44

TROJAN UV ACTIVE ALARMS 6/4/2005 4:07:56 PM USER: OP1

Message

NOT ENOUGH HEALTHY CHANNELS AVAILABLE

SCADA COMMUNICATIONS FAULT

CH 1 BANK A MULTIPLE BALLAST FAULT

CH 1 BANK A MULTIPLE LAMP FAULT

CH 1 BANK A BALLAST FAULT

CH 1 BANK A LAMP FAULT

CH 1 BANK B LAMP HRS MAX EXCEEDED

HCB 2 WG 1 NOT IN REMOTE

HCB 2 WG 2 NOT IN REMOTE

HCB 2 WG 3 NOT IN REMOTE

Top Up Down End History Close

TROJAN UV  
CERTIFIED SERVICE









44

### System Control Center - Touchsmart Controller

- Manages all operations of the UV3000™Plus System QSI Microprocessor Controller



### Icon Based Screen Navigation

- 
  - Displays System Overview with Bank & Channel Status & operator controls functions
- 
  - Displays Bank Overview status & control
- 
  - Displays Wiper Overview status & control
- 
  - Flow, UVT & UV Dose Trend display for 24 hours
- 
  - Displays Active Alarms & Historical Alarms
- 
  - Displays System Info. & allows access to change time on QSI HMI
- 
  - Displays Login & Logout buttons to allow security level access
- 
  - System Settings access when properly logged in





## Touchsmart Controller – System Overview

47

10/26/2015 **SYSTEM OVERVIEW** 1:42 pm

<b>Manual Flow</b>	<b>Manual UVT</b>	<b>Dose</b>	<b>Intensity</b>	<b>Retention</b>	<b>Next Rotation</b>
MGD	%	mW.s/cm <sup>2</sup>	mW/cm <sup>2</sup>	s	
50.00	65	24.24	12.12	2	499d 20h

Channel 1	Bank 1A	Bank 1B
Enabled	Lead	1st Lag
	Remote Auto	Remote Auto
	0 %	72 %
	4 hours	5 hours

TROJAN UV  
CERTIFIED SERVICE

47

## Touchsmart Controller Bank Overview – Bank control

48

Bank 1A Lead

**BANK OVERVIEW**

Remote Auto	1	2	3	4	5	6	7	8	Bank Cycles
	✓	✓	✓	✓	✓	✓	✓	✓	1
Bank Status	○	○	○	○	○	○	○	○	Bank Hours
On	○	○	○	○	○	○	○	○	0
UVI mW/cm <sup>2</sup>	○	○	○	○	○	○	○	○	Lamp Hours
5.76	○	○	○	○	○	○	○	○	0

Bank Control

Go To Module Control

TROJAN UV  
CERTIFIED SERVICE

48

Touchsmart Controller Bank Overview – Module controls

49

**BANK OVERVIEW**

1	2	3	4	5	6	7	8
✓	✓	✗	✓	✓	✓	✓	✓
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○

Bank 1A Lead: Remote Auto  
 Bank Status: On  
 UVI mW/cm<sup>2</sup>: 5.76

Bank Cycles: 1  
 Bank Hours: 0  
 Lamp Hours: 0

Module Control: [Checkmark] [Cross] [Question Mark]

Go To Bank Control



49

Touchsmart Controller Bank Overview – Module Status

50

**BANK OVERVIEW**

1	2	3	4	5	6	7	8
?	✗	?	✓	✓	✓	✓	✓
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○

Bank 1A Lead: Remote Auto  
 Power %: 100  
 UVI %: 0.77

Reset Module Comm. [Red Button]

Bank Cycles: 1  
 Bank Hours: 0  
 Bank Not Healthy [Red Button]

Module Control: [Checkmark] [Cross] [Question Mark]

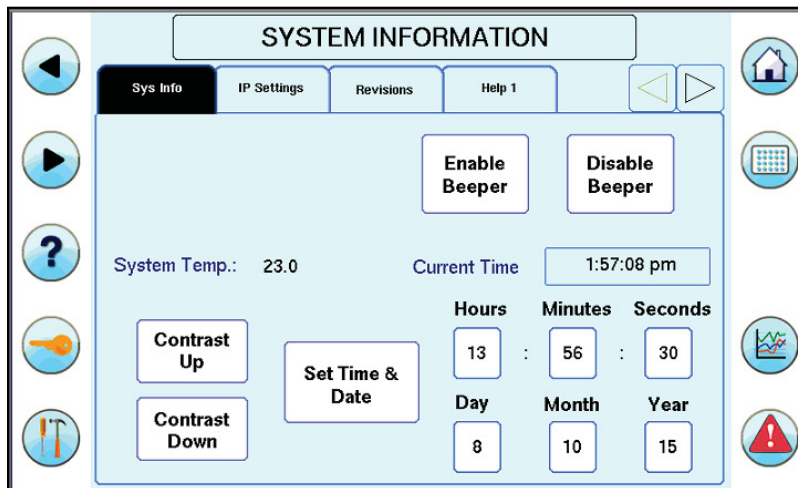
Go To Bank Control



50

## Touchsmart Controller – System information

51

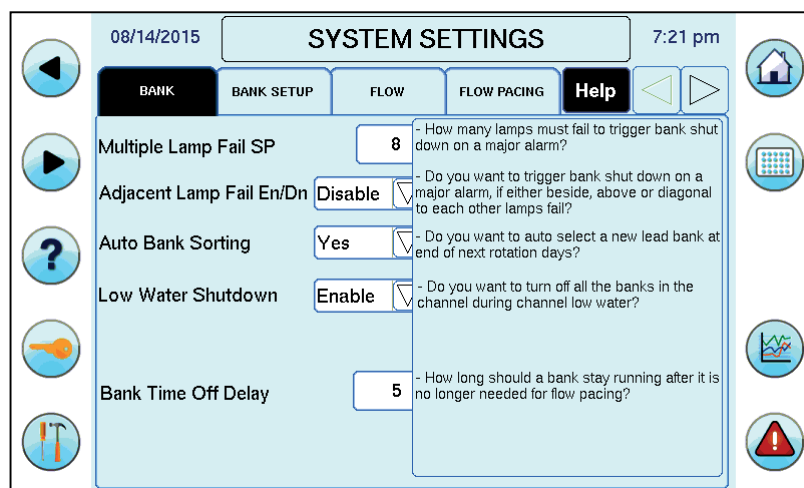


TROJAN UV  
CERTIFIED SERVICE

51

## Touchsmart Controller – Bank settings

52

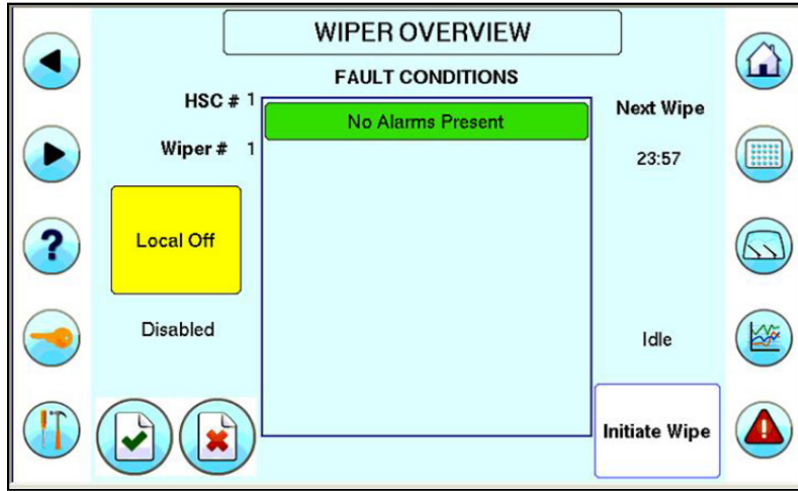


TROJAN UV  
CERTIFIED SERVICE

52

Touchsmart Controller – Wiper Overview – Wiper control

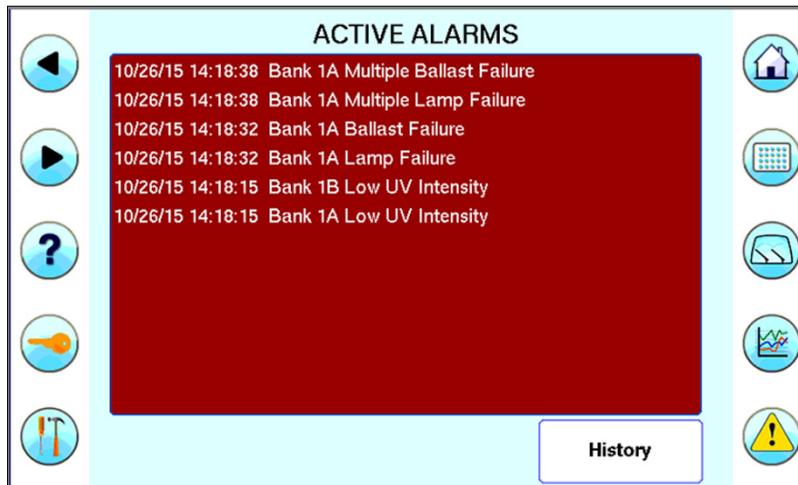
53



53

Touchsmart Controller – Active Alarms

54



54

## Important System Operation & Maintenance Notes

### Things to remember when operating a UV disinfection system:

- Keep banks operating in **Remote Auto Mode**
- Keep banks “healthy” – free from alarms
- Keep flow and UV transmittance signals in measured mode (if applicable)
- Perform daily, monthly, semi-annual, and annual inspections / maintenance as per O&M

Bank 1A  
Lead

Remote Auto

Power %  
100

UVI %  
0.77

Mode

Remote Auto Ch 1 Lead  
Bk A Lead

Status

In-Op Healthy

Power % UVI mW/cm<sup>2</sup>  
100 12.9



## Important System Operation & Maintenance Notes

### Keep Lamps ON

- Any alarms on the system can potentially cause disinfection problems
- Failed Lamps or Ballast create “holes” in the lamp array – fix it
- Banks in Auto mode will allow system to achieve disinfection required
- UV intensity output of lamps decreases as they age – replace lamps when they reach EOL



BANK OVERVIEW

Prev BANK 1A Next View Bank Control

Chnl Bank Chnl

Enable Disable Reset

1	2	3	4	5	6	7	8	9	10	11	12
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Settings Info Security Trends Alarms Overview

BANK OVERVIEW

1	2	3	4	5	6	7	8	Bank Cycles
✓	✓	✓	✓	✓	✓	✓	✓	1
○	○	○	○	○	○	○	○	Bank Hours
○	○	○	○	○	○	○	○	0
○	○	○	○	○	○	○	○	Lamp Hours
○	○	○	○	○	○	○	○	0

Go To Module Control



### Important System Operation & Maintenance Notes

#### Keep Sleeves Clean

- Fouled (dirty) lamps/sleeves absorb UV light and reduces disinfection
- Automatic Cleaning Systems cleans fouling – must be inspected and maintained
- Manual cleaning must be done on a regular basis – cleaning interval is specific to water quality
- Inspect sleeves when dry – wet sleeves usually appear clean



Wet Sleeve

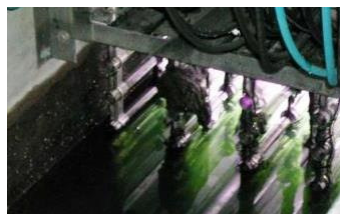
Dry Sleeve



### Important System Operation & Maintenance Notes

#### Keep System Clean

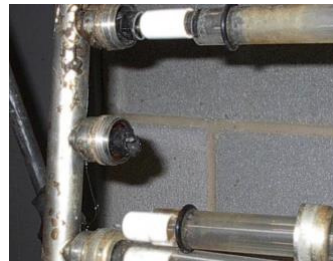
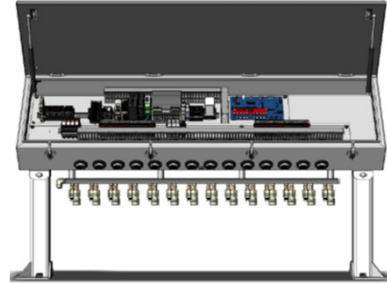
- Bottom of channel can accumulate sludge and algae
- Floating solids can affect operation of equipment – low water level sensors
- Large floating solids in effluent can get caught on lamps – this blocks the UV light



## Important System Operation & Maintenance Notes

### Keep Components Dry

- UV disinfection systems require electrical components to be submersed or in close proximity to water - not a great mix
- Inspect & reseal components with care when performing maintenance
- Keep lamp connections dry
- Reinstall PDC, SCC & enclosure covers carefully & securely
- Replace seals and gaskets if worn or cracked



59

## System Maintenance

- Daily
  - Check operation and alarms
- Weekly
  - Inspect 1 module per bank for fouling, debris build-up and sleeve nut tightness
- Monthly
  - Inspect & clean water level sensor probes
  - Inspect electrical enclosures seals and clean outer surfaces
  - Initiate wipe sequence and ensure HSC pressure is within range (150-200 psi)
- 2 months
  - Inspect modules for algae and debris build up, clean with garden hose as required.
- 6 months
  - Flush and fill wiper canisters with ActiClean gel
  - Grease hydraulic cylinder – done at same time as above
- Annually
  - Clean UV channel
  - Replace hydraulic filter
  - Inspect hydraulic hoses for wear
  - Inspect water level controller for leaks



60

## System Maintenance

- 12,000 Hours
  - Remove and replace UV lamps
  - Remove and replace sleeve sealing O-rings
  - Flush all ActiClean gel from canisters using garden hose. To be performed when replacing lamps
- Every 2 Years
  - Replace hydraulic fluid in HSC reservoir
  - Replace wiper seals



61

## System Maintenance

### Daily visual inspection

System component	Inspection activity
SCC	Check Alarm Status screen for new faults and record new alarms
SCC	Check the Alarm History screen to get an overview of past faults
SCC	Check the Overview screen(s) on the user interface to make sure that all the UV banks are in REMOTE AUTO and that all Modules are enabled
ActiClean™ Cleaning System	Check the Wiper Control screen(s) on the user interface to make sure that all the wiper groups are in REMOTE AUTO and that all wiper groups are enabled.
Level sensor	Visually inspect water level sensor for debris build up. Clean as needed.
Hydraulic System Center	Visually inspect Manifold and HSC for Hydraulic fluid leaks.



62



## System Maintenance – Preventative maintenance schedule

System Component	Maintenance Requirement	On Removal	Daily	Weekly	Monthly	Every 2 Months	Semi-Annually	Annually	12,000 hour	Every 2 years
UV system	Visual walk-about inspection		X							
	Clean the UV channel around the UV system. Perform semi-annually for poor water quality conditions.							X		
Hydraulic System Center	Inspect HSC and Hydraulic System Components				X					
	Initiate wipe sequence and check the HSC pressure is within range (150–200 psi)				X					
	Check the hydraulic fluid level			X						
	Replace the filter							X		
	Inspect the hydraulic hoses for wear. Replace hoses if bulges, spots, cracks or leaks are apparent. Perform when recharging the ActiClean™ Gel	X							X	
Level Sensor(s)	Replace hydraulic fluid									X
	Check Level Sensor for debris, algae or damage. Clean the sensor rods as needed with a wire brush. Replace if worn. Perform once every two weeks for poor water quality conditions.				X					
Water Level Control	Inspect for debris and remove as needed. Perform once every two weeks for poor water quality conditions.				X					
	Inspect grousing/seals and repair/replace if any signs of cracking or damage							X		
UV Module	Inspect and if required remove debris from module. Use low pressure washer (e.g. a garden hose). Perform once every two months for poor water quality conditions.	X				X				
	Remove the module. Replace UV lamps and lamp sleeve O-ring seals								X	
	Check the module power cable strain relief for tightness. Replace end cap seal					X				
ActiClean™ Cleaning System	Replace end cap seal	X								
	Remove module debris and fill the wiper collars with ActiClean™ Gel	X					X			
	Apply grease to the wiper cylinder—done at same time as filling the ActiClean™ Gel						X			
	Flush and clean entire cleaning system and replace ActiClean™ Gel (perform at the same time as replacing UV lamps at EOLL) or every 18 months. Perform annually for poor water quality conditions. Replace Wiper Seals								X	



## UV System Troubleshooting – The Basics

- Knowledge of how the UV system should work is required to be able to observe and define a problem:
  - Use the Operations and Maintenance (O&M) manual
- Most UV systems are modular:
  - Faulty components can be swapped with known good components
- Perform the easiest and most probable tests / checks first.
- Document all tests / checks performed as you go along.
- Be patient when doing your testing.
- When you have solved the problem, record what the issue was and how you fixed it. Check if your solution matches an option in Trojan's Troubleshooting section in the O&M manual. If not, then add it to the O&M so that this information is available for next time.



## UV System Troubleshooting – Lamp Failure


65

Condition	Possible Cause	Solutions	
<b>UV lamp failure</b>	EOL* > 12,000 hours	Replace UV lamps and reset UV lamp hours.	
	On/off cycles – Blackened UV lamp Ends	Refer to <b>Blackened UV lamps</b> .	
	Running UV lamps in air (top UV lamp)	Determine if water level management system is working properly.	
	Broken UV lamp	Replace with new UV lamp	
	Water in sleeve		UV lamp may still be fine, clean using isopropyl alcohol, with lint free wipes and let UV lamp dry completely before reusing.
			Replace sleeve O-ring if missing or damaged.
			Tighten loose sleeve nut.
		Replace sleeve if cracked or broken.	
	UV lamp holder/corrosion or burned/ damaged pins	Replace UV lamp socket and/or UV lamp.	
	Improper UV lamp connection (not plugged in completely)	Remove UV lamp from socket check pin alignment and try again. UV lamp and socket should seat tight in place with no gaps.	
Broken UV lamp Filament	Replace UV lamp.		
UV lamp Handling/Storage		Store in a dry, clean and stable environment.	
		Use rubber or cotton gloves to handle the UV lamps.	
Bad UV lamp	Replace with new lamp driver enclosure UV lamp connectors. Make sure all wires inserted in the connectors are not loose.		
Pinched/broken wires	Replace wires as required.		

65

## Warranty Claim Form

66



**TROJAN UV**  
Warranty Claim Form

Complete all applicable info

Check one:  Lamp Driver     TrojanUV3000P/TP     TrojanUV4000

Lamp     TrojanUV3000B     TrojanUV4000Plus

UV Sensor     TrojanUV3000     TrojanUV/signa

TrojanUV3000Plus     TrojanUV/Sonus

Site/Project Name: \_\_\_\_\_

Project/Serial #: \_\_\_\_\_

Part Number: \_\_\_\_\_

For electronic copy of form please contact our Customer Care Representatives (CCR) at na.warranty@trojanuv.com

No.	Installation	Date of Failure	Bank #	Module or Letter	Array	Position / Sensor #	Bank Hours at Install	Bank Hours at Failure	Net Operating Hours	On/Off Cycles	Date Code and Serial Number
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											


Notes:

Completed By: \_\_\_\_\_

Phone #: \_\_\_\_\_

Email: \_\_\_\_\_

\* Submit failures on warranty claim form monthly otherwise warranty claim may be void.  
\* Items that are damaged, show signs of corrosion, have been exposed to water, or were not handled, installed, or operated according to the O&M manual are not valid for warranty.



66

## Non-OEM Lamps vs. Genuine



### The Risks Associated With non-OEM Lamps



#### Permit Compliance Issues

- Low UV lamp output & insufficient UV intensity
- High bacteria counts



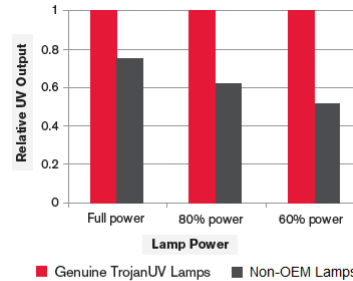
#### Increased Labor & Costs

- Premature lamp and/or ballast failures
- Damaged connectors, cables and other parts



#### Safety Concerns

- Loss of electrical and safety certifications, including UL, CSA and CE
- Potential for fire, shock and equipment damage



Genuine TrojanUV Lamps consistently deliver higher UV output

During a test, non-OEM lamps delivered at least 25% less UV output at full power. When dimmed to 60% power, they delivered only 52% of the output of a TrojanUV lamp. This could result in your disinfection process and permit compliance being at risk.



## TrojanUV Support Contact Information

First Point of Contact for Parts and Service:

Your local Trojan representative

If unavailable contact Trojan's Technical Assistance Center (TAC):

[tac@trojanuv.com](mailto:tac@trojanuv.com)

1 866 388 0488 (North America)

+1 519 457 3400 (Rest of World)

8:00 a.m. – 5:00 p.m. NA Eastern Time, 24/7 emergency support



**Instructions:** Indicate whether you believe the following statements are true (T) or false (F) by circling the appropriate letter.

1. UV light at a wavelength from 200nm to 300nm permanently alters the DNA structure of the cells of microorganisms.  
T F
2. Water quality, the fouling of sleeves and the air temperature has a direct effect on UV Dose.  
T F
3. The amalgam lamps on a UV3000PLUS system require changing when they reach 12000 hours of operation  
T F
4. When tightening a Sleeve Nut, a special tool is required to ensure it has been tightened sufficiently.  
T F
5. If ballast 2 is replaced on a module, the two addressing dipswitches must be set to the ON position.  
T F
6. A blown 15A fuse on the module control relay could cause a "module failure" alarm.  
T F
7. The Bank Selector Switch will turn the lamps ON in a bank at 60% power when switched to the local position.  
T F
8. When a Bank of UV lamps turns ON, the bank will operate at a power level of 100% for a 10 minute lamp warm up time.  
T F

9. When the system is operating in Remote Auto, the system controller will determine the Bank operating power levels to maintain a sufficient UV Dose for disinfection.

T F

10. A banks operational mode can be changed from Remote Auto to Remote Manual in the System Overview screen.

T F

11. The Alarm Status screen will display all alarms that are currently in the system.

T F

12. When lubricating the Wiper Drive Cylinder, Cassida (food grade) grease should be used.

T F

13. Pressing the "Ballast Status" button on the Bank Control screen will change the display to indicate if the ballasts are ON or OFF.

T F

14. When filling the Automatic Cleaning System, the cleaning solution is filled from the bottom Wiper Canister.

T F NA

15. The Automatic Cleaning System will perform automatic timed cleaning sequences when the wiper selector switches are in the LOCAL SEQ positions

T F NA

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Project Name: \_\_\_\_\_

## Testing and Commissioning Plan:

The Proponent shall describe the plan for checking-out, start-up, initial operation and performance of the equipment in accordance with the Technical Specifications. The Proponent shall provide the following:

- Commissioning team roles and responsibilities;
- Description of check-out of equipment, including factory acceptance and field acceptance test procedures;
- Description of start-up and initial operation, including roles and responsibilities of the Proponent's staff and expectation of the Town's staff; and
- Decision of the performance testing, monitoring and reporting of the system during the commissioning period.

- **TROJAN'S RESPONSE:** A brief outline of the testing and commission are directly below and a more detailed overview on the following pages. We have included an example of a typical testing plan, but a site specific, more detailed one will be provided with submittals that is tailored to the specification requirements. Please refer to the project team list for more details on staff and note the commissioning and testing will be done by a certified Trojan technician.

## Testing and Commissioning Plan

Inspect Channel when dry

Will require assistance to install UV Modules

Connect Each UV module

Power No Load

Power Full Load

Ensure Communication for all UV Equipment and to SCADA as required

With the commissioning checklist, record points and readings, completing some wiper tests, flow for level controller, flow to UV and complete dose pacing table

Review SCADA and or Alarming Requirements

Provide Operator Training

Save and Submit final configuration, PLC and HMI programs to be stored in project file

Submit all completed Trojan Service Startup Forms and Checklist along with Service Report and Training

Carry out performance test requirements of specification.



1.0 Project Information			
Project Name			
Project Number			
Project Configuration			
Total Lamps		Modules per Bank	
Channels		Banks per Channel	
Lamps per Module		Lamp Spacing ("	
Project Documentation Revisions			
Controls Philosophy		SCC Drawing	
Software Verification		PDC Drawing	
Layout Drawing		HSC Drawing	

2.0 System Information			See Note
System Control Center (SCC)			
2.1	Controller type (QSI, PLC, etc.)		
2.2	Controller program revision level		
Human Machine Interface (HMI)			
2.3	Type (QSI, Panelview, etc.)		
2.4	Serial number		
2.5	HMI/QSI Program revision level		
Power Distribution Centre (PDC)			
2.6	Communication control board revision		
Hydraulic System Center (HSC)			
2.7	Program revision		
2.8	Current overload setting		

If a note applies, write an X and record note with item number on page 12.

3.0 Channel Dimensions & Elevations		Layout	Measured	Status	See Note
<b>Baffle (if applicable)</b>					
3.1	Height				
3.2	Width				
<b>Channel</b>					
3.3	Channel width at modules				
3.4	Channel wall height				
3.5	Start of channel floor to center of first bank's support beam				
3.6	Between centers of last & first support beam between each bank				
3.7	Center of last support beam & start of ramp to ALC/Weir				
3.8	Between centers of module support beams				
3.9	Module support beam – top height				
3.10	Module support beam bracket – top mounting bolt height				
3.11	Low level sensor box (center of bolts)				
3.12	Low level sensor – short rod height				
<b>ALC/Weir</b>					
3.13	Channel width at ALC/Weir				
3.14	Top height relative to channel floor				
3.15	Base ramp length				
3.16	Base length				
3.17	ALC center to end of ALC base				



4.0 System Inspection		Reference	Status	See Note
<b>Channel</b>				
4.1	Effluent flow is available for startup			
4.2	Channel is free of water/debris			
4.3	LWL sensor rod cut to correct length			
4.4	ALC/Weir sealed correctly			
<b>System Cabinets (SCC, PDC, HSC)</b>				
4.5	Installed in correct locations	Layout Drawing		
4.6	All service entrances accessible			
4.7	Cables entrances secure & sealed			
4.8	Wire terminals secure			
<b>Connections &amp; Interfacing</b>				
4.9	Communication wiring installed			
4.10	Wiring correct (i.e. daisy chain)	SCC Drawing		
4.11	Correct comm. wiring terminations at cabinet service entrances	Electrical Drawings		
4.12	Comm. wiring grounding is correct	SCC Drawing		
4.13	End of line resistor installed at end of RS485 comms daisy chain			
4.14	Selector switches to OFF position			
4.15	UV & SCADA comm. wiring complete	Controls Philosophy		
4.16	UV to plant digital/analogue wiring complete	Controls Philosophy		
4.17	Short LWL rod connected to P1 PDC terminal	Electrical Drawings		
4.18	Hydraulic lines installed from HSC to manifold			
<b>Control Equipment</b>				
4.19	Online UVT is in correct location. Install UVT sensor. The contractor should have save it safely	(if supplied)		
4.20	Flowmeter installed & connected			
4.21	Inlet/Outlet gates installed & connected			
4.22	Level sensor installed & connected	(if supplied)		
4.23	Channel drain valves installed	(if supplied)		

5.0 Electrical Inspection		Reference	Status	See Note
<b>Current (Amperage) Rating</b>				
5.1	Transformer(s) feeding UV equipment rated correctly for voltage & current, taking into consideration any other loads that may be using transformer	Layout Drawing		
5.2	Incoming power terminated in all panels (but not energized)			
5.3	Verify neutral to ground bonding completed	Electrician		

Table A: Breaker/Disconnect/Conductor Verification				
Rating Location	SCC	PDC	HSC	Other
Cabinet amperage rating				
Cabinet's main breaker amperage rating				
Electrical supply panel breaker amperage rating				
Supply conductor size				

5.4	Cabinet amperage & breaker ratings verified			
5.5	Incoming power conductors sized correctly			

Table B1: PDC Voltage (AC RMS)				Tolerance: +5% / -10%		
Measurement Location	PDC 1A		PDC ____		PDC ____	
	No Load	Full Load	No Load	Full Load	No Load	Full Load
L1 – N						
L2 – N						
L3 – N						
N – GND						
L1 – L2						
L1 – L3						
L2 – L3						

Table B2: PDC Voltage (AC RMS)					Tolerance: +5% / -10%	
Measurement Location	PDC ____		PDC ____		PDC ____	
	No Load	Full Load	No Load	Full Load	No Load	Full Load
L1 – N						
L2 – N						
L3 – N						
N – GND						
L1 – L2						
L1 – L3						
L2 – L3						

Table C: PDC Current (AC RMS)						
Measurement Location	PDC 1A	PDC ____	PDC ____	PDC ____	PDC ____	PDC ____
	Full Load	Full Load	Full Load	Full Load	Full Load	Full Load
Line 1						
Line 2						
Line 3						
N						
GND						

**For a balanced system:** If the system has an equal load on each phase, the Line 1, 2 and 3 phase currents recorded should be very close. However, phases with lamp/ballast failures or systems with an even number of modules that have one phase with one fewer module will show slightly lower amperage values on the affected phase(s). The neutral current should not be greater than any of the line phase currents, and will generally have a value close to the difference in the highest and lowest phase currents. The ground current is system specific but should be close to zero.

Table D: Expected Current vs. Measured Values										
PDC	Modules/Phase			Lamps/ Module	# Lamps Off/Phase			Expected Amps/Phase		
	L1	L2	L3		L1	L2	L3	L1	L2	L3
1A	/	/			/	/		/	/	
	/	/			/	/		/	/	
	/	/			/	/		/	/	
	/	/			/	/		/	/	
	/	/			/	/		/	/	
	/	/			/	/		/	/	

**Lamp / Ballast Current Draw:** One UV3000Plus ballast, which drives two lamps, will draw approximately 1.8 to 2.4 Amps (depending on supply voltage) with the lamps operating at 100% power. Therefore, each lamp's current draw is approximately 0.9 to 1.2 Amps. Lamp/ballast failures on a phase will cause the measured current of that phase to be lower than the expected calculations.

**Estimated Lamp Current Draw:**

Supply Voltage (VAC)	Current Draw Per Lamp (Amps)	Supply Voltage (VAC)	Current Draw Per Lamp (Amps)
200	1.20	240	1.00
210	1.15	250	0.95
220	1.10	277	0.85
230	1.05		

Table E: SCC Voltage (AC RMS)		Tolerance: +5% / -10%
Measurement Location	No Load	Full Load
L - N		
N - GND		

<b>Table F: HSC Voltage (AC RMS)</b>					<b>Tolerance: +5% / -10%</b>	
<b>Measurement Location</b>	<b>HSC <u>1</u></b>		<b>HSC ____</b>		<b>HSC ____</b>	
	<b>No Load</b>	<b>Full Load</b>	<b>No Load</b>	<b>Full Load</b>	<b>No Load</b>	<b>Full Load</b>
L1 – G						
L2 – G						
L3 – G						
L1 – L2						
L1 – L3						
L2 – L3						

<b>Table G: HSC Pump Current (AC RMS)</b>			
<b>Measurement Location</b>	<b>HSC <u>1</u></b>	<b>HSC ____</b>	<b>HSC ____</b>
	<b>Full Load</b>	<b>Full Load</b>	<b>Full Load</b>
Line 1			
Line 2			
Line 3			
GND			

6.0 Commissioning		Reference	Status	See Note
<b>UV Modules</b>				
6.1	Lamps & sleeves installed & sleeve nuts tight			
6.2	Hydraulic connections tight			
6.3	Cylinders filled with grease			
6.4	Canisters filled with Acticlean			
6.5	Modules installed into channel			
6.6	Sensor modules installed center-bank			
6.7	Power cables have proper drip loop			
6.8	Sensor cable loop secured			
<b>SCC Electrical Energization &amp; Configuration</b>				
6.9	If 'No Load' voltage measurements for SCC correct, energize breaker in cabinet that feeds power to SCC			
6.10	Double-check 'No Load' voltage measurements inside SCC without energizing internal breaker			
6.11	Energize internal breaker for HMI & controller			
6.12	Verify operation of HMI & controller			
6.13	Measure 'Full Load' voltage of SCC			
6.14	Verify HMI settings (Region, Time, Date, etc.)			
6.15	Verify system configuration settings			
<b>HSC Electrical Energization</b>				
6.16	If 'No Load' voltage measurements for HSC correct, energize breaker in cabinet that feeds power to HSC	Verify with Electrician		
6.17	Double-check 'No Load' voltage measurements inside HSC without energizing internal breaker			
6.18	Energize internal breaker for HSC			
6.19	Verify pump operation & rotation	Pump Housing Arrow		
6.20	Motor starter(s) operate correctly			
6.21	Measure 'Full Load' <b>Voltage</b> of HSC with motor operating			
6.22	Measure 'Full Load' <b>Current</b> of HSC with motor operating			
6.23	Ensure pump current overload setting is suitable for 'Full Load' current			
6.24	Verify Comms between SCC & HSC			

6.0 Commissioning		Reference	Status	See Note
<b>PDC Electrical Energization</b>				
6.25	If 'No Load' voltage measurements for PDC are correct, energize breaker in cabinet that feeds power to PDC	Verify with Electrician		
6.26	Double-check 'Low Load' Voltage Measurements Inside PDC While Energized	Record in Table B1 & B2		
6.27	Verify Comms between SCC & PDC			
<b>Water Level Control Device</b>				
6.28	Provide <b>Minimum</b> flow to channel & confirm ALC/Weir operation & level			
6.29	Provide <b>High</b> flow to channel & confirm ALC/Weir operation & level			
<b>System Operation</b>				
6.30	Ensure all modules are enabled			
6.31	Put PDC selector switch to OFF & perform Local Map Write to PDC			
6.32	Verify LWL sensor operation and input from PDC Comm. Board			
6.33	Test 'Local ON' operation of UV banks, ensure all modules & lamps functioning			
6.34	Verify 'Remote AUTO' operation of UV banks, ensure all modules & lamps functioning			
6.35	Place bank(s) in 'Remote Hand' at 100% power			
6.36	Measure 'Full Load' <b>voltage</b> of PDC(s)	Record in Table B1 & B2		
6.37	Measure 'Full Load' <b>current</b> of PDC(s)	Record in Table C		
6.38	Calculate 'expected' measured current per phase, compare with actual values	Record in Table D		

6.0	Commissioning	Reference	Status	See Note
<b>HSC and Wiping System Operation</b>				
6.39	Put selector switch in OFF Position and perform Local Map Write from controller			
6.40	HSC reservoir filled with hydraulic oil			
6.41	Bleed air out of PDC to HSC hydraulic lines & PDC manifold			
6.42	Connect hydraulic lines to manifold			
6.43	Run wipers to observe module operation & bleed out remaining air			
6.44	Ensure wipers are parked over spring when retracted			
6.45	Monitor HSC pressures while wiping			
6.46	Top up reservoir if required			
6.47	Measure wiper EXT & RET times	Record in Table H		
6.48	Enter desired stroke time in settings	Record in Table H		
6.49	Test local ON wiper operation using the sequence mode			

Deadhead Pressure (PSI)				
Operating Pressure (PSI)	Wiper Group 1	Wiper Group 2	Wiper Group 3	Wiper Group 4
Extend				
Retract				
Wiper Stroke Time Programmed (sec)	Extend Time Measured	Retract Time Measured	Fluid Level After Testing (record when wiper sequence complete)	
Pressure Switch High Setting (PSI)			<input type="checkbox"/>	<input type="checkbox"/>
			E	1/4
			1/2	3/4
			F	



6.0 Commissioning		Reference	Status	See Note
<b>Additional Equipment Demonstration &amp; Verification</b>				
6.50	Demonstrate operation of portable photometer			
6.51	Flowmeter signal & 20mA setpoint			
6.52	Ultrasonic level sensor signal & 20mA setpoint			
6.53	Online UVT signal			
6.54	Inlet gates			
6.55	Outlet gates or adjustable weirs			
6.56	Channel drain valves			
<b>Peripheral Equipment Testing</b>				
6.57	Verify flow meter signal with varying flow rates			
6.58	Verify correct online/entered UVT values			
6.59	Verify intensity sensors operational			
6.60	Verify SCADA signals and data at plant interface	Controls Philosophy		
6.61	Verify digital & analogue signal at plant interface	Controls Philosophy		
6.62	Verify SAT requirements with customer	(if applicable)		
6.63	Simulate & verify dose pacing with worst case values	Record in Table I		

Table I: Dose Pacing Values

Design values entered in configuration settings				
Dose Setpoint (mWs/cm <sup>2</sup> )	Entered Value (%)	Lamp Hours	Flow Rate (MLD, MGD, L/S, m <sup>3</sup> /day)	
Set to design dose value	Use design value	Use EOL hour value	Set to peak design flow	
Results				
Flow	UVT	Calc. Dose (mWs/cm <sup>2</sup> )	Bank Name	Bank Power Level (%)

6.0 Commissioning		Reference	Status	See Note
<b>Completion</b>				
6.64	Conduct operation & maintenance training	Training guideline		
6.65	Complete effluent level testing with low flows	Layout Drawing		
6.66	Complete effluent level testing with high flows	Layout Drawing		
6.67	As-built changes recorded on drawings			
6.68	Controls Philosophy changes documented	Controls Philosophy		
6.69	Cabinet covers installed & doors closed			





## TECHNICAL INFORMATION

TROJAN  UV™

**Technical Information.** The following information should be included:

a) General System Information.

The Proponent shall provide the following:

- a. Catalogue and equipment data sheets showing complete descriptive information and product literature for the UV disinfection equipment proposed;
- b. Complete list of equipment including make and model numbers;
- c. Electrical requirements; and
- d. An outline of the operating procedures for start-up and shutdown of the equipment.

b) System Description. The Proponents shall describe the system upon which the proposal is based. Provide the following information:

- a. Dimensional drawings showing plan, elevation and appropriate cross sections, materials of construction, overall weight, weight of largest components requiring removal for maintenance, and clearance required around the equipment for maintenance access; and
- b. Description of the instrumentation and control system. Include programming requirements and any support expectations of the City during the FAT, SAT and testing period.

c) Provide the following:

[Equipment Data Sheets & Deviations from Specifications]

**TROJAN'S RESPONSE:**

a) General System Information

- a. Please see included 'System Overview' and '3000Plus Brochure' for catalogue and equipment data sheets of proposed UV equipment.
- b. Please see 'Scope of Supply' for list of equipment.
- c. Please see 'Layout Drawings' for electrical requirements.
- d. Please see excerpt from O & M Manual 'Section 7 Startup and Shutdown'.

b) System Description

- a. Please see 'Layout Drawings' for dimensional drawings showing plan, elevation and appropriate cross sections, as well as clearance required around equipment for maintenance access and see 'Scope of Supply' for weights of equipment.
- b. Please see 'Controls Philosophy' description of the instrumentation and control system.

c) Please see page below for exceptions to the mandatory terms, and the scopes for both plants showing the Equipment Data Sheets and any Deviations from the Technical Specifications.



## City of Windsor

(List of Exceptions to the Mandatory Terms – Appendix E)

Trojan Technologies (“Service Provider”) appreciates the opportunity to conduct business with the City of Windsor (“City”). To help provide the City with the best and most cost-effective products and services we can offer, we respectfully request the opportunity to negotiate reasonable terms and conditions prior to finalizing any contract we enter into. In addition, we note the following list of non-exclusive exceptions to Appendix E – Mandatory Contract Terms - attached to RFP No. 146-23 which we are providing to you as part of our response.

- i. **Indemnification and Insurance** - All indemnity obligations must be limited to the proportional extent directly caused by Service Provider’s negligence or willful misconduct relating to the work.  
  
Service Provider is not obligated to purchase or carry Professional Liability or E&O Insurance coverage, provide copies of Manufacturer’s policies, or provide waivers of subrogation.
- ii. **Ownership Rights** – Service Provider retains all rights in and to any intellectual property and confidential information created or procured by it or its representatives at any time, and the City receives licenses to use such intellectual property and information only to the extent provided by implied license under applicable law.
- iii. **Event of Default** – In the event a party has been declared in default, such defaulting party shall be allowed a period of five (5) days to commence to cure said default.
- iv. **Remedies** – In the event of early termination by the City, the City shall pay Service Provider recovery of costs plus reasonable profit, and for undamaged goods provided or services rendered to the date of termination. Service Provider does not provide the remedy of cover. Service Provider will not agree to give up its rights under general statutory and case law.

**LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE**

9. **Technical Information.** The following information should be included:

The Proponent shall provide sufficient information on the equipment so that the City and the Consultant can ascertain the Proponent’s ability to comply with the requirements of the RFP, as outlined below:

a) General System Information.

The Proponent shall provide the following:

- a. Catalogue and equipment data sheets showing complete descriptive information and product literature for the UV disinfection equipment proposed;
- b. Complete list of equipment including make and model numbers;
- c. Electrical requirements; and
- d. An outline of the operating procedures for start-up and shutdown of the equipment.

b) System Description. The Proponents shall describe the system upon which the proposal is based. Provide the following information:

- a. Dimensional drawings showing plan, elevation and appropriate cross sections, materials of construction, overall weight, weight of largest components requiring removal for maintenance, and clearance required around the equipment for maintenance access; and
- b. Description of the instrumentation and control system. Include programming requirements and any support expectations of the City during the FAT, SAT and testing period.

c) Provide the following:

**CORPORATION OF THE CITY OF WINDSOR  
LRPCP UV DISINFECTION SYSTEM UPGRADES: UV EQUIPMENT PRESELECTION  
STATEMENT 'A'  
EQUIPMENT DATA SHEETS**

Submit with the Submission the following information applicable to the proposed system to allow an evaluation of the equipment:

- 1. Description of system
- 2. Dimensioned plan and section of layout of the equipment including lamp module locations, channel dimensions, equipment support details, clearances and location of control system
- 3. Details of how modules will be fixed in place in banks and channels
- 4. Details of control gates or fixed weirs
- 5. Control system details including PLC and control panel locations

**LAYOUT**

1. Number of channels	Two (2)
2. Number of channels and banks online under average flow at design conditions	1 channel, 2 banks
3. Number of lamps (total)	Plant 1 - 192 Plant 2 - 192
4. Number of channels and banks online under average flow at design conditions with associated power conditions	
a. Number of new lamps/clean	Plant 1 - 96 Plant 2 - 96

**LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE**

b. Number of lamps at end of life	Plant 1 - 96 Plant 2 - 96
5. Number of modules	Plant 1 - 32 Plant 2 - 32
6. Number of modules/bank	Plant 1 - 8 Plant 2 - 8
7. Number of banks/channel	Two (2)
<b>LAMPS</b>	
1. Manufacturer	Trojan Technologies
2. Type of Lamp	LPHO
3. (Arc) Length	147 cm
4. Rated output (% of life)	
a. 100% (end of life)	240 Watts 12000 Hours
b. 50%	240 Watts 6000 Hours
c. New 100 hours	240 Watts 100 Hours
5. Power to lamps variable (Y/N)	Yes
<b>QUARTZ SLEEVES</b>	
1. Manufacturer	Trojan Technologies
2. Wall Thickness	1.5 mm
3. Outside Diameter	28 mm
<b>UV INTENSITY METER</b>	
1. Manufacturer and Type	Trojan Technologies
2. Total Number Supplied	Four (4)
3. Location	Centre module
<b>POWER</b>	
1. Input power to UV control panel	
a. Phase	Single
b. Volts	120 V
c. Amps	15 A
2. Number of control panels	1 (SCC) per plant
3. Ballast Power	
a. Phase	3 Phase, 4 wire + ground
b. Volts	480Y / 277 V (600V transformer will be provided)
c. Amps	15 A
<b>MODULES</b>	

**LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE**

1. Weight of Module	45 kg
2. Lamp Configuration	6 Lamp Modules
3. Lamp Spacing	4 inch
<b>HYDRAULIC CONSIDERATIONS: Losses across reactor zone (upstream to downstream)</b>	
<b>Plant 1</b>	
1. Average Design (41,500 m <sup>3</sup> /d)	3.49 cm
2. Peak Design Flow (72,800 m <sup>3</sup> /d)	2.73 cm
<b>Plant 2</b>	
1. Average Design (31,300 m <sup>3</sup> /d)	3.69 cm
2. Peak Design Flow (54,500 m <sup>3</sup> /d)	2.86 cm

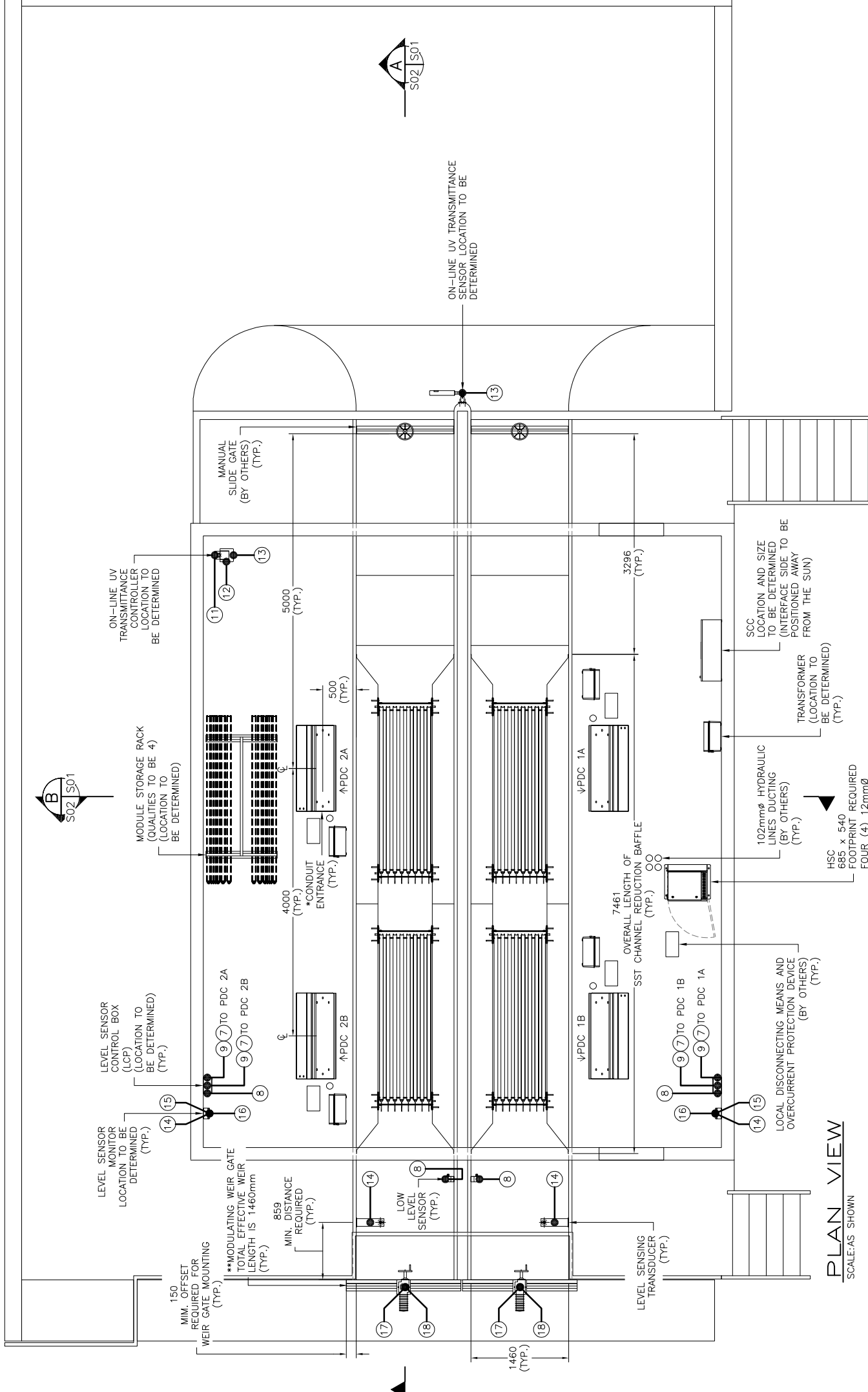
d) Provide in the following chart any deviations from the Technical Specifications:

<p><b>CORPORATION OF THE CITY OF WINDSOR</b>  <b>LRPCP UV DISINFECTION SYSTEM UPGRADES: UV EQUIPMENT PRESELECTION</b>  <b>STATEMENT 'B'</b>  <b>DEVIATIONS FROM SPECIFICATION</b></p>
<p>The Proponent shall list herein the part or parts of the equipment of his Quotation that are NOT IN ACCORDANCE with the Specifications.</p>
<p>1) Addendum 1, P-101 &amp; P-201 – CLARIFICATION – drawings show isolation gates. Please confirm that these gates are provided by other. Isolation gates are not included in the Scope of Supply.</p>
<p>2) Addendum 1, P-201 – CLARIFICATION – Drawing show Downstream water level higher than upstream. Please confirm levels</p>

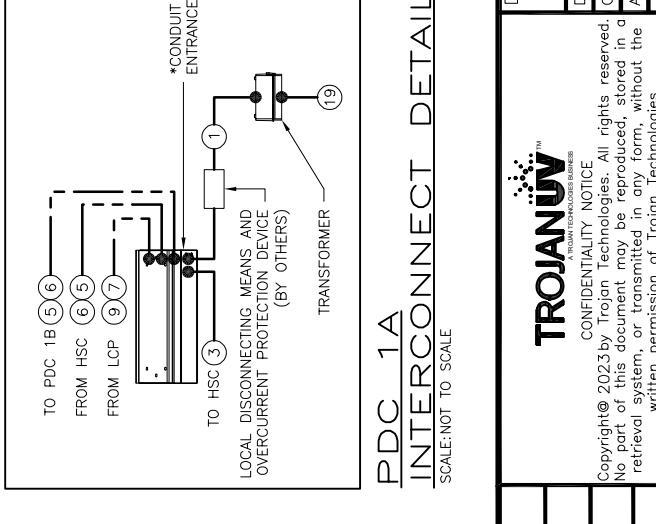
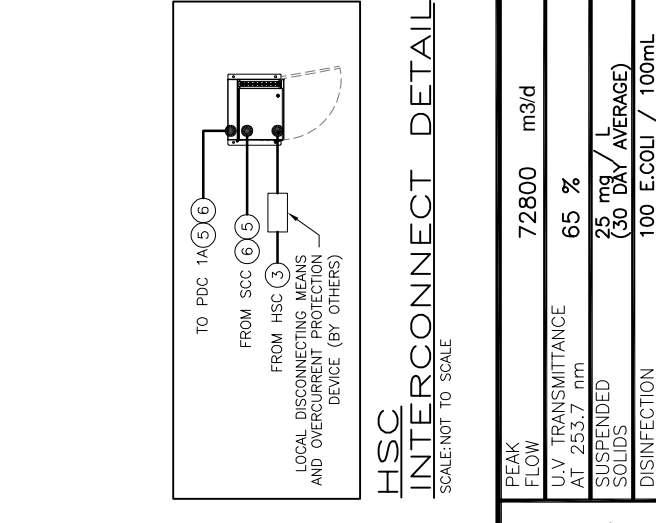
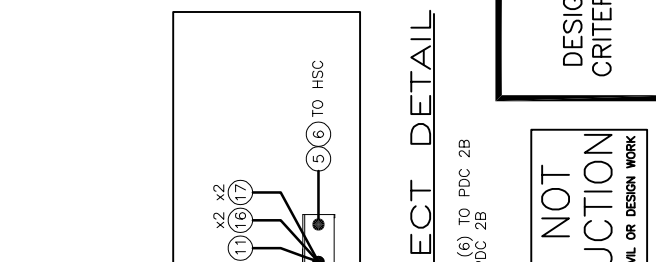
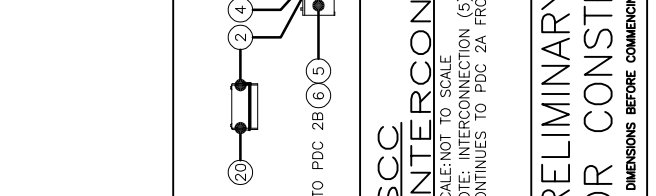


# TROJAN UV3000PLUS™ EQUIPMENT INTERCONNECTIONS

No.	DESCRIPTION	FROM	TO
1	POWER DISTRIBUTION CENTER (PDC) POWER SUPPLY 480Y/277V, 3 PHASE, 4 WIRE + GROUND 12.3 kVA/PDC POWER DRAW 17 AMPS MAXIMUM CURRENT/PHASE	TRANSFORMER	PDCs
2	SYSTEM CONTROL CENTER (SCC) POWER SUPPLY 120V, 1 PHASE, 2 WIRE + GROUND 1.8 kVA	TRANSFORMER	SCC
3	HYDRAULIC SYSTEMS CENTER (HSC) POWER SUPPLY 480V, 3 PHASE, 3 WIRE + GROUND	PDC 1A	HSC
4	FLOW METER 4-20 mA, DC ANALOG INPUT	FLOW METER PANEL (NOT SHOWN) (BY OTHERS)	SCC
5	GROUND LINK 14 AWG TYPE THW STRANDED	SCC	PDCs THRU HSC (DAISY CHAINED)
6	MODBUS 1 SHIELDED TWISTED PAIR	SCC	PDCs THRU HSC (DAISY CHAINED)
7	LEVEL SENSOR CONTROL BOX (LCP) POWER SUPPLY 24 VDC - 2 CONDUCTORS	PDCs	LCPs
8	DISCRETE LOW LEVEL SIGNAL 24 VDC - 2 CONDUCTORS	LOW LEVEL SENSOR	LCP
9	DISCRETE WATER LEVEL SIGNAL 24 VDC - 2 CONDUCTORS	LCP	PDC
10	ETHERNET/IP COMMUNICATION	SCC	PLANT SCADA (BY OTHERS) (NOT SHOWN)
11	ON-LINE UV TRANSMITTANCE CONTROLLER SIGNAL 4-20 mA	ON-LINE UV TRANSMITTANCE CONTROLLER	SCC
12	ON-LINE UV TRANSMITTANCE CONTROLLER POWER SUPPLY 120V, 1 PHASE, 2 WIRE + GROUND, 0.2 kVA	DP (NOT SHOWN) (BY OTHERS)	ON-LINE UV TRANSMITTANCE CONTROLLER
13	ON-LINE UV TRANSMITTANCE SENSOR (SENSOR CABLE PROVIDED BY HACH)	ON-LINE UV TRANSMITTANCE CONTROLLER	ON-LINE UV TRANSMITTANCE CONTROLLER
14	COMMUNICATION LINK 10m OR 30FT CABLE PROVIDED BY TROJAN	LEVEL SENSING TRANSDUCER	LEVEL SENSOR MONITOR
15	LEVEL SENSOR POWER SUPPLY 120V, 1 PHASE, 2 WIRE + GROUND, 36VA	DP (BY OTHERS) (NOT SHOWN)	LEVEL SENSOR MONITOR
16	WATER LEVEL SENSING 4-20 mA ANALOG INPUT SIGNAL	LEVEL SENSING MONITOR	SCC
17	OPEN COMMAND DISCRETE OUTPUT (MIN 20 AWG) - 2 CONDUCTORS CLOSE COMMAND DISCRETE OUTPUT (MIN 20 AWG) - 2 CONDUCTORS GATE IN REMOTE MODE DISCRETE INPUT (MIN 20 AWG) - 2 CONDUCTORS GATE FAULT DISCRETE INPUT (MIN 20 AWG) - 2 CONDUCTORS GATE POSITION ANALOG INPUT 4-20mA 1 TWISTED SHIELDED PAIR (24 AWG)	SCC SCC WEIR GATE WEIR GATE WEIR GATE WEIR GATE	WEIR GATE WEIR GATE SCC SCC SCC
18	WEIR GATE POWER SUPPLY	(DP) (BY OTHERS) (NOT SHOWN)	WEIR GATE
19	MAIN SERVICE TO TRANSFORMER 600V, 3 PHASE, 4 WIRE TO 480V, 3 PHASE, 3 WIRE + GROUND	DP (BY OTHERS) (NOT SHOWN)	TRANSFORMER
20	MAIN SERVICE TO TRANSFORMER 600V, 3 PHASE, 4 WIRE TO 120V, 1 PHASE, 2 WIRE + GROUND	DP (BY OTHERS) (NOT SHOWN)	TRANSFORMER



- NOTES:**
- : DO NOT SLOPE CHANNEL FLOOR.
  - : CHANNEL WIDTH & DEPTH MUST BE KEPT WITHIN A TOLERANCE OF + - 6mm AGAINST A COMMON DATUM ELEVATION.
  - : ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES.
  - : SYSTEM CONDUIT WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS.
  - : ELECTRICAL REQUIREMENTS SHOWN ARE TO SUPPLY TROJAN UV EQUIPMENT ONLY.
  - : REMOVABLE GRATING SECTIONS SHALL BE EASILY REMOVED BY ONE PERSON. MAXIMUM WEIGHT OF THE SECTIONS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE APPLICABLE JURISDICTION.
  - : CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
  - : EFFLUENT LEVELS SHOWN REFLECT HYDRAULICS ASSOCIATED WITH TROJAN EQUIPMENT ONLY. EFFLUENT LEVELS MAY BE ALTERED DUE TO CHANNEL DEBRIS OR GEOMETRY.
  - : ANY UPSTREAM AND DOWNSTREAM WL ELEVATIONS BEYOND THOSE SHOWN WITHIN THIS LAYOUT DRAWING ARE OUTSIDE OF THE SCOPE OF TROJAN TECHNOLOGIES AND ARE THE RESPONSIBILITY OF THE CONSULTING ENGINEER.
  - : GRATING IMMEDIATELY ABOVE UV MODULES TO BE OPEN TYPE (EG. PERFORATED) TO ALLOW ADEQUATE COOLING OF THE UV MODULES.
  - : CONDUIT RUN BETWEEN HSC AND PDC 1A & PDC 1B IS 6.0m MAXIMUM. CONDUIT RUN BETWEEN HSC AND PDC 2A & PDC 2B IS 13.6m MAXIMUM.
  - : HSC HYDRAULIC ENTRANCE(S) NOT BE MORE THAN 300mm BELOW PDC MOUNTING ELEVATION TO PREVENT HSC PUMP FLOODING.
  - : TOLERANCE AT ALC IS CHANNEL WIDTH +25mm.
  - : SITE TO PROVIDE APPROVED (ENGINEERED) ANCHOR POINTS FOR PERSONNEL TO USE AS PART OF THEIR FALL RESTRAINT SYSTEM AROUND OPEN CHANNELS. THE ANCHOR POINTS MUST BE POSITIONED SO THAT THE PREFERRED RETRACTABLE LIFELINE OF 2.4m IS OF SUFFICIENT LENGTH TO ACCESS THE WORK AT THE CHANNEL.
  - \* POWER AND LOW VOLTAGE CONDUITS MUST ENTER LABELED LOCATION ON LEFT SIDE OF PDC.
  - \*\* MODULATING WEIR GATE REQUIRES 1 MINUTE TO TRAVEL 305mm SEE MWG SECTION VIEW FOR FULLY OPEN POSITION (FOP), FULLY CLOSED POSITION (FCP), AND GATE POSITION(S) (GP).



QUOTE NO.	241223
PROJECT NO.	N/A
DATE :	23DEC11
CHECKED BY :	LG
APPROVED BY :	MB
LOG NUMBER :	N/A

**DESIGN CRITERIA**

PEAK FLOW	72800	m3/d
UV TRANSMITTANCE AT 253.7 nm	65 %	
SUSPENDED SOLIDS	25 mg/L	(30 DAY AVERAGE)
DISINFECTION STANDARD	100 E.COLI / 100ml	(30 DAY GEO. MEAN)

**DESIGN CRITERIA**

PRELIMINARY, NOT FOR CONSTRUCTION

VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK

**DESCRIPTION:**  
LAYOUT TROJANUV3000PLUS 22' WINDSOR REPLACEMENT, LITTLE RIVER PLANT 1/3A, ON

WINDSOR REPLACEMENT, LITTLE RIVER PLANT 1/3A, ON

**DESIGN CRITERIA**

PRELIMINARY, NOT FOR CONSTRUCTION

VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK

**DESIGN CRITERIA**

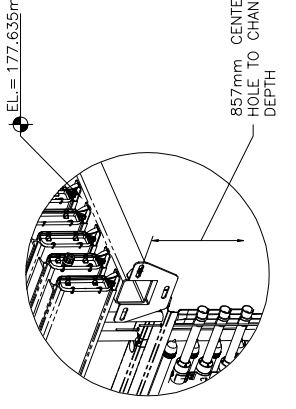
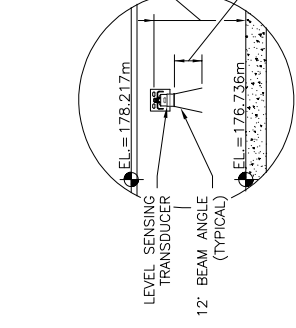
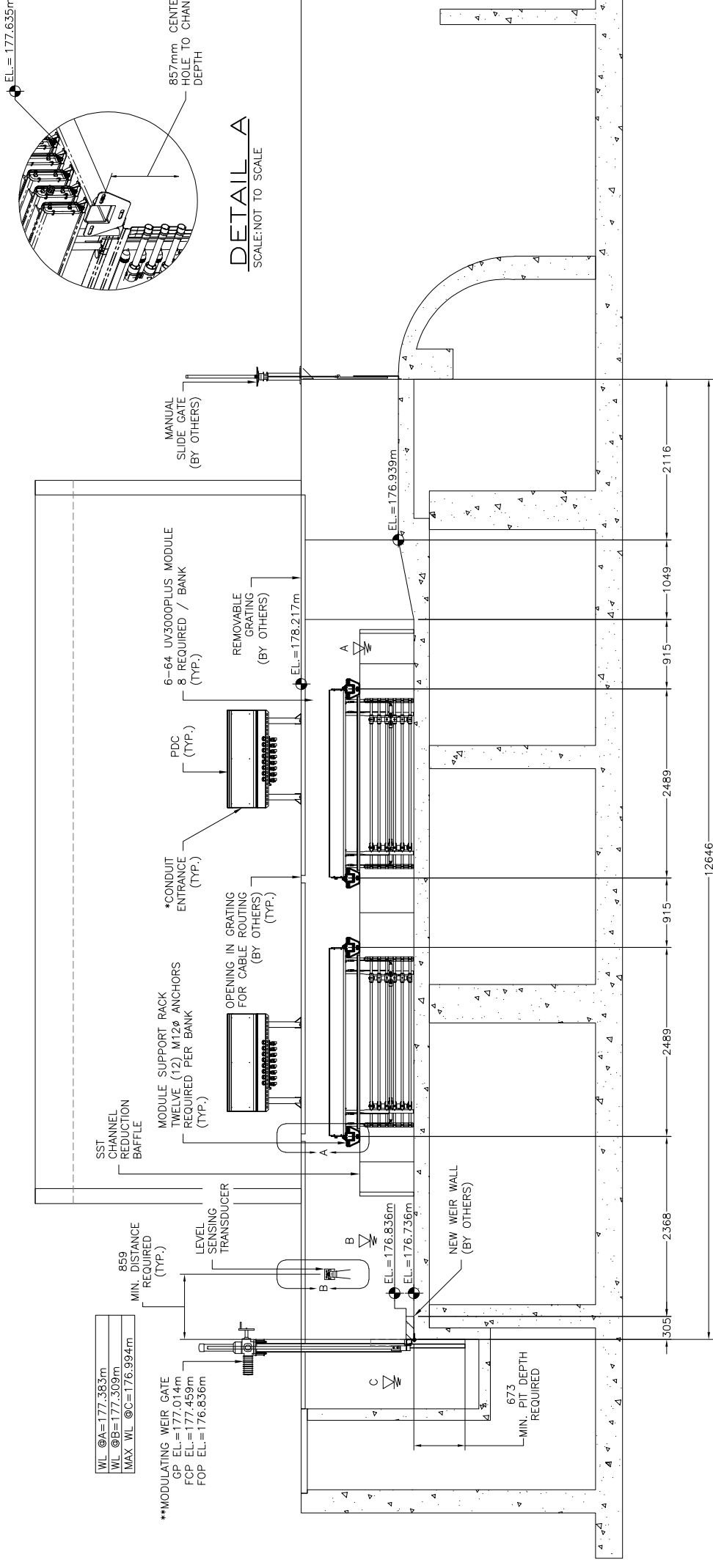
PRELIMINARY, NOT FOR CONSTRUCTION

VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK

**DESIGN CRITERIA**

PRELIMINARY, NOT FOR CONSTRUCTION

VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK

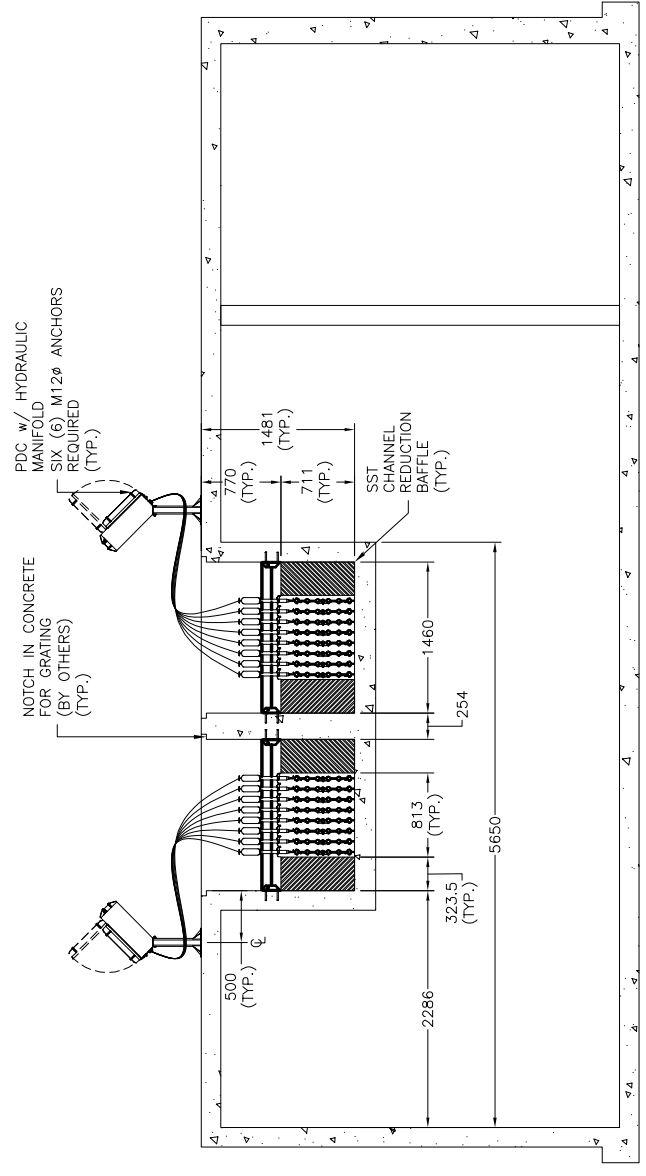


**DETAIL B**  
SCALE: NOT TO SCALE

**DETAIL A**  
SCALE: NOT TO SCALE

**A SECTION**  
S01 S02 SCALE: AS SHOWN

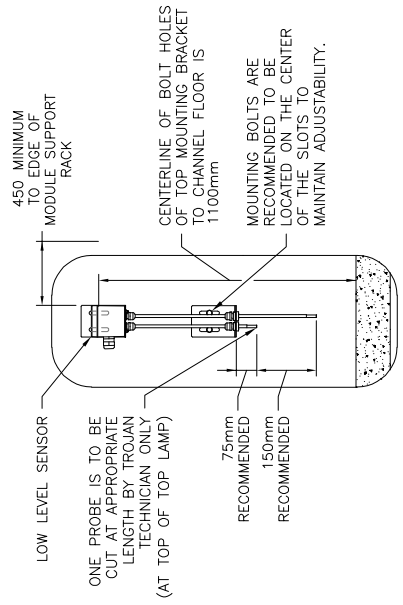
NOTE: LEVEL SENSOR CONTROL BOX (LCP), LEVEL SENSOR MONITOR, MODULE STORAGE RACK & ON-LINE UV CONTROLLER & SENSOR, TRANSFORMERS ON-LINE UV TRANSMITTANCE CONTROLLER & SENSOR NOT SHOWN FOR CLARITY



**B SECTION**  
S01 S02 SCALE: AS SHOWN

NOTE: HSC, LEVEL SENSOR CONTROL BOX (LCP), LEVEL SENSOR MONITOR, TRANSFORMERS, MODULE STORAGE RACK & REMOVABLE GRATING (BY OTHERS) NOT SHOWN FOR CLARITY

- NOTES:**
- DO NOT SLOPE CHANNEL FLOOR.
  - CHANNEL WIDTH & DEPTH MUST BE KEPT WITHIN A TOLERANCE OF + OR - 6mm AGAINST A COMMON DATUM ELEVATION.
  - ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES.
  - SYSTEM CONDUIT, WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS.
  - ELECTRICAL REQUIREMENTS SHOWN ARE TO SUPPLY TROJAN UV EQUIPMENT ONLY.
  - ELECTRICAL INRUSH FACTOR TO BE ADDED AS PER LOCAL CODE.
  - REMOVABLE GRATING SECTIONS SHALL BE EASILY REMOVED BY ONE PERSON, MAXIMUM WEIGHT OF THE SECTIONS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE APPLICABLE JURISDICTION.
  - CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
  - EFFLUENT LEVELS SHOWN REFLECT HYDRAULICS ASSOCIATED WITH TROJAN EQUIPMENT ONLY. EFFLUENT LEVELS MAY BE ALTERED DUE TO CHANNEL DEBRIS OR GEOMETRY.
  - ANY UPSTREAM AND DOWNSTREAM WL ELEVATIONS BEYOND THOSE SHOWN WITHIN THIS LAYOUT DRAWING ARE OUTSIDE OF THE SCOPE OF TROJAN TECHNOLOGIES AND ARE THE RESPONSIBILITY OF THE CONSULTING ENGINEER.
  - GRATING IMMEDIATELY ABOVE UV MODULES TO BE OPEN TYPE (EG. PERFORATED) TO ALLOW ADEQUATE COOLING OF THE UV MODULES.
  - CONDUIT RUN BETWEEN HSC AND PDC 1A & PDC 1B IS 6.0m MAXIMUM. CONDUIT RUN BETWEEN HSC AND PDC 2A & PDC 2B IS 13.6m MAXIMUM.
  - HSC HYDRAULIC ENTRANCE(S) NOT BE MORE THAN 300mm BELOW PDC MOUNTING ELEVATION TO PREVENT HSC PUMP FLOODING.
  - TOLERANCE AT ALC IS CHANNEL WIDTH +25mm.
  - SITE TO PROVIDE APPROVED (ENGINEERED) ANCHOR POINTS FOR PERSONNEL TO USE AS PART OF THEIR FALL RESTRAINT SYSTEM AROUND OPEN CHANNELS. THE ANCHOR POINTS MUST BE POSITIONED SO THAT THE PREFERRED RETRACTABLE LIFELINE OF 2.4m IS OF SUFFICIENT LENGTH TO ACCESS THE WORK AT THE CHANNEL.
  - POWER AND LOW VOLTAGE CONDUITS MUST ENTER LABELED LOCATION ON LEFT SIDE OF PDC.
  - MODULATING WEIR GATE REQUIRES 1 MINUTE TO TRAVEL 305mm SEE MWG SECTION VIEW FOR FULLY OPEN POSITION (FOP), FULLY CLOSED POSITION (FCP), AND GATE POSITION(S) (GP).



**DETAIL C**  
SCALE: NOT TO SCALE

**FRONT VIEW OF LLS**  
SCALE: AS SHOWN

DESCRIPTION:	LAYOUT TROJANUV3000PLUS 22' WINDSOR REPLACEMENT, LITTLE RIVER PLANT 1/3A, ON
QUOTE NO.	241223
PROJECT NO.	N/A
DRAWN BY:	RP
CHECKED BY:	LG
DATE:	23DEC14
APPROVED BY:	MB
DATE:	23DEC19
LOG NUMBER:	N/A
DWG NO.	S02
REV.	A

**TROJANUV**  
CONFIDENTIALITY NOTICE  
Copyright © 2023 by Trojan Technologies. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form, without the written permission of Trojan Technologies.

**PRELIMINARY, NOT FOR CONSTRUCTION**  
VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK

**SCOPE OF SUPPLY FOR WINDSOR REPLACEMENT (LITTLE RIVER 3A Plant 1), ON WASTEWATER TREATMENT PLANT**

**ULTRAVIOLET DISINFECTION EQUIPMENT – TROJAN SYSTEM UV3000Plus™**

**Prepared for:** All bidding General Contractors

**Project Name:** Windsor Replacement (Little River 3A – Plant 1), ON

**Consulting Engineer:** Stantec

Specification Section: 11380

Addendum No.:

- Addendum 1, Dec 5, 2023
- Addendum 2, Dec 8, 2023
- Addendum 3, Dec 14, 2023
- Addendum 4, Dec 18, 2023

**Submitted by:** Rob Jansen, Regional Manager

**Trojan Quote:** 241223

**Design Criteria:**

Current Peak Design Flow:	72 800 m3/d
UV Transmission:	65 % minimum
Total Suspended Solids:	25 <b>mg/l</b> (30 Day Average, grab sample)
Discharge Limit:	100 E.coli (30 day geometric mean)

We are pleased to submit the following scope of equipment based on the above criteria.

**The purchaser is responsible for reading all information contained in this Supply Contract. Trojan will not be held accountable for the supply of equipment not specifically detailed in this document. Supplemental Terms and Conditions are attached to this document. Detailed installation instructions are provided with the shop drawings and are available earlier upon request. Changes to this Scope of Supply that affect selling price will be handled through a change order.**

**Please refer all inquiries to Trojan Manufacturer's Representative:**

Andrew J. Pelley, M.Eng., P.Eng.  
Area Manager  
H2Flow Equipment Inc.  
Phone: (905) 660-9775 x39  
Email: [Andrew@h2flow.com](mailto:Andrew@h2flow.com)

This proposal has been respectfully submitted by,  
**Trojan Technologies**

Rob Jansen  
Regional Manager  
Trojan Technologies

**UV Disinfection System Scope of Supply**

---

Unless otherwise indicated in this proposal all anchor bolts, conduit, conductors, local disconnects and transformers (if required) are the responsibility of the CONTRACTOR and are not included in this Scope of Supply.

**ULTRAVIOLET MODULES**

***Trojan's Responsibility:***

Each module supplied shall be completely assembled containing lamps, quartz sleeves and be electrically wired to each electronic ballast. Modules are shipped in a support rack and crated.

<b>Model and Make:</b>	Standard System TrojanUV3000Plus™
<b>Quantity:</b>	Thirty Two (32) UV modules will be supplied, 6 Lamp - 4.0" Spacing
<b>Material of Construction:</b>	316 stainless steel frame
<b>Approximate Weight:</b>	45 kg per 6 Lamp module

**SYSTEM CONTROL CENTER**

***Trojan's Responsibility:***

One (1) System Control Center (SCC) shall be supplied to monitor and control the UV System. Trojan will provide a PLC I/O and soft address map to aid the Contractor with integration of the UV PLC and WWTP SCADA system. The UV SCC shall consist of the following:

<b>Quantity Supplied</b>	One (1) SCC will be supplied
<b>Location:</b>	Wall mounted
<b>Controller Type:</b>	PLC (2022) Allen-Bradley
<b>Operator Interface:</b>	AB PanelView Plus 15" HMI
<b>Panel UPS:</b>	40 Min on 24VDC
<b>Material of Construction:</b>	304 Stainless Steel
<b>Enclosure Rating:</b>	UL Type 4X
<b>Approximate Weight:</b>	200 pounds

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for mounting the SCC as indicated on the drawings. The Installation Contractor to be responsible for the supply, installation and connection of the following at the SCC:

1. One (1) 600V 60Hz power supply
2. One (1) 4 – 20 mA DC analog signal from plant flow meter
3. One (1) Ground Link , 14 gauge (2.5mm<sup>2</sup>) minimum type TWH stranded, daisy chained to the HSC and PDCs.
4. One (1) serial communication link consisting of one (1) shielded twisted pair, 18 gauge (1mm<sup>2</sup>) maximum from the HSC and other PDCs (daisy chained).
5. One (1) 4 – 20 mA DC analog signal from the On-Line UVT Monitor
6. Ethernet Cat5e link to SCADA – Ethernet I/P

**POWER DISTRIBUTION CENTERS**

***Trojan's Responsibility:***

The Power Distribution Center (PDC) distributes power to the UV Modules and shall consist of the following:

<b>Quantity Supplied:</b>	Four (4) PDCs will be supplied
<b>Material of Construction:</b>	304 Stainless Steel
<b>Enclosure Rating:</b>	UL Type 4X
<b>Approximate Weight:</b>	100 Kg

***Installation Contractor's Responsibility:***

**UV Disinfection System Scope of Supply**

---

The Installation Contractor to be responsible for setting in place and bolting the Power Distribution Centers to the top of channel. The Installation Contractor to be responsible for the supply, installation and connection of the following at the Power Distribution Center(s):

1. One (1) 600V 60Hz, 3 Phase, 4 Wire + Ground, 12.30 kVA power feed. (Step down transformer is included in this scope)
2. One (1) Ground Link, 14 gauge (2.5mm<sup>2</sup>) minimum, TWH stranded single wire from the HSC.
3. One (1) communication link consisting of one (1) shielded twisted pair from the SCC and daisy chained to other PDC's.
4. One (1) pair 24Volt DC, 18 gauge minimum power feed to the Level Control Panel from 2 PDCs in the channel, or a single PDC if only 1 per channel
5. One (1) pair of 24Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the water Level Control Panel to each PDC(s).
6. Connection of communication, power cables and hydraulic lines from the UV Modules

**HYDRAULIC SYSTEM CENTER**

***Trojan's Responsibility:***

The Hydraulic System Center (HSC) houses the ancillary equipment required to operate the quartz sleeve cleaning system.

<b>Quantity Supplied:</b>	One (1) HSC will be supplied
<b>Materials of Construction:</b>	304 Stainless Steel
<b>Enclosure Rating:</b>	UL Type 4X
<b>Approximate Weight:</b>	136 Kg

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place and bolting the HSC and manifold as shown on the contract drawings. The HSC should be located within 50 feet (15 meters) from the farthest PDC. The Installation Contractor shall be responsible for the supply, connection and installation of the following at the HSC:

1. One (1) 480V 60Hz, 3 Phase, 3 Wire + Ground, 5 Amp power feed with local disconnect
2. One (1) ground link of, 14 gauge (2.5mm<sup>2</sup>) minimum, TWH stranded from the PDC(s).
3. Connection of the hydraulic hoses from PDC(s). Hoses and connections will be supplied by Trojan.
4. One (1) serial communication link of one (1) twisted, shielded pairs, 18 gauge (1mm<sup>2</sup>) maximum cable from the SCC and daisy chained to the PDC's.

**SUPPORT RACKS**

***Trojan's Responsibility:***

Support racks are provided to support UV modules in the effluent channel.

<b>Quantity Supplied:</b>	Four (4) racks will be supplied
<b>Material of Construction:</b>	304 Stainless Steel
<b>Approximate Weight:</b>	< 45 Kg each

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place and bolting the support racks to the channel walls. The Contractor will be required to supply eight (8) 1/2" Diameter x 5 1/2" Long expansion anchor bolts per rack.

Install approved (engineered) anchor points for personnel to use as part of their fall restraint system around the open channels. The anchor points must be positioned so that the preferred retractable lifeline of 8 feet is of sufficient length to access the work at the channel. Refer to local safety regulation.

**UV Disinfection System Scope of Supply**

---

**MODULATING WEIR GATE LEVEL CONTROLLER**

*Modulating Weir Gates (MWGs) shall be self-contained and shall be designed and manufactured by an experienced and reputable manufacturer, based on the AWWA C561 Standard for Fabricated Stainless Steel Slide Gates and AWWA C542 Standard for Electric Motor Actuators for Valves and Slide Gates in effect as of the date of this specification.*

*MWGs shall be designed for the following performance criteria:*

- *MWG actuation speeds shall be between 10" (255 mm) and 14" (356 mm) per minute*
- *MWG maximum design rate of change of flow shall be limited to 25% of the Peak Design Flow/Channel per minute, or alternatively, flow shall be ramped up (zero to peak) or down (peak to zero) in no less than 4 minutes*
- *MWG actuators shall employ AWWA compliant, S4-50% duty class motors with a rated minimum 900 starts per hour capability*
- *MWG actuators shall employ AWWA compliant, Class B, solid-state Thyristor based switchgear capable of at least 5,000,000 modulating steps before overhaul; electromechanical type actuators and controls are not permitted*

***It is the responsibility of the Plant designers to ensure the stated performance criteria are acceptable for the plant process or to modify the design accordingly.***

***Trojan's Responsibility***

Level control devices are required to maintain and control the effluent level in the channel, regardless of flow rate.

<b>Quantity Supplied:</b>	Two (2) level controllers to be supplied
<b>Description:</b>	Level Control Weir Gate
<b>Material of Construction:</b>	316 stainless steel frame and yoke
<b>Approximate Weight:</b>	500 Kg each

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place, grouting and sealing the level control weir gate and the installation of the following connections:

1. One (1) 480 Volt, 3 phase, 3 wire, 5 AMP (plus ground) feed to each of two (2) gates.
2. Open command discrete output, two (2) conductors, 20 gauge (0.5mm<sup>2</sup>) minimum, from SCC to each weir gate.
3. Close command discrete output, two (2) conductors, 20 gauge (0.5mm<sup>2</sup>) minimum, from SCC to each weir gate.
4. Remote mode discrete input, two (2) conductors, 20 gauge (0.5mm<sup>2</sup>) minimum, to SCC from each weir gate.
5. Gate position analog input, one (1) twisted shielded pair, 24 gauge (0.25mm<sup>2</sup>) minimum, to SCC from each weir gate.

**ULTRASONIC or RADAR CHANNEL LEVEL SENSOR**

***Trojan's Responsibility:***

An ultrasonic level sensor will be supplied to monitor the effluent levels within each UV Channel specifically for weir gate control. The transducer will be supplied with a sufficient length of cable to distribute to the monitor panel along with a mounting bracket.

***Installation Contractor's Responsibility:***

The Contractor shall be responsible for mounting the transducer and bracket in the UV Channel, the monitor panel adjacent to the channel, and distributing the following cable/wiring between these two components and to SCC in appropriate conduit:

1. One (1) 120 Volt, 1 phase, 2 wire, 15 VA (plus ground) from a Distribution Panel (by others) to the Level Sensor Monitor.

**UV Disinfection System Scope of Supply**

---

2. One (1) 4-20mA analog signal from the Level Sensor Monitor to the System Control Center (SCC).
3. One (1) communication link using 30 feet of cable (supplied by Trojan) from the Level Sensing Transducer to the Level Sensor Monitor.

**ON-LINE UV TRANSMISSION MONITOR**

***Trojan's Responsibility:***

**Description:** One (1) Hach UVT meter containing: One (1) submersible probe with multi-beam flash photometer, one (1) 25' cable between the probe and the controller, One (1) Hach SC200 UV-254 Analyzer Controller.

**Enclosure Rating:** UL Type 4X  
**Controller Dimensions:** 12 x 12 x 4 inches  
**Operating Temperature:** 32 to 140°F (Probe), 14 to 122°F (Controller)  
**Approximate Weight:** 14 Kg (includes Probe and Controller)  
**Probe Immersion Depth:** up to 6 feet

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place and bolting the controller panel and the probe. The Installation Contractor shall also be responsible for the supply, installation and connection of the following:

1. One (1) 120 Volt, 1 phase, 2 wire (plus ground), 14 VA power supply
2. One (1) 4-20mA DC Analog communications link between the Controller and the SCC
3. Installation of sensor communication cable between Probe and Controller (Cable supplied by Trojan)
4. Supply of the required bolts for mounting Controller and Probe to the channel edge

**WATER LEVEL SENSOR KIT**

***Trojan's Responsibility:***

The water level sensor is located downstream of the UV System and provides a digital signal to shut down & protect the UV System if the water level is too low. The Water Level Sensor Kit includes the water level sensor probes as well as a Level Control Panel (LCP). Optionally there are high water level probes that provide a digital signal to the System Control Center.

**Quantity Supplied:** Two (2) low water level sensor and water Level Control Panel (LCP) to be supplied  
**Enclosure Rating:** UL Type 4X  
**Approximate LCP Weight:** 11 Kg  
**Approximate Probe Weight:** 5 Kg

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place and bolting the water level probes assembly to the effluent channel wall and mounting the Level Control Panel as indicated on the drawings. The Installation Contractor shall also be responsible for the supply of mounting hardware, watertight conduit and supply and connection of one discrete signal (pair of 12V DC, 14 gauge (2.5mm<sup>2</sup>)) from the water level sensor probe to each LCP.

1. One (1) pair of 24Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the water Level Control Panel to each PDC(s).
2. One (1) pair of 24Volt DC and 18 gauge (1mm<sup>2</sup>) minimum to the water Level Control Panel from 2 PDCs in the channel, or a single PDC if only 1 per channel.
3. One (1) pair of 12Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the low water level probes from the Level Control Panel
4. One (1) pair of 24Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the water Level Control Panel to the SCC for high water level [if required].
5. One (1) pair of 12Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the high water level probes from the Level Control Panel [if required]

**UV Disinfection System Scope of Supply**

---

**UV PHOTOMETER**

**Trojan's Responsibility:**

A single beam UV Photometer shall be provided to measure the UV transmission of the effluent. The range of the UV Photometer shall be 5 - 100% transmittance with a wavelength accuracy of +/- 0.16 half bandwidth. The UV Photometer will come equipped with two matched quartz cuvettes, 100% T standard solution and cuvette cleaning solution.

**UV MODULE STORAGE RACK**

***Trojan's Responsibility:***

Four (4) portable racks, constructed of 304 SST, will be supplied to store UV modules when not in use. The Rack shall be constructed to hold 8 UV Modules.

**UV CHANNEL REDUCTION BAFFLES**

***Trojan's Responsibility:***

Trojan will supply (2) baffles constructed of 316 stainless steel to reduce the channel in the area of the UV Banks by 468mm.

***Installation Contractor's Responsibility:***

Contractor shall install and seal watertight the baffles by anchoring the perimeter of the baffle to the channel floor and walls with approximately 40 anchors.

**PDC ISOLATION TRANSFORMERS**

***Trojan's Responsibility:***

A standalone isolation transformer, per channel, will be supplied to step down the existing 600 Volt, 3 phase power supply to 480Y/277 volt 3 phase, 4 wire + GROUND.

<b>Quantity:</b>	Four (4) transformers
<b>Rating:</b>	30 kVA
<b>Enclosure Rating:</b>	Nema 3R, Painted Mild Steel
<b>Approximate Weight:</b>	300 kgs

***Installation Contractor's Responsibility:***

Contractor is responsible for installing and wiring the primary and secondary taps, all conductors, conduit and local disconnects as per local electrical codes.

**CONTROL ISOLATION TRANSFORMER**

**Trojan's Responsibility:**

A standalone isolation transformer will be supplied to step down the existing 600 Volt, 3 phase power supply to 120/208V volt 1 phase.

<b>Quantity:</b>	One (1) transformer
<b>Enclosure Rating:</b>	Nema 3R, Painted Mild Steel
<b>Approximate Weight:</b>	100 kgs

***Installation Contractor's Responsibility:***

Contractor is responsible for installing and wiring the primary and secondary taps, all conductors, conduit and local disconnects as per local electrical codes.



**UV Disinfection System Scope of Supply**

---

**SPARE PARTS AND SAFETY EQUIPMENT**

***Trojan's Responsibility:***

The following spare parts and safety equipment will be supplied with the UV system:

- 48 UV lamp/sleeve assembly
- 10 Ballasts
- 1 Operators Kit (including face shield, gloves and cleaning solution)
- 2 Additional Face Shield
- 2 Intensity sensors
- 50 Wiper Seal Kit
- 1 Acticlean Gel ( 4 x 4L case)
- 100 Lamp holder seal
- 1 CCB board kit
- 1 Acticlean fill pump
- 4 6 lamp module
- 4 Spare lamp cable.

**NOTES AND CLARIFICATIONS TO SPECIFICATION**

- 1) Addendum 1, P-101 & P-201 – CLARIFICATION – drawings show isolation gates. Please confirm that these gates are provided by other. Isolation gates are not included in the Scope of Supply.
- 2) Addendum 1, P-201 – CLARIFICATION – Drawing show Downstream water level higher than upstream. Please confirm levels

**DOCUMENTATION (SHOP DRAWINGS AND O & M MANUALS)**

***Trojan's Responsibility:***

The following documentation will be supplied to the contractor by Trojan per the following schedule:

- 1 electronic copy of submittal shop drawings 6-8 weeks after receipt of written purchase order.
- 1 electronic copy of Trojan Standard O&M manuals at time of equipment delivery.

**DELIVERY, START-UP AND TRAINING**

Equipment shipped **18-20** weeks after approval of Shop Drawings.

***Installation Contractor's Responsibility:***

The Contractor is responsible for:

- Un loading of the components supplied by Trojan, storage of all components, if required in a clean dry environment
- Installing the equipment outlined in the scope of Supply in accordance with contract drawings, Trojan's shop drawings, instructions and installation checklist.
- Supplying all conduits and conductors and components per the sites state regulations and components indicated as supplied by others,
- Completing the Checklist and returned at least two (2) weeks prior to date requested for commissioning.

The following start-up services will be provided by Trojan-certified technicians:

- Installation assistance as required by phone or fax. Technical Assistance Center 1-866-388-0488 or [tac@trojanuv.com](mailto:tac@trojanuv.com)
- Start-up and testing of the installed UV equipment.
  - If the Trojan's Certified Service Technician determines the Contractor work is not complete and the start-up cannot be completed in the allotted time a return visit will be scheduled at the Contractors expense.
- Classroom and/or jobsite training for operations staff
  - If trainees are not available a return visit will be scheduled at the Contractors expense.
- Performance testing.

**UV Disinfection System Scope of Supply**

---

**WARRANTY**

***Trojan's Responsibility:***

Trojan Technologies will warrant the equipment and parts for 24 months after start-up or 30 months after shipment, whichever comes first. Refer to attached Terms and Conditions for additional details.

**MICROBIOLOGICAL PERFORMANCE TESTING**

***Trojan's Responsibility:***

Trojan will supply a performance testing protocol to the Contractor to be forwarded to the Engineer for approval. Trojan will produce the final test report (based on data supplied by the independent lab) and will forward the final report to the Contractor.

***Installation Contractor's Responsibility:***

The Installation Contractor to cover all associated on site costs for performance testing (independent lab services, bottles, shipment, etc.). The Contractor to be responsible for completing the performance testing as per the testing protocol supplied by Trojan and approved by the Engineer.

**PAYMENT TERMS**

20% after approved submittal

75% upon delivery of equipment to site

5% upon equipment acceptance or 60 days after delivery (whichever occurs first)

Net 30 Days

If UV System Start-up is required within 30 days of shipment, Trojan requires 95% payment unless agreed upon in writing before authorizing system Start-up.

Freight included for all North American projects. Incoterms 2002

Selling price does not include any applicable duties or taxes.

**TERMS AND CONDITIONS - ATTACHED**

Trojan appreciates the opportunity to submit this proposal. Our proposal is submitted subject to and based on Trojan's standard terms and conditions, which we have attached as part of our proposal. We believe these terms and conditions are customary in the trade and respectfully reserve the opportunity to negotiate, fair and reasonable contract terms acceptable to both parties, if Trojan is selected for this project.



## Terms and Conditions of Sale

This document sets forth the Terms & Conditions of Sale for goods manufactured and/or supplied, and services provided, by the seller entity identified on the purchase order ("SELLER") and sold to the original purchaser thereof ("BUYER"). The term "SELLER" includes only SELLER, and none of its affiliates. Unless otherwise specifically stated in a previously-executed written purchase agreement signed by authorized representatives of SELLER and BUYER, these Terms & Conditions of Sale establish the rights, obligations and remedies of SELLER and BUYER which apply to this offer and any resulting order or contract for the sale of SELLER's goods and/or services ("Products").

**1. APPLICABLE TERMS & CONDITIONS:** These Terms & Conditions of Sale are contained directly and/or by reference in SELLER's proposal, offer, order acknowledgment, packing slip, and/or invoice documents. The first of the following acts constitutes an acceptance of SELLER's offer and not a counteroffer and creates a contract of sale ("Contract") in accordance with these Terms & Conditions of Sale: (i) BUYER's issuance of a purchase order document against SELLER's offer; (ii) acknowledgement of BUYER's order by SELLER; or (iii) commencement of any performance by SELLER pursuant to BUYER's order. Provisions contained in BUYER's purchase documents (including electronic commerce interfaces) that materially alter, add to, or subtract from the provisions of these Terms & Conditions of Sale are not a part of the Contract.

**2. CANCELLATION AND RETURN:** The whole or any part of this order may be cancelled only with the prior written consent of SELLER. If SELLER does consent to a cancellation, such consent will be given only upon payment of reasonable cancellation charges in an amount determined by SELLER. In addition, with respect to any Products returned on cancellation, BUYER will pay SELLER's cost of placing the returned Products in a saleable condition, sales expenses incurred by SELLER in connection with such returned Products, a reasonable restocking charge and freight costs incurred in connection with the original shipment and in connection with returning such Products to SELLER, all in such amounts as are advised to the BUYER by SELLER.

**3. DELIVERY:** Delivery will be accomplished EXW or CIP at the point of shipment (Incoterms 2020), unless otherwise expressly agreed between the parties. Legal title and risk of loss or damage pass to BUYER upon transfer to the first carrier, regardless of final destination and mode of transit. SELLER will use commercially reasonable efforts to deliver the Products ordered herein within SELLER's normal lead-time necessary for SELLER to deliver the Products sold hereunder. Products will be boxed or crated as determined appropriate by SELLER for protection against normal handling and there will be an extra charge to the BUYER for additional packaging required by the BUYER with respect to waterproofing or other added protection. BUYER has sole responsibility for off-loading, storage and handling of the Products at the site. Where Buyer is responsible for any delay in the delivery date or installation date, the earlier of the date of delivery or the date on which the Products are ready for shipment by SELLER may be treated as the delivery date for purposes of determining the time of payment of the purchase price. Moreover, BUYER will be responsible for reasonable storage and insurance expenses with respect to such Products. Should BUYER fail to effect pick-up of Product as previously agreed in a timely manner, SELLER may, at its discretion, assess reasonable storage charges to the account of BUYER.

**4. INSPECTION:** BUYER will promptly inspect and accept any Products delivered pursuant to this Contract after receipt of such Products. In the event the Products do not conform to any applicable specifications, BUYER will promptly notify SELLER of such nonconformance in writing. SELLER will have a reasonable opportunity to repair or replace the nonconforming Product at its option. BUYER will be deemed to have accepted any Products delivered hereunder and to have waived any such nonconformance for such Products unless a written notification pursuant to this paragraph is received by SELLER within thirty (30) days of delivery to BUYER destination on order.

**5. PRICES & ORDER SIZES:** Prices do not include any charges for services such as insurance; brokerage fees; sales, use, inventory, or excise taxes; import or export duties; special financing fees; value added tax, income, or royalty taxes imposed outside the U.S. or Canada; consular fees; special permits or licenses; or other charges imposed upon the production, sale, distribution, or delivery of Products. BUYER will either pay any and all such charges or provide SELLER with acceptable exemption certificates, which obligation survives performance under this Contract. Installation, maintenance and any other services which relate to the Products are not included unless specifically set forth in the quotation. SELLER reserves the right to establish minimum order sizes and will advise BUYER accordingly. Any orders below the minimum order size are subject to a fee as set out by SELLER. If SELLER's delivery of Products surpasses one (1) year in length, then at least on an annual basis, or if changes to the Products are requested or needed, the parties shall conduct good faith discussions regarding changes to the prices for the Products, to reflect SELLER's increased costs for which SELLER shall be entitled to additional fair and appropriate compensation.

**6. PAYMENTS:** All payments must be made in agreed-to currency, normally Canadian or U.S. Dollars. Unless other payment terms are expressly set forth in the purchase order or otherwise required by the Seller, invoices are due and payable NET 30 DAYS from date of the invoice, without regard to delays for inspection or transportation, with payments to be made by check to SELLER at the address listed in the purchase order or by bank transfer to the account obtainable from SELLER's Accounts Receivable Manager. In the event payments are not made or not made in a timely manner, SELLER may, in addition to all other remedies provided at law, either: (a) declare BUYER's performance in breach and terminate this Contract for default; (b) withhold future shipments until delinquent payments are made; (c) deliver future shipments on a cash-with-order or cash-in-advance basis even after the delinquency is cured; (d) charge interest on the outstanding balance at a rate of 1.5% per month or the maximum rate permitted by law, if lower, for each month or part thereof that there is an outstanding balance plus applicable storage charges and/or inventory carrying charges; (e) repossess the Products for which payment has not been made; (f) pursue other collection efforts and recover all associated costs including reasonable attorney's fees; or (g) combine any of the above rights and remedies as is practicable and permitted by law. BUYER is prohibited from setting off any and all monies owed under this Contract from any other sums, whether liquidated or not, that are or may be due to the BUYER, which arise out of a different transaction with SELLER or any of its affiliates. Should BUYER's financial condition become unsatisfactory to SELLER in its discretion, SELLER may require payment in advance or other security. If BUYER fails to meet these requirements, SELLER may treat such failure as reasonable grounds for repudiation of this Contract, in which case reasonable cancellation charges shall be due to SELLER. BUYER hereby grants SELLER a security interest in the Products, wherever located, and whether now existing or hereafter arising or acquired from time to time, and in all accessions thereto and replacements or modifications thereof, as well as all proceeds of the foregoing, to secure payment in full of all amounts to Seller, which payment releases the security interest but only if such payment could not be considered an avoidable transfer under applicable laws. The security interest granted hereby constitutes a purchase money security interest under the applicable Uniform Commercial Code or Personal Property Security Act or other applicable law, and SELLER is authorized to make whatever registration or notification or take such other action as SELLER deems necessary or desirable to perfect such security interest. BUYER's insolvency, bankruptcy, assignment for the benefit of creditors, or dissolution or termination of the existence of BUYER, constitutes a default under this Contract and affords SELLER all of the remedies of a secured creditor under applicable law, as well as the remedies stated above for late payment or non-payment.

**7. LIMITED WARRANTY:** Unless specifically provided otherwise in SELLER's quotation, SELLER provides the following Limited Warranty. SELLER warrants that Products sold hereunder will be free from defects in material and workmanship and will, when used in accordance with the manufacturer's operating and maintenance instructions, conform to any express written warranty pertaining to the specific goods purchased, which for Products is for a period of twelve (12) months from delivery. SELLER warrants that services furnished hereunder will be free from defects in workmanship for a period of ninety (90) days from the completion of the services. Products repaired or replaced are not covered by any warranty except to the extent repaired or replaced by SELLER, an authorized representative of SELLER, or under specific instructions by SELLER, in which cases, the Products will be covered under warranty up to the end of the warranty period applicable to the original Products. The above warranties do not include the cost of shipping and handling of returned items. Parts provided by SELLER in the performance of services may be new or refurbished parts functioning equivalent to new parts. Any non-functioning parts that are repaired by SELLER shall become the property of SELLER. No warranties are extended to consumable items such as, without limitation, light bulbs, and for normal wear and tear. All other guarantees, warranties, conditions and representations, either express or implied, whether arising under any statute, law, commercial usage or otherwise, including implied warranties of merchantability and fitness for a particular purpose, are hereby excluded. The sole remedy for Products not meeting this Limited Warranty is replacement, credit or refund of the purchase price, as determined by SELLER in its sole discretion. This remedy will not be deemed to have failed of its essential purpose so long as SELLER is willing to provide such replacement, credit or refund. To make a warranty claim, BUYER must notify SELLER in writing within 5 days of discovery of the defect in question. This notification must include a description of the problem, a copy of the applicable operator's log, a copy of BUYER's maintenance record and any analytical results detailing the problem. Any warranty hereunder or performance guarantees shall only be enforceable if (a) all equipment is properly installed, inspected regularly, and is in good working order, (b) all operations are consistent with SELLER recommendations, (c) operating conditions at the installation site have not materially changed and remain within anticipated specifications, and (d) no reasonably unforeseeable circumstances exist or arise.

**8. INDEMNIFICATION:** Indemnification applies to a party and to such party's successors-in-interest, assignees, affiliates, directors, officers, and employees ("Indemnified Parties"). SELLER is responsible for and will defend, indemnify and hold harmless the BUYER Indemnified Parties against all losses, claims, expenses or damages which may result from accident, injury, damage, or death due to SELLER's breach of the Limited Warranty. BUYER is responsible for and will defend, indemnify and hold harmless SELLER Indemnified Parties against all losses, claims, expenses, or damages which may result from accident, injury, damage, or death due to the negligence or misuse or misapplication of any Products or the breach of any provision of this Contract by the BUYER or any third party affiliated or in privity with BUYER.

**9. PATENT PROTECTION:** Subject to all limitations of liability provided herein, SELLER will, with respect to any Products of SELLER's design or manufacture, indemnify BUYER from any and all damages and costs as finally determined by a court of competent jurisdiction in any suit for infringement of any U.S. or Canadian patent (or European patent for Products that SELLER sells to BUYER for end use in a member state of the E.U. or the U.K.) that has issued as of the delivery date, solely by reason of the sale or normal use of any Products sold to BUYER hereunder and from reasonable expenses incurred by BUYER in defense of such suit if SELLER does not undertake the defense thereof, provided that BUYER promptly notifies SELLER of such suit and offers SELLER either (i) full and exclusive control of the defense of such suit when Products of SELLER only are involved, or (ii) the right to participate in the defense of such suit when products other than those of SELLER are also involved. SELLER's warranty as to use patents only applies to infringement arising solely out of the inherent operation of the Products according to their applications as envisioned by SELLER's specifications. In case the Products are in such suit held to constitute infringement and the use of the Products is enjoined, SELLER will, at its own expense and at its option, either procure for BUYER the right to continue using such Products or replace them with non-infringing products, or modify them so they become non-infringing, or remove the Products and refund the purchase price (prorated for depreciation) and the transportation costs thereof. The foregoing states the entire liability of SELLER for patent

infringement by the Products. Further, to the same extent as set forth in SELLER's above obligation to BUYER, BUYER agrees to defend, indemnify and hold harmless SELLER for patent infringement related to (x) any goods manufactured to the BUYER's design, (y) services provided in accordance with the BUYER's instructions, or (z) SELLER's Products when used in combination with any other devices, parts or software not provided by SELLER hereunder.

**10. TRADEMARKS AND OTHER LABELS:** BUYER agrees not to remove or alter any indicia of manufacturing origin or patent numbers contained on or within the Products, including without limitation the serial numbers or trademarks on nameplates or cast, molded or machined components.

**11. SOFTWARE AND INTELLECTUAL PROPERTY:** All licenses to SELLER's separately provided software products are subject to the separate software license agreement(s) accompanying the software media. In the absence of such express licenses and for all other software, SELLER grants BUYER only a personal, non-exclusive license to access and use the software provided by SELLER with Products purchased hereunder solely as necessary for BUYER to enjoy the benefit of the Products. A portion of the software may contain or consist of open source software, which BUYER may use under the terms and conditions of the specific license under which the open source software is distributed. BUYER agrees that it will be bound by all such license agreements. Title to software remains with the applicable licensor(s). All SELLER contributions to the Products, the results of the services, and any other work designed or provided by SELLER hereunder may contain or result in statutory and non-statutory Intellectual Property, including but not limited to patentable subject matter or trade secrets; and all such Intellectual Property remains the sole property of SELLER; and BUYER shall not disclose (except to the extent inherently necessary during any resale of Product sold hereunder), disassemble, decompile, or any results of the Services, or any Products, or otherwise attempt to learn the underlying processes, source code, structure, algorithms, or ideas.

**12. PROPRIETARY INFORMATION AND PRIVACY:** "Proprietary Information" means any information, technical data, or know-how in whatever form, whether documented, contained in machine readable or physical components, mask works or artwork, or otherwise, which SELLER considers proprietary, including but not limited to service and maintenance manuals. BUYER and its customers, employees, and agents will keep confidential all such Proprietary Information obtained directly or indirectly from SELLER and will not transfer or disclose it without SELLER's prior written consent, or use it for the manufacture, procurement, servicing, or calibration of Products or any similar products, or cause such products to be manufactured, serviced, or calibrated by or procured from any other source, or reproduce or otherwise appropriate it. All such Proprietary Information remains SELLER's property. No right or license is granted to BUYER or its customers, employees or agents, expressly or by implication, with respect to the Proprietary Information or any patent right or other proprietary right of SELLER, except for the limited use licenses implied by law. In respect of personal data supplied by BUYER to SELLER, BUYER warrants that is duly authorized to submit and disclose these data, including but not limited to obtaining data subjects' informed consent. SELLER will manage BUYER's information and personal data in accordance with its Privacy Policy, a copy of which is available to Buyer upon request. In respect of other data and information that SELLER may receive in connection with BUYER's use of the Products including without limitation data that are captured by the Products and transmitted to SELLER, BUYER hereby grants SELLER a non-exclusive, worldwide, royalty-free, perpetual, non-revocable license to use, compile, distribute, display, store, process, reproduce, or create derivative works of such data as needed for Product operation and maintenance, and to aggregate such data for use in an anonymous manner, solely to facilitate marketing, sales and R&D activities of SELLER and its affiliates.

**13. SPECIAL TOOLS, DIES, JIGS, FIXTURES AND PATTERNS:** Any tools, dies, jigs, fixtures, patterns and similar items which are included or required in connection with the manufacture and/or supply of the Products will remain the property of SELLER without credit to the BUYER. SELLER assumes the cost for maintenance and replacement of such items and shall have the right to discard and scrap any such item after it has been inactive for a minimum of one year, without credit to the BUYER.

**14. CHANGES AND ADDITIONAL CHARGES:** SELLER reserves the right to make design changes or improvements to any products of the same general class as Products being delivered hereunder without liability or obligation to incorporate such changes or improvements to Products ordered by BUYER unless agreed upon in writing before the Products' delivery date.

**15. SITE ACCESS / PREPARATION / WORKER SAFETY / ENVIRONMENTAL COMPLIANCE:** In connection with services provided by SELLER, BUYER agrees to permit prompt access to equipment. BUYER assumes full responsibility to back-up or otherwise protect its data against loss, damage or destruction before services are performed. BUYER is the operator and in full control of its premises, including those areas where SELLER employees or contractors are performing service, repair, and maintenance activities. BUYER will ensure that all necessary measures are taken for safety and security of working conditions, sites, and installations during the performance of any services. BUYER is the generator of any resulting wastes, including without limitation hazardous wastes. BUYER is solely responsible to arrange for the disposal of any wastes at its own expense. BUYER will, at its own expense, provide SELLER employees and contractors working on BUYER's premises with all information and training required under applicable safety compliance regulations and BUYER's policies. SELLER has no responsibility for the supervision or actions of BUYER's employees or contractors or for non-SELLER items (e.g., chemicals, equipment) and disclaims all liability and responsibility for any loss or damage that may be suffered as a result of such actions or items, or any other actions or items not under SELLER's control.

**16. LIMITATIONS ON USE:** BUYER will not use any Products for any purpose other than those identified in SELLER's catalogs and literature as intended uses. Unless SELLER has advised the BUYER in writing, in no event will BUYER use any Products in drugs, food additives, food, or cosmetics, or medical applications for humans or animals. In no event will BUYER use in any application any Product that requires FDA 510(k) clearance unless and only to the extent the Product has such clearance. BUYER will not sell, transfer, export, or re-export any SELLER Products or technology for use in activities which involve the design, development, production, use, or stockpiling of nuclear, chemical, or biological weapons or missiles, nor use SELLER Products or technology in any facility which engages in activities relating to such weapons. Unless the "ship-to" address is in California, U.S.A., the Products are not intended for sale in California and may lack markings required by California Proposition 65; accordingly, unless BUYER has ordered Products specifying a California ship-to address, BUYER will not sell or deliver any SELLER Products for use in California. Any warranty granted by SELLER is void if any goods covered by such warranty are used for any purpose not permitted hereunder.

**17. EXPORT AND IMPORT LICENSES AND COMPLIANCE WITH LAWS:** Unless otherwise expressly agreed, BUYER is responsible for obtaining any required export or import licenses necessary for Product delivery. BUYER will comply with all laws and regulations applicable to the installation or use of all Product, including applicable import and export control laws and regulations of the U.S., E.U., and any other country having proper jurisdiction, and will obtain all necessary export or import licenses in connection with any subsequent export, re-export, transfer, and use of all Product and technology delivered hereunder. BUYER will not sell, transfer, export, or re-export any SELLER Product or technology for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical, or biological weapons or missiles, nor use SELLER Product or technology in any facility which engages in activities relating to such weapons. BUYER will comply with all local, national, and other laws of all jurisdictions globally relating to anti-corruption, bribery, extortion, kickbacks, or similar matters which are applicable to BUYER's business activities in connection with this Contract, including but not limited to the U.S. Foreign Corrupt Practices Act of 1977, as amended (the "FCPA"). BUYER agrees that no payment of money or provision of anything of value will be offered, promised, paid, or transferred, directly or indirectly, by any person or entity, to any government official, government employee, or employee of any company owned in part by a government, political party, political party official, or candidate for any government office or political party office to induce such organizations or persons to use their authority or influence to obtain or retain an improper business advantage for BUYER or for SELLER, or which otherwise constitute or have the purpose or effect of public or commercial bribery, acceptance of or acquiescence in extortion, kickbacks, or other unlawful or improper means of

obtaining business or any improper advantage, with respect to any of BUYER's activities related to this Contract. SELLER asks BUYER to "Speak Up!" if aware of any violation of law, regulation, or our Code of Conduct ("CoC") in relation to this Contract. See [www.danaherintegrity.com](http://www.danaherintegrity.com) and [www.danaher.com/how-we-work/integrity-and-compliance](http://www.danaher.com/how-we-work/integrity-and-compliance) for a copy of the CoC and for access to our Helpline portal.

**18. RELATIONSHIP OF PARTIES:** BUYER is not an agent or representative of SELLER and will not present itself as such under any circumstances, unless and to the extent it has been formally screened by SELLER's compliance department and received a separate duly-authorized letter from SELLER setting forth the scope and limitations of such authorization.

**19. FORCE MAJEURE:** SELLER is excused from performance of its obligations under this Contract to the extent caused by acts or omissions that are beyond its control, including but not limited to Government embargoes, blockages, seizures or freezing of assets, delays, or refusals to grant an export or import license, or the suspension or revocation thereof, or any other acts of any Government; fires, floods, severe weather conditions, or any other acts of God; quarantines; epidemics and pandemics; labor strikes or lockouts; riots; strife; insurrections; civil disobedience or acts of criminals or terrorists; war; material shortages or delays in deliveries to SELLER by third parties. In the event of the existence of any force majeure circumstances, the period of time for delivery, payment terms, and payments under any letters of credit will be extended for a period of time equal to the period of delay. If the force majeure circumstances extend for six months, SELLER may, at its option, terminate this Contract without penalty and without being deemed in default or in breach thereof.

**20. NON-ASSIGNMENT AND WAIVER:** BUYER will not transfer or assign this Contract or any rights or interests hereunder without SELLER's prior written consent. Failure of either party to insist upon strict performance of any provision of this Contract, or to exercise any right or privilege contained herein, or the waiver of any breach of the terms or conditions of this Contract, will not be construed as thereafter waiving any such terms, conditions, rights, or privileges, and the same will continue and remain in force and effect as if no waiver had occurred.

**21. FUNDS TRANSFERS:** BUYER and SELLER both recognize that there is a risk of banking fraud when individuals impersonating a business demand payment under new mailing or banking transfer instructions. To avoid this risk, BUYER must verbally confirm any new or changed mailing or banking transfer instructions by calling SELLER and speaking with SELLER's Accounts Receivable Manager before transferring any monies using the new instructions. Both parties agree that they will not institute mailing or banking transfer instruction changes and require immediate payment under the new instructions, but will instead provide a ten (10) day grace period to verify any mailing or banking transfer instruction changes before any new or outstanding payments are due using the new instructions.

**22. LIMITATION OF LIABILITY:** None of SELLER, its successors-in-interest, assignees, affiliates, directors, officers, and employees will be liable to any BUYER Indemnified Parties under any circumstances for any special, treble, incidental, or consequential damages, including without limitation, damage to or loss of property other than for the Products purchased hereunder; damages incurred in installation, repair, or replacement; lost profits, revenue, or opportunity; loss of use; losses resulting from or related to downtime of the Products or inaccurate measurements or reporting; the cost of substitute products; or claims of any BUYER's Indemnified Parties' customers for such damages, howsoever caused, and whether based on warranty, contract, and/or tort (including negligence, strict liability or otherwise). The total liability of SELLER, its successors-in-interest, assignees, affiliates, directors, officers, and employees arising out of the performance or nonperformance hereunder, or SELLER's obligations in connection with the design, manufacture, sale, delivery, and/or use of Products, will in no circumstance exceed the amount actually paid to SELLER for Products delivered hereunder.



**23. APPLICABLE LAW AND DISPUTE RESOLUTION:** All issues relating to the construction, validity, interpretation, enforcement, and performance of this agreement and the rights and obligations of SELLER and the BUYER hereunder shall be governed by the laws of the Province of Ontario and the federal laws of Canada applicable therein. Any provisions of the International Sale of Goods Act or any convention on contracts for the international sale of goods shall not be applicable to this agreement. The parties submit to and consent to the non-exclusive jurisdiction of courts located in the Province of Ontario.

**24. ENTIRE AGREEMENT, TERM & MODIFICATION:** These Terms & Conditions of Sale constitute the entire agreement between the parties and supersede any prior agreements or representations, whether oral or written. Upon thirty (30) days prior written notice, SELLER may, in its sole discretion, elect to terminate any order for the sale of Products and provide a pro-rated refund for any pre-payment of undelivered Products. No change to or modification of these Terms & Conditions shall be binding upon SELLER unless in a written instrument specifically referencing that it is amending these Terms & Conditions of Sale and signed by an authorized representative of SELLER. SELLER rejects any additional or inconsistent Terms & Conditions of Sale offered by BUYER at any time, whether or not such terms or conditions materially alter the Terms & Conditions herein and irrespective of SELLER's acceptance of BUYER's order for the described goods and services.

---

Terms and Conditions Covering Sales of Configured-to-Order Projects and Systems

In addition to all terms and conditions above, the following sections apply to sales of Configured-to-Order Projects, Systems, and the like:

**101. PAYMENT.**

**101.1** Payments will be made per the schedule of payment events set forth in Seller's Quotation; provided that if the Start-Up Date (as defined below) is less than 30 days after the Acceptance Date, 90% of the purchase price is due on or before the Start-Up Date.

**101.2.** In the event that achievement of a scheduled payment event is delayed or suspended due to the Buyer's convenience or other reasons for which the Buyer or its representatives is responsible, such payment event will be deemed to have occurred and Seller shall be entitled to invoice Buyer as if achievement of such payment event had been achieved. In such circumstances, Buyer must notify Seller in writing of the reasons for the delay and anticipated duration of the delay. Seller will mark the Products (or parts thereof) as the Buyer's property and shall store the Products (or parts thereof) in a segregated area until actual delivery.

**102. DELIVERY**

**102.1** SELLER will request the BUYER to provide a firm date for delivery of the Products to the project site (the "Delivery Date") which SELLER will then use to establish the production schedule for the Products. The Delivery Date will then be binding on the BUYER except for any changes made in accordance with the provisions below.

**102.2** The BUYER can request a rescheduling of the Delivery Date on one occasion only by notifying SELLER in writing not less than four weeks prior to the scheduled Delivery Date. The BUYER may request that the Delivery Date be extended by a period up to six weeks, without penalty, but may not request that the Delivery Date be moved forward. The BUYER may also request that the Delivery Date be extended beyond a six-week period but, SELLER may not agree to such extension, beyond the maximum six-week extension period

**102.3** SELLER may, in its sole discretion, agree to change the Delivery Date on more than one occasion or if less than four weeks' prior notice is provided of a requested change, but is under no obligation to do so.

**102.4** SELLER reserves the right to reschedule the Delivery Date to a date prior to or subsequent to the scheduled Delivery Date in order to accommodate its shipping, production or other requirements. This right to reschedule will be applicable unless otherwise agreed in writing by an authorized officer of SELLER. SELLER will provide the BUYER or its representative with a minimum of 24 hours' notice of any such rescheduling.

**102.5** Where any change to the Delivery Date is made at BUYER's request, for all purposes with respect to the warranty and payment provided by SELLER in connection with the Products, the initial Delivery Date will be considered to be the Delivery Date regardless of any change later made to the Delivery Date.

### **103. ACCEPTANCE**

**103.1** During the period between the Delivery Date and the Start-up Date, the BUYER shall prepare the Products and the project site for installation and start-up and, unless otherwise agreed in writing by an authorized representative of SELLER, shall complete acceptance testing with respect to the Products. The Products shall be deemed to be accepted on the earliest to occur of the following dates (the "Acceptance Date"): (a) that date on which the Products can function in either manual or automatic operation and provide disinfection in accordance with criteria specified in the Quotation, or (b) 60 days after the Delivery Date.

**103.2** All amounts which remain owing by the BUYER for the Products, including any amount which is specified to be payable on the Acceptance Date, will be paid by the BUYER to SELLER within 30 days after the Acceptance Date, unless otherwise agreed in writing by an authorized representative of SELLER.

**103.3** Written notification must be given by the BUYER to SELLER within seven days after the Acceptance Date listing any outstanding deficiencies with respect to the Products and SELLER will use all reasonable efforts to correct such deficiencies promptly.

### **104. START-UP**

**104.1** SELLER will request a firm date for start-up of the Equipment (the "Start-Up Date"). Trojan will then schedule its technician to be on-site for the Start-up Date. The Start-up Date is binding except for any changes made in accordance with the provisions below.

**104.2** On the Start-up Date, BUYER must have the Equipment and site ready as provided in the Installation Preparation Checklist contained in the Contractor Installation Package sent to BUYER and must have paid all amounts then due and payable to SELLER.

**104.3** BUYER can request a rescheduling of the Start-up Date by notifying SELLER in writing not less than three weeks prior to the Start-up Date. BUYER may request that the Start-up Date be extended but may not request that the Start-up Date be moved forward. SELLER requires a minimum extension period of two weeks between the existing Start-up Date and the requested new Start-up Date in order to reschedule its technician.

**104.4** SELLER may, in its sole discretion, agree to reschedule the Start-up Date where a BUYER requests less than a two-week extension but is under no obligation to do so. In the event that SELLER does agree to less than a two-week extension or that BUYER requests more than two changes to the Start-up Date, BUYER will be charged an administration fee in an amount determined by SELLER.

**104.5** SELLER reserves the right to reschedule the Start-up Date to a date which is prior to or subsequent to the scheduled Start-up Date in order to accommodate its resource availability. This right to reschedule will be applicable unless otherwise agreed in writing by an authorized officer of SELLER. SELLER will provide BUYER or its representative with a minimum of 72 hours' notice of any such change to the Start-up Date.

**104.6** In the event that SELLER'S technician arrives at the project site and finds that the Equipment or the project site is not ready for start-up as defined in the Contractor Installation Package, or any amounts then due and payable to SELLER remain unpaid, BUYER may either:

(a) provided all amounts then due and payable to SELLER have been paid, issue a purchase order for all costs involved in having SELLER correct the deficiencies, or

(b) have SELLER'S technician leave the site and then reschedule the Start-up Date to a date when all deficiencies will be corrected, and the Equipment will be ready for start-up as defined in the Contractor Installation Package. If BUYER selects this option, the cost of rescheduling will be not less than a minimum amount specified by SELLER, with the final cost being determined by SELLER based on its costs and expenses incurred in connection with the rescheduling.

PLANT 2

The Corporation of the City of Windsor

RFP No. 146-23

**LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE**

9. **Technical Information.** The following information should be included:

The Proponent shall provide sufficient information on the equipment so that the City and the Consultant can ascertain the Proponent’s ability to comply with the requirements of the RFP, as outlined below:

a) General System Information.

The Proponent shall provide the following:

- a. Catalogue and equipment data sheets showing complete descriptive information and product literature for the UV disinfection equipment proposed;
- b. Complete list of equipment including make and model numbers;
- c. Electrical requirements; and
- d. An outline of the operating procedures for start-up and shutdown of the equipment.

b) System Description. The Proponents shall describe the system upon which the proposal is based. Provide the following information:

- a. Dimensional drawings showing plan, elevation and appropriate cross sections, materials of construction, overall weight, weight of largest components requiring removal for maintenance, and clearance required around the equipment for maintenance access; and
- b. Description of the instrumentation and control system. Include programming requirements and any support expectations of the City during the FAT, SAT and testing period.

c) Provide the following:

**CORPORATION OF THE CITY OF WINDSOR  
LRPCP UV DISINFECTION SYSTEM UPGRADES: UV EQUIPMENT PRESELECTION  
STATEMENT 'A'  
EQUIPMENT DATA SHEETS**

Submit with the Submission the following information applicable to the proposed system to allow an evaluation of the equipment:

- 1. Description of system
- 2. Dimensioned plan and section of layout of the equipment including lamp module locations, channel dimensions, equipment support details, clearances and location of control system
- 3. Details of how modules will be fixed in place in banks and channels
- 4. Details of control gates or fixed weirs
- 5. Control system details including PLC and control panel locations

**LAYOUT**

1. Number of channels	Two (2)
2. Number of channels and banks online under average flow at design conditions	1 channel, 2 banks
3. Number of lamps (total)	Plant 1 - 192 Plant 2 - 192
4. Number of channels and banks online under average flow at design conditions with associated power conditions	
a. Number of new lamps/clean	Plant 1 - 96 Plant 2 - 96

**LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE**

b. Number of lamps at end of life	Plant 1 - 96 Plant 2 - 96
5. Number of modules	Plant 1 - 32 Plant 2 - 32
6. Number of modules/bank	Plant 1 - 8 Plant 2 - 8
7. Number of banks/channel	Two (2)
<b>LAMPS</b>	
1. Manufacturer	Trojan Technologies
2. Type of Lamp	LPHO
3. (Arc) Length	147 cm
4. Rated output (% of life)	
a. 100% (end of life)	240 Watts 12000 Hours
b. 50%	240 Watts 6000 Hours
c. New 100 hours	240 Watts 100 Hours
5. Power to lamps variable (Y/N)	Yes
<b>QUARTZ SLEEVES</b>	
1. Manufacturer	Trojan Technologies
2. Wall Thickness	1.5 mm
3. Outside Diameter	28 mm
<b>UV INTENSITY METER</b>	
1. Manufacturer and Type	Trojan Technologies
2. Total Number Supplied	Four (4)
3. Location	Centre module
<b>POWER</b>	
1. Input power to UV control panel	
a. Phase	Single
b. Volts	120 V
c. Amps	15 A
2. Number of control panels	1 (SCC) per plant
3. Ballast Power	
a. Phase	3 Phase, 4 wire + ground
b. Volts	480Y / 277 V (600V transformer will be provided)
c. Amps	15 A
<b>MODULES</b>	

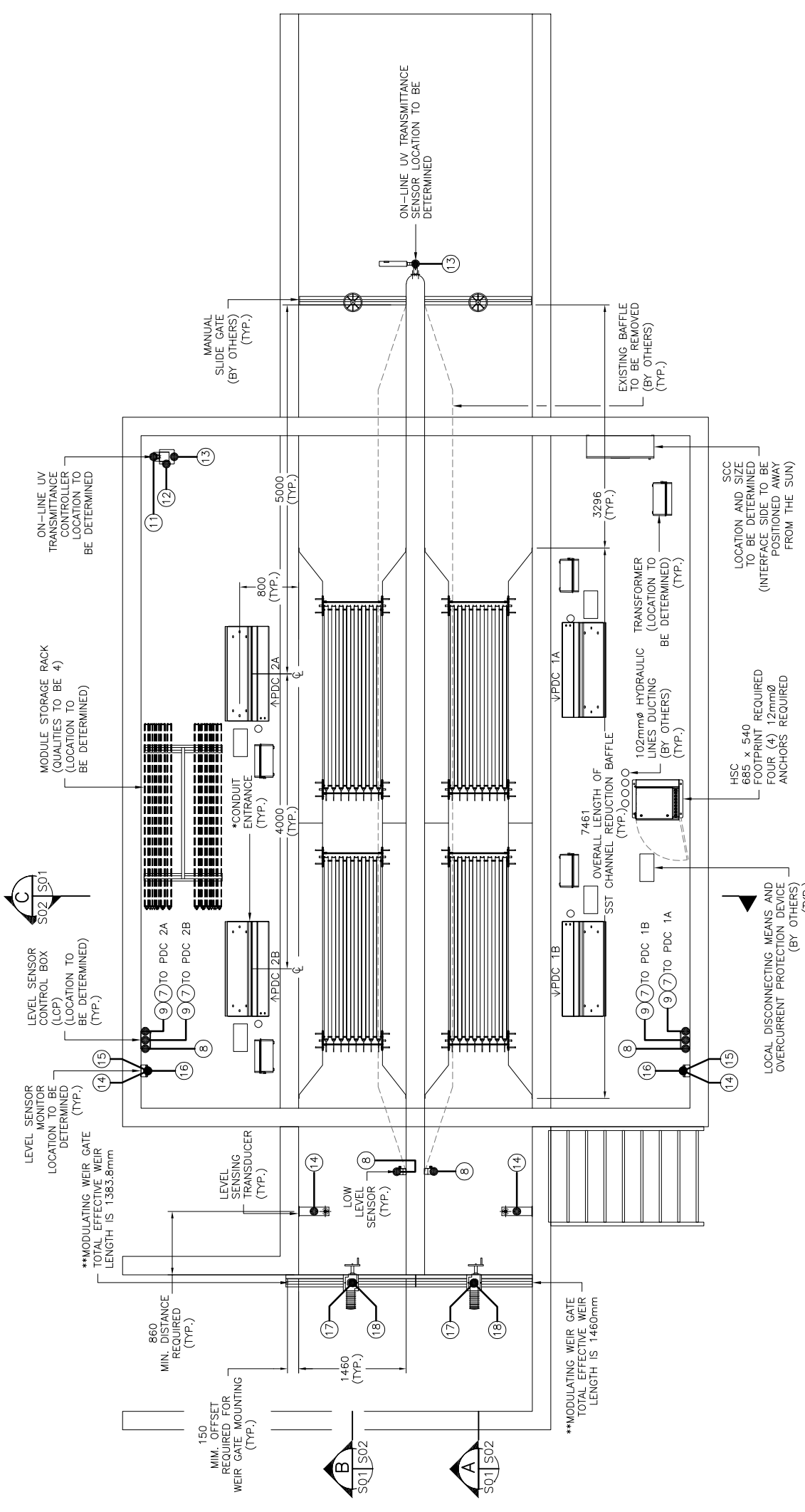
LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE

1. Weight of Module	45 kg
2. Lamp Configuration	6 Lamp Modules
3. Lamp Spacing	4 inch
<b>HYDRAULIC CONSIDERATIONS: Losses across reactor zone (upstream to downstream)</b>	
<b>Plant 1</b>	
1. Average Design (41,500 m <sup>3</sup> /d)	3.49 cm
2. Peak Design Flow (72,800 m <sup>3</sup> /d)	2.73 cm
<b>Plant 2</b>	
1. Average Design (31,300 m <sup>3</sup> /d)	3.69 cm
2. Peak Design Flow (54,500 m <sup>3</sup> /d)	2.86 cm

d) Provide in the following chart any deviations from the Technical Specifications:

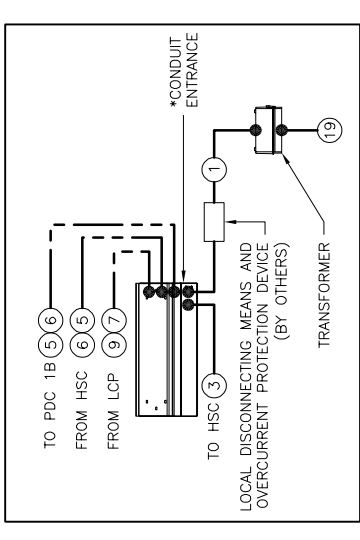
<p><b>CORPORATION OF THE CITY OF WINDSOR</b>  <b>LRPCP UV DISINFECTION SYSTEM UPGRADES: UV EQUIPMENT PRESELECTION</b>  <b>STATEMENT 'B'</b>  <b>DEVIATIONS FROM SPECIFICATION</b></p>
<p>The Proponent shall list herein the part or parts of the equipment of his Quotation that are NOT IN ACCORDANCE with the Specifications.</p>
<p>1) Addendum 1, P-101 &amp; P-201 – CLARIFICATION – drawings show isolation gates. Please confirm that these gates are provided by other. Isolation gates are not included in the Scope of Supply.</p>
<p>2) Addendum 1, P-201 – CLARIFICATION – Drawing show Downstream water level higher than upstream. Please confirm levels</p>

No.	DESCRIPTION	FROM	TO
1	POWER DISTRIBUTION CENTER (PDC) POWER SUPPLY 480V/277V, 3 PHASE, 4 WIRE + GROUND 12.3 KW/PDC POWER DRAW 17 AMPS MAXIMUM CURRENT/PHASE	TRANSFORMER	PDCs
2	SYSTEM CONTROL CENTER (SCC) POWER SUPPLY 120V, 1 PHASE, 2 WIRE + GROUND 1.8 KVA	TRANSFORMER	SCC
3	HYDRAULIC SYSTEMS CENTER (HSC) POWER SUPPLY 480V, 3 PHASE, 3 WIRE + GROUND	PDC 1A	HSC
4	FLOW METER 4-20 mA, DC ANALOG INPUT	FLOW METER PANEL (NOT SHOWN) (BY OTHERS)	SCC
5	GROUND LINK 14 AWG TYPE TWH STRANDED	SCC	PDCs THRU HSC (DAISY CHAINED)
6	MODBUS 1 SHIELDED TWISTED PAIR	SCC	PDCs THRU HSC (DAISY CHAINED)
7	LEVEL SENSOR CONTROL BOX (LCP) POWER SUPPLY 24 VDC - 2 CONDUCTORS	PDCs	LCPs
8	DISCRETE LOW LEVEL SIGNAL 24 VDC - 2 CONDUCTORS	LOW LEVEL SENSOR	LCP
9	DISCRETE WATER LEVEL SIGNAL 24 VDC - 2 CONDUCTORS	LCP	PDC
10	ETHERNET/IP COMMUNICATION	SCC	PLANT SCADA (BY OTHERS) (NOT SHOWN)
11	ON-LINE UV TRANSMITTANCE CONTROLLER SIGNAL 4-20 mA	ON-LINE UV TRANSMITTANCE CONTROLLER	SCC
12	ON-LINE UV TRANSMITTANCE CONTROLLER POWER SUPPLY 120V, 1 PHASE, 2 WIRE + GROUND, 0.2 KVA	DP (NOT SHOWN) (BY OTHERS)	ON-LINE UV TRANSMITTANCE CONTROLLER
13	ON-LINE UV TRANSMITTANCE SENSOR COMMUNICATION (SENSOR CABLE PROVIDED BY HACH)	ON-LINE UV TRANSMITTANCE CONTROLLER	ON-LINE UV TRANSMITTANCE CONTROLLER
14	COMMUNICATION LINK 10m OR 30FT CABLE PROVIDED BY TROJAN	LEVEL SENSING TRANSDUCER	LEVEL SENSOR MONITOR
15	LEVEL SENSOR POWER SUPPLY 120V, 1 PHASE, 2 WIRE + GROUND, 36VA	DP (BY OTHERS) (NOT SHOWN)	LEVEL SENSOR MONITOR
16	WATER LEVEL SENSING 4-20 mA ANALOG INPUT SIGNAL	LEVEL SENSOR MONITOR	SCC
17	OPEN COMMAND DISCRETE OUTPUT (MIN 20 AWG) - 2 CONDUCTORS CLOSE COMMAND DISCRETE OUTPUT (MIN 20 AWG) - 2 CONDUCTORS GATE IN REMOTE MODE DISCRETE INPUT (MIN 20 AWG) - 2 CONDUCTORS GATE FAULT DISCRETE INPUT (MIN 20 AWG) - 2 CONDUCTORS GATE POSITION ANALOG INPUT 4-20mA 1 TWISTED SHIELDED PAIR (24 AWG)	SCC SCC WEIR GATE WEIR GATE WEIR GATE	WEIR GATE WEIR GATE SCC SCC SCC
18	WEIR GATE POWER SUPPLY	DP (BY OTHERS) (NOT SHOWN)	WEIR GATE
19	MAIN SERVICE TO TRANSFORMER 600V, 3 PHASE, 4 WIRE TO 480V, 3 PHASE, 3 WIRE + GROUND	DP (BY OTHERS) (NOT SHOWN)	TRANSFORMER
20	MAIN SERVICE TO TRANSFORMER 600V, 3 PHASE, 4 WIRE TO 120V, 1 PHASE, 2 WIRE + GROUND	DP (BY OTHERS) (NOT SHOWN)	TRANSFORMER

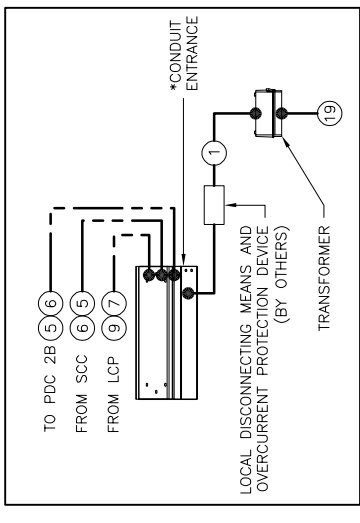


**PLAN VIEW**  
SCALE: AS SHOWN

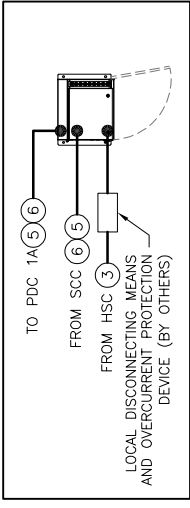
- NOTES:**
- DO NOT SLOPE CHANNEL FLOOR.
  - CHANNEL WIDTH & DEPTH MUST BE KEPT WITHIN A TOLERANCE OF + OR - 6mm AGAINST A COMMON DATUM ELEVATION.
  - ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES.
  - SYSTEM CONDUIT, WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS.
  - ELECTRICAL REQUIREMENTS SHOWN ARE TO BE ADDED AS PER LOCAL CODE.
  - REMOVABLE GRATING SECTIONS SHALL BE EASILY REMOVED BY ONE PERSON. MAXIMUM WEIGHT OF THE SECTIONS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE APPLICABLE JURISDICTION.
  - CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
  - EFFLUENT LEVELS SHOWN REFLECT HYDRAULICS ASSOCIATED WITH TROJAN EQUIPMENT ONLY. EFFLUENT LEVELS MAY BE ALTERED DUE TO CHANNEL DEBRIS OR GEOMETRY.
  - ANY UPSTREAM AND DOWNSTREAM WL ELEVATIONS BEYOND THOSE SHOWN WITHIN THIS LAYOUT DRAWING ARE OUTSIDE OF THE SCOPE OF TROJAN TECHNOLOGIES AND ARE THE RESPONSIBILITY OF THE CONSULTING ENGINEER.
  - GRATING IMMEDIATELY ABOVE UV MODULES TO BE OPEN TYPE (EG. PERFORATED) TO ALLOW ADEQUATE COOLING OF THE UV MODULES.
  - CONDUIT RUN BETWEEN HSC AND PDC 1A & PDC 1B IS 6.0m MAXIMUM. CONDUIT RUN BETWEEN HSC AND PDC 2A & PDC 2B IS 13.6m MAXIMUM.
  - HSC HYDRAULIC ENTRANCE(S) NOT BE MORE THAN 300mm BELOW PDC MOUNTING ELEVATION TO PREVENT HSC PUMP FLOODING.
  - TOLERANCE AT ALC IS CHANNEL WIDTH +25mm.
  - SITE TO PROVIDE APPROVED (ENGINEERED) ANCHOR POINTS FOR PERSONNEL TO USE AS PART OF THEIR FALL RESTRAINT SYSTEM AROUND OPEN CHANNELS. THE ANCHOR POINTS MUST BE POSITIONED SO THAT THE PREFERRED RETRACTABLE LIFELINE OF 2.4m IS OF SUFFICIENT LENGTH TO ACCESS THE WORK AT THE CHANNEL LEFT SIDE OF PDC.
  - POWER AND LOW VOLTAGE CONDUITS MUST ENTER LABELED LOCATION ON VIEW FOR FULLY OPEN POSITION (FOP), FULLY CLOSED POSITION (FCP), AND GATE POSITION(S) (GP).



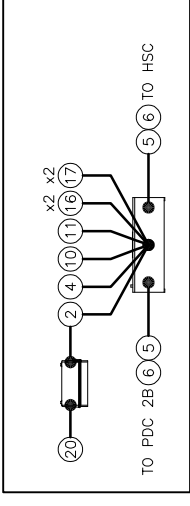
**PDC 1A**  
INTERCONNECT DETAIL  
SCALE: NOT TO SCALE



**PDC 1B**  
INTERCONNECT DETAIL  
SCALE: NOT TO SCALE



**HSC**  
INTERCONNECT DETAIL  
SCALE: NOT TO SCALE



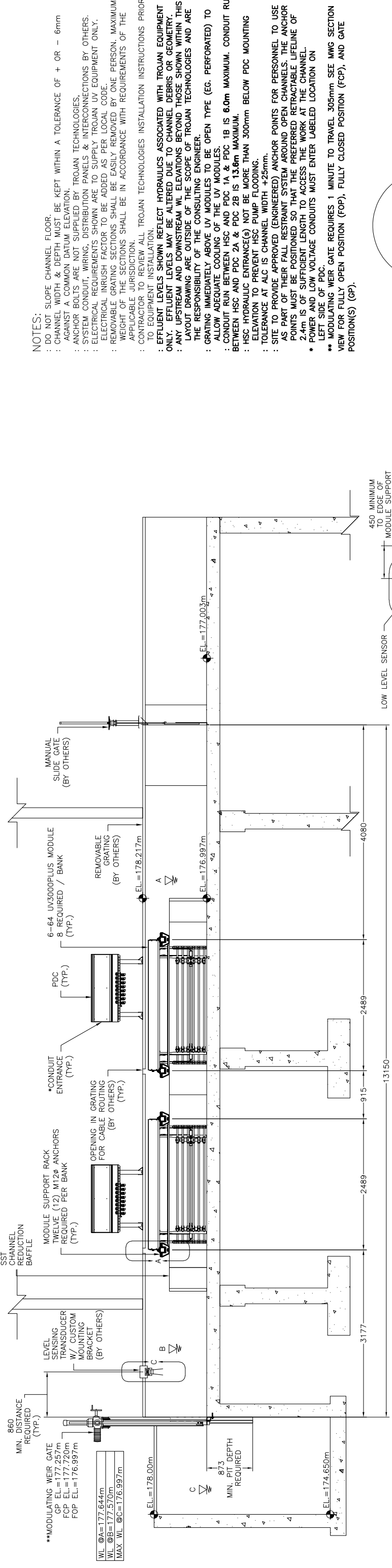
**SCC**  
INTERCONNECT DETAIL  
SCALE: NOT TO SCALE  
NOTE: INTERCONNECTION (5) & (6) TO PDC 2B CONTINUES TO PDC 2A FROM PDC 2B

**PRELIMINARY, NOT FOR CONSTRUCTION**  
VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK

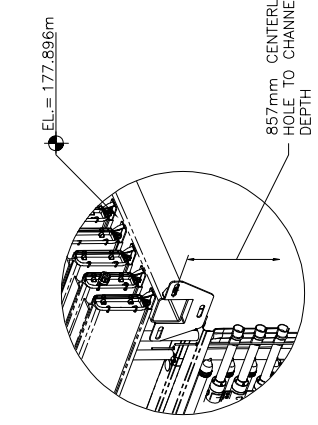
DESIGN CRITERIA	PEAK FLOW	72800	m3/d
U.V TRANSMITTANCE AT 253.7 nm	65 %		
SUSPENDED SOLIDS	25 mg/L		
DISINFECTION STANDARD	100 E.COLI / 100mL		
	(30 DAY GEO. MEAN)		

**TROJAN UV**  
CONFIDENTIALITY NOTICE  
Copyright © 2023 by Trojan Technologies. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form, without the written permission of Trojan Technologies.

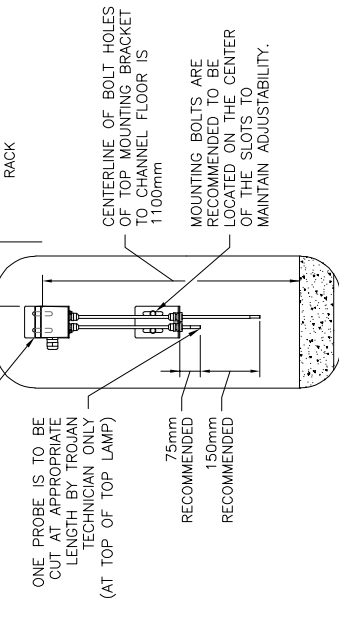
DESCRIPTION:	QUOTE NO.
LAYOUT TROJANUV3000PLUS 22' WINDSOR REPLACEMENT, LITTLE RIVER PLANT 2/3B, ON	243044
DRAWN BY: RP	PROJECT NO. N/A
CHECKED BY: LG	DWG NO. S01
APPROVED BY: MB	REV. A
SCALE: (11x17) : 1:75	LOG NUMBER: N/A
DATE: 23DEC11	
DATE: 23DEC19	
DATE: 23DEC19	



**A SECTION**  
 S01|S02 SCALE:AS SHOWN  
 NOTE: LEVEL SENSOR MONITOR, TRANSFORMERS  
 MODULE STORAGE RACK & ON-LINE UV TRANSMITTANCE CONTROLLER & SENSOR  
 NOT SHOWN FOR CLARITY

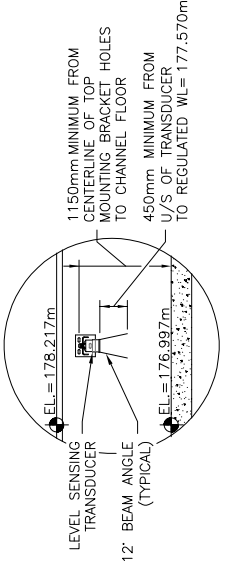


**DETAIL A**  
 SCALE:NOT TO SCALE

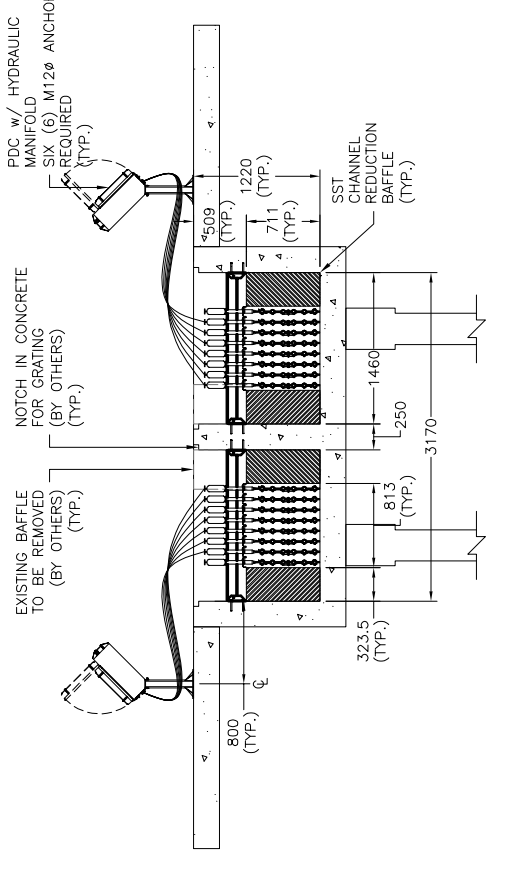


**DETAIL B**  
 SCALE:NOT TO SCALE

- NOTES:**
- : DO NOT SLOPE CHANNEL FLOOR.
  - : CHANNEL WIDTH & DEPTH MUST BE KEPT WITHIN A TOLERANCE OF + OR - 6mm AGAINST A COMMON DATUM ELEVATION.
  - : ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES.
  - : SYSTEM CONDUIT, WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS.
  - : ELECTRICAL REQUIREMENTS SHOWN ARE TO SUPPLY TROJAN UV EQUIPMENT ONLY.
  - : REMOVABLE GRATING SECTIONS SHALL BE EASILY REMOVED BY ONE PERSON, MAXIMUM WEIGHT OF THE SECTIONS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE APPLICABLE JURISDICTION.
  - : CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
  - : EFFLUENT LEVELS SHOWN REFLECT HYDRAULICS ASSOCIATED WITH TROJAN EQUIPMENT ONLY. EFFLUENT LEVELS MAY BE ALTERED DUE TO CHANNEL DEBRIS OR GEOMETRY.
  - : ANY UPSTREAM AND DOWNSTREAM WL ELEVATIONS BEYOND THOSE SHOWN WITHIN THIS LAYOUT DRAWING ARE OUTSIDE OF THE SCOPE OF TROJAN TECHNOLOGIES AND ARE THE RESPONSIBILITY OF THE CONSULTING ENGINEER.
  - : GRATING IMMEDIATELY ABOVE UV MODULES TO BE OPEN TYPE (EG. PERFORATED) TO ALLOW ADEQUATE COOLING OF THE UV MODULES.
  - : CONDUIT RUN BETWEEN HSC AND PDC 1A & PDC 1B IS 6.0m MAXIMUM. CONDUIT RUN BETWEEN HSC AND PDC 2A & PDC 2B IS 13.6m MAXIMUM.
  - : HSC HYDRAULIC ENTRANCE(S) NOT BE MORE THAN 300mm BELOW PDC MOUNTING ELEVATION TO PREVENT HSC PUMP FLOODING.
  - : TOLERANCE AT ALC IS CHANNEL WIDTH +25mm.
  - : SITE TO PROVIDE APPROVED (ENGINEERED) ANCHOR POINTS FOR PERSONNEL TO USE AS PART OF THEIR FALL RESTRAINT SYSTEM AROUND OPEN CHANNELS. THE ANCHOR POINTS MUST BE POSITIONED SO THAT THE PREFERRED RETRACTABLE LIFELINE OF 2.4m IS OF SUFFICIENT LENGTH TO ACCESS THE WORK AT THE CHANNEL.
  - \* POWER AND LOW VOLTAGE CONDUITS MUST ENTER LABELED LOCATION ON LEFT SIDE OF PDC.
  - \*\* MODULATING WEIR GATE REQUIRES 1 MINUTE TO TRAVEL 305mm SEE MWG SECTION VIEW FOR FULLY OPEN POSITION (FOP), FULLY CLOSED POSITION (FCP), AND GATE POSITION(S) (GP).

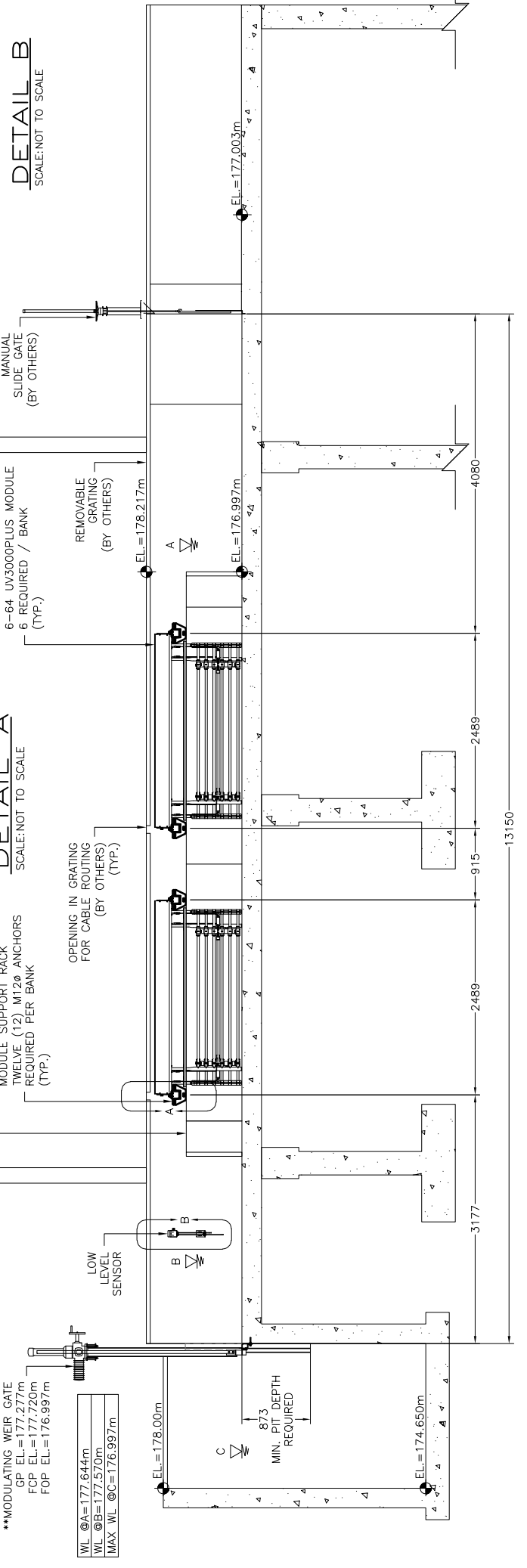


**DETAIL C**  
 SCALE:NOT TO SCALE  
 NOTE: CUSTOM MOUNTING BRACKET (BY OTHERS)  
 NOT SHOWN FOR CLARITY



**C SECTION**  
 S01|S02 SCALE:AS SHOWN

NOTE: HSC, LEVEL SENSOR CONTROL BOX (LCP), LEVEL SENSOR MONITOR, TRANSFORMERS MODULE STORAGE RACK & REMOVABLE GRATING (BY OTHERS) NOT SHOWN FOR CLARITY



**B SECTION**  
 S01|S02 SCALE:AS SHOWN  
 NOTE: LEVEL SENSOR MONITOR, PDC 2B, PDC 2A,  
 MODULE STORAGE RACK & ON-LINE UV TRANSMITTANCE CONTROLLER & SENSOR AND  
 TRANSFORMERS  
 NOT SHOWN FOR CLARITY

DESCRIPTION:	LAYOUT TROJANUV3000PLUS 22' WINDSOR REPLACEMENT, LITTLE RIVER PLANT 2/3B, ON
DRAWN BY :	RP
CHECKED BY :	LG
APPROVED BY :	MB
SCALE (11x17) :	1:75
LOG NUMBER :	N/A
DATE :	23DEC11
DATE :	23DEC19
DATE :	23DEC19
DWG NO. :	S02
REV. :	A

**TROJANUV**  
 A TROJAN TECHNOLOGIES COMPANY  
 CONFIDENTIALITY NOTICE  
 Copyright © 2023 by Trojan Technologies. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form, without the written permission of Trojan Technologies.

**PRELIMINARY, NOT FOR CONSTRUCTION**  
 VERIFY DIMENSIONS BEFORE COMMENCING CIVIL OR DESIGN WORK





**SCOPE OF SUPPLY FOR WINDSOR REPLACEMENT (LITTLE RIVER 3B Plant 2), ON WASTEWATER TREATMENT PLANT**

**ULTRAVIOLET DISINFECTION EQUIPMENT – TROJAN SYSTEM UV3000Plus™**

**Prepared for:** All bidding General Contractors

**Project Name:** Windsor Replacement (Little River 3B – Plant 2), ON

**Consulting Engineer:** Stantec

Specification Section: 11380

Addendum No.:

- Addendum 1, Dec 5, 2023
- Addendum 2, Dec 8, 2023
- Addendum 3, Dec 14, 2023
- Addendum 4, Dec 18, 2023

**Submitted by:** Rob Jansen, Regional Manager

**Trojan Quote:** 243044

**Design Criteria:**

Current Peak Design Flow:	54 500 m3/d
UV Transmission:	65 % minimum
Total Suspended Solids:	25 <b>mg/l</b> (30 Day Average, grab sample)
Discharge Limit:	100 E.coli (30 day geometric mean)

We are pleased to submit the following scope of equipment based on the above criteria.

**The purchaser is responsible for reading all information contained in this Supply Contract. Trojan will not be held accountable for the supply of equipment not specifically detailed in this document. Supplemental Terms and Conditions are attached to this document. Detailed installation instructions are provided with the shop drawings and are available earlier upon request. Changes to this Scope of Supply that affect selling price will be handled through a change order.**

**Please refer all inquiries to Trojan Manufacturer's Representative:**

Andrew J. Pelley, M.Eng., P.Eng.  
Area Manager  
H2Flow Equipment Inc.  
Phone: (905) 660-9775 x39  
Email: [Andrew@h2flow.com](mailto:Andrew@h2flow.com)

This proposal has been respectfully submitted by,  
**Trojan Technologies**

Rob Jansen  
Regional Manager  
Trojan Technologies

December 27, 2023

Scope of Supply generated by: Mike Bartram

**UV Disinfection System Scope of Supply**

---

Unless otherwise indicated in this proposal all anchor bolts, conduit, conductors, local disconnects and transformers (if required) are the responsibility of the CONTRACTOR and are not included in this Scope of Supply.

**ULTRAVIOLET MODULES**

***Trojan's Responsibility:***

Each module supplied shall be completely assembled containing lamps, quartz sleeves and be electrically wired to each electronic ballast. Modules are shipped in a support rack and crated.

<b>Model and Make:</b>	Standard System TrojanUV3000Plus™
<b>Quantity:</b>	Thirty Two (32) UV modules will be supplied, 6 Lamp - 4.0" Spacing
<b>Material of Construction:</b>	316 stainless steel frame
<b>Approximate Weight:</b>	45 kg per 6 Lamp module

**SYSTEM CONTROL CENTER**

***Trojan's Responsibility:***

One (1) System Control Center (SCC) shall be supplied to monitor and control the UV System. Trojan will provide a PLC I/O and soft address map to aid the Contractor with integration of the UV PLC and WWTP SCADA system. The UV SCC shall consist of the following:

<b>Quantity Supplied</b>	One (1) SCC will be supplied
<b>Location:</b>	Wall mounted
<b>Controller Type:</b>	PLC (2022) Allen-Bradley
<b>Operator Interface:</b>	AB PanelView Plus 15" HMI
<b>Panel UPS:</b>	40 Min on 24VDC
<b>Material of Construction:</b>	304 Stainless Steel
<b>Enclosure Rating:</b>	UL Type 4X
<b>Approximate Weight:</b>	200 pounds

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for mounting the SCC as indicated on the drawings. The Installation Contractor to be responsible for the supply, installation and connection of the following at the SCC:

1. One (1) 600V 60Hz power supply
2. One (1) 4 – 20 mA DC analog signal from plant flow meter
3. One (1) Ground Link , 14 gauge (2.5mm<sup>2</sup>) minimum type TWH stranded, daisy chained to the HSC and PDCs.
4. One (1) serial communication link consisting of one (1) shielded twisted pair, 18 gauge (1mm<sup>2</sup>) maximum from the HSC and other PDCs (daisy chained).
5. One (1) 4 – 20 mA DC analog signal from the On-Line UVT Monitor (if specified)
6. Ethernet Cat5e link to SCADA – Ethernet I/P

**POWER DISTRIBUTION CENTERS**

***Trojan's Responsibility:***

The Power Distribution Center (PDC) distributes power to the UV Modules and shall consist of the following:

<b>Quantity Supplied:</b>	Four (4) PDCs will be supplied
<b>Material of Construction:</b>	304 Stainless Steel
<b>Enclosure Rating:</b>	UL Type 4X
<b>Approximate Weight:</b>	100 Kg

***Installation Contractor's Responsibility:***

**UV Disinfection System Scope of Supply**

---

The Installation Contractor to be responsible for setting in place and bolting the Power Distribution Centers to the top of channel. The Installation Contractor to be responsible for the supply, installation and connection of the following at the Power Distribution Center(s):

1. One (1) 480/277V 60Hz, 3 Phase, 4 Wire + Ground, 9.20 kVA power feed with local disconnect to each of 4 PDC(s)
2. One (1) Ground Link, 14 gauge (2.5mm<sup>2</sup>) minimum, TWH stranded single wire from the HSC.
3. One (1) communication link consisting of one (1) shielded twisted pair from the SCC and daisy chained to other PDC's.
4. One (1) pair 24Volt DC, 18 gauge minimum power feed to the Level Control Panel from 2 PDCs in the channel, or a single PDC if only 1 per channel
5. One (1) pair of 24Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the water Level Control Panel to each PDC(s).
6. Connection of communication, power cables and hydraulic lines from the UV Modules

**HYDRAULIC SYSTEM CENTER**

***Trojan's Responsibility:***

The Hydraulic System Center (HSC) houses the ancillary equipment required to operate the quartz sleeve cleaning system.

<b>Quantity Supplied:</b>	One (1) HSC will be supplied
<b>Materials of Construction:</b>	304 Stainless Steel
<b>Enclosure Rating:</b>	UL Type 4X
<b>Approximate Weight:</b>	136 Kg

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place and bolting the HSC and manifold as shown on the contract drawings. The HSC should be located within 50 feet (15 meters) from the farthest PDC. The Installation Contractor shall be responsible for the supply, connection and installation of the following at the HSC:

1. One (1) 480V 60Hz, 3 Phase, 3 Wire + Ground, 5 Amp power feed with local disconnect
2. One (1) ground link of, 14 gauge (2.5mm<sup>2</sup>) minimum, TWH stranded from the PDC(s).
3. Connection of the hydraulic hoses from PDC(s). Hoses and connections will be supplied by Trojan.
4. One (1) serial communication link of one (1) twisted, shielded pairs, 18 gauge (1mm<sup>2</sup>) maximum cable from the SCC and daisy chained to the PDC's.

**SUPPORT RACKS**

***Trojan's Responsibility:***

Support racks are provided to support UV modules in the effluent channel.

<b>Quantity Supplied:</b>	Four (4) racks will be supplied
<b>Material of Construction:</b>	304 Stainless Steel
<b>Approximate Weight:</b>	< 45 Kg each

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place and bolting the support racks to the channel walls. The Contractor will be required to supply eight (8) 1/2" Diameter x 5 1/2" Long expansion anchor bolts per rack.

Install approved (engineered) anchor points for personnel to use as part of their fall restraint system around the open channels. The anchor points must be positioned so that the preferred retractable lifeline of 8 feet is of sufficient length to access the work at the channel. Refer to local safety regulation.

**UV Disinfection System Scope of Supply**

---

**MODULATING WEIR GATE LEVEL CONTROLLER**

*Modulating Weir Gates (MWGs) shall be self-contained and shall be designed and manufactured by an experienced and reputable manufacturer, based on the AWWA C561 Standard for Fabricated Stainless Steel Slide Gates and AWWA C542 Standard for Electric Motor Actuators for Valves and Slide Gates in effect as of the date of this specification.*

*MWGs shall be designed for the following performance criteria:*

- *MWG actuation speeds shall be between 10" (255 mm) and 14" (356 mm) per minute*
- *MWG maximum design rate of change of flow shall be limited to 25% of the Peak Design Flow/Channel per minute, or alternatively, flow shall be ramped up (zero to peak) or down (peak to zero) in no less than 4 minutes*
- *MWG actuators shall employ AWWA compliant, S4-50% duty class motors with a rated minimum 900 starts per hour capability*
- *MWG actuators shall employ AWWA compliant, Class B, solid-state Thyristor based switchgear capable of at least 5,000,000 modulating steps before overhaul; electromechanical type actuators and controls are not permitted*

***It is the responsibility of the Plant designers to ensure the stated performance criteria are acceptable for the plant process or to modify the design accordingly.***

***Trojan's Responsibility***

Level control devices are required to maintain and control the effluent level in the channel, regardless of flow rate.

<b>Quantity Supplied:</b>	Two (2) level controllers to be supplied
<b>Description:</b>	Level Control Weir Gate
<b>Material of Construction:</b>	316 stainless steel frame and yoke
<b>Approximate Weight:</b>	500 Kg each

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place, grouting and sealing the level control weir gate and the installation of the following connections:

1. One (1) 480 Volt, 3 phase, 3 wire, 5 AMP (plus ground) feed to each of two (2) gates.
2. Open command discrete output, two (2) conductors, 20 gauge (0.5mm<sup>2</sup>) minimum, from SCC to each weir gate.
3. Close command discrete output, two (2) conductors, 20 gauge (0.5mm<sup>2</sup>) minimum, from SCC to each weir gate.
4. Remote mode discrete input, two (2) conductors, 20 gauge (0.5mm<sup>2</sup>) minimum, to SCC from each weir gate.
5. Gate position analog input, one (1) twisted shielded pair, 24 gauge (0.25mm<sup>2</sup>) minimum, to SCC from each weir gate.

**ULTRASONIC or RADAR CHANNEL LEVEL SENSOR**

***Trojan's Responsibility:***

An ultrasonic level sensor will be supplied to monitor the effluent levels within each UV Channel specifically for weir gate control. The transducer will be supplied with a sufficient length of cable to distribute to the monitor panel along with a mounting bracket.

***Installation Contractor's Responsibility:***

The Contractor shall be responsible for mounting the transducer and bracket in the UV Channel, the monitor panel adjacent to the channel, and distributing the following cable/wiring between these two components and to SCC in appropriate conduit:

1. One (1) 120 Volt, 1 phase, 2 wire, 15 VA (plus ground) from a Distribution Panel (by others) to the Level Sensor Monitor.

**UV Disinfection System Scope of Supply**

---

2. One (1) 4-20mA analog signal from the Level Sensor Monitor to the System Control Center (SCC).
3. One (1) communication link using 30 feet of cable (supplied by Trojan) from the Level Sensing Transducer to the Level Sensor Monitor.

**ON-LINE UV TRANSMISSION MONITOR**

***Trojan's Responsibility:***

**Description:** One (1) Hach UVT meter containing: One (1) submersible probe with multi-beam flash photometer, one (1) 25' cable between the probe and the controller, One (1) Hach SC200 UV-254 Analyzer Controller.

**Enclosure Rating:** UL Type 4X  
**Controller Dimensions:** 12 x 12 x 4 inches  
**Operating Temperature:** 32 to 140°F (Probe), 14 to 122°F (Controller)  
**Approximate Weight:** 14 Kg (includes Probe and Controller)  
**Probe Immersion Depth:** up to 6 feet

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place and bolting the controller panel and the probe. The Installation Contractor shall also be responsible for the supply, installation and connection of the following:

1. One (1) 120 Volt, 1 phase, 2 wire (plus ground), 14 VA power supply
2. One (1) 4-20mA DC Analog communications link between the Controller and the SCC
3. Installation of sensor communication cable between Probe and Controller (Cable supplied by Trojan)
4. Supply of the required bolts for mounting Controller and Probe to the channel edge

**WATER LEVEL SENSOR KIT**

***Trojan's Responsibility:***

The water level sensor is located downstream of the UV System and provides a digital signal to shut down & protect the UV System if the water level is too low. The Water Level Sensor Kit includes the water level sensor probes as well as a Level Control Panel (LCP). Optionally there are high water level probes that provide a digital signal to the System Control Center.

**Quantity Supplied:** Two (2) low water level sensor and water Level Control Panel (LCP) to be supplied  
**Enclosure Rating:** UL Type 4X  
**Approximate LCP Weight:** 11 Kg  
**Approximate Probe Weight:** 5 Kg

***Installation Contractor's Responsibility:***

The Installation Contractor to be responsible for setting in place and bolting the water level probes assembly to the effluent channel wall and mounting the Level Control Panel as indicated on the drawings. The Installation Contractor shall also be responsible for the supply of mounting hardware, watertight conduit and supply and connection of one discrete signal (pair of 12V DC, 14 gauge (2.5mm<sup>2</sup>)) from the water level sensor probe to each LCP.

1. One (1) pair of 24Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the water Level Control Panel to each PDC(s).
2. One (1) pair of 24Volt DC and 18 gauge (1mm<sup>2</sup>) minimum to the water Level Control Panel from 2 PDCs in the channel, or a single PDC if only 1 per channel.
3. One (1) pair of 12Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the low water level probes from the Level Control Panel
4. One (1) pair of 24Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the water Level Control Panel to the SCC for high water level [if required].
5. One (1) pair of 12Volt DC, 18 gauge (1mm<sup>2</sup>) minimum discrete signal to the high water level probes from the Level Control Panel [if required]

**UV Disinfection System Scope of Supply**

---

**UV PHOTOMETER**

**Trojan's Responsibility:**

A single beam UV Photometer shall be provided to measure the UV transmission of the effluent. The range of the UV Photometer shall be 5 - 100% transmittance with a wavelength accuracy of +/- 0.16 half bandwidth. The UV Photometer will come equipped with two matched quartz cuvettes, 100% T standard solution and cuvette cleaning solution.

**UV MODULE STORAGE RACK**

***Trojan's Responsibility:***

Four (4) portable racks, constructed of 304 SST, will be supplied to store UV modules when not in use. The Rack shall be constructed to hold 8 UV Modules.

**UV CHANNEL REDUCTION BAFFLES**

***Trojan's Responsibility:***

Trojan will supply (2) baffles constructed of 316 stainless steel to reduce the channel in the area of the UV Banks by 850mm.

***Installation Contractor's Responsibility:***

Contractor shall install and seal watertight the baffles by anchoring the perimeter of the baffle to the channel floor and walls with approximately 40 anchors.

**PDC ISOLATION TRANSFORMERS**

***Trojan's Responsibility:***

A standalone isolation transformer, per channel, will be supplied to step down the existing 600 Volt, 3 phase power supply to 480Y/277 volt 3 phase, 4 wire + GROUND.

<b>Quantity:</b>	Four (4) transformers
<b>Rating:</b>	30 kVA
<b>Enclosure Rating:</b>	Nema 3R, Painted Mild Steel
<b>Approximate Weight:</b>	300 kgs

***Installation Contractor's Responsibility:***

Contractor is responsible for installing and wiring the primary and secondary taps, all conductors, conduit and local disconnects as per local electrical codes.

**CONTROL ISOLATION TRANSFORMER**

**Trojan's Responsibility:**

A standalone isolation transformer will be supplied to step down the existing 600 Volt, 3 phase power supply to 120/208V volt 1 phase.

<b>Quantity:</b>	One (1) transformer
<b>Enclosure Rating:</b>	Nema 3R, Painted Mild Steel
<b>Approximate Weight:</b>	100 kgs

***Installation Contractor's Responsibility:***

Contractor is responsible for installing and wiring the primary and secondary taps, all conductors, conduit and local disconnects as per local electrical codes.

**UV Disinfection System Scope of Supply**

---

**SPARE PARTS AND SAFETY EQUIPMENT**

***Trojan's Responsibility:***

The following spare parts and safety equipment will be supplied with the UV system:

- 48 UV lamp/sleeve assembly
- 10 Ballasts
- 1 Operators Kit (including face shield, gloves and cleaning solution)
- 2 Additional Face Shield
- 2 Intensity sensors
- 50 Wiper Seal Kit
- 1 Acticlean Gel ( 4 x 4L case)
- 100 Lamp holder seal
- 1 CCB board kit
- 1 Acticlean fill pump
- 4 6 lamp module
- 4 Spare lamp cable.

**NOTES AND CLARIFICATIONS TO SPECIFICATION**

- 1) Addendum 1, P-101 & P-201 – CLARIFICATION – drawings show isolation gates. Please confirm that these gates are provided by other. Isolation gates are not included in the Scope of Supply.
- 2) Addendum 1, P-201 – CLARIFICATION – Drawing show Downstream water level higher than upstream. Please confirm levels

**DOCUMENTATION (SHOP DRAWINGS AND O & M MANUALS)**

***Trojan's Responsibility:***

The following documentation will be supplied to the contractor by Trojan per the following schedule:

- 1 electronic copy of submittal shop drawings 6-8 weeks after receipt of written purchase order.
- 1 electronic copy of Trojan Standard O&M manuals at time of equipment delivery.

**DELIVERY, START-UP AND TRAINING**

Equipment shipped **18-20** weeks after approval of Shop Drawings.

***Installation Contractor's Responsibility:***

The Contractor is responsible for:

- Un loading of the components supplied by Trojan, storage of all components, if required in a clean dry environment
- Installing the equipment outlined in the scope of Supply in accordance with contract drawings, Trojan's shop drawings, instructions and installation checklist.
- Supplying all conduits and conductors and components per the sites state regulations and components indicated as supplied by others,
- Completing the Checklist and returned at least two (2) weeks prior to date requested for commissioning.

The following start-up services will be provided by Trojan-certified technicians:

- Installation assistance as required by phone or fax. Technical Assistance Center 1-866-388-0488 or [tac@trojanuv.com](mailto:tac@trojanuv.com)
- Start-up and testing of the installed UV equipment.
  - If the Trojan's Certified Service Technician determines the Contractor work is not complete and the start-up cannot be completed in the allotted time a return visit will be scheduled at the Contractors expense.
- Classroom and/or jobsite training for operations staff
  - If trainees are not available a return visit will be scheduled at the Contractors expense.
- Performance testing.

**UV Disinfection System Scope of Supply**

---

**WARRANTY**

***Trojan's Responsibility:***

Trojan Technologies will warrant the equipment and parts for 24 months after start-up or 30 months after shipment, whichever comes first. Refer to attached Terms and Conditions for additional details.

**MICROBIOLOGICAL PERFORMANCE TESTING**

***Trojan's Responsibility:***

Trojan will supply a performance testing protocol to the Contractor to be forwarded to the Engineer for approval. Trojan will cover all associated on site costs for performance testing (independent lab services, bottles, shipment, etc.).

Trojan will cover all associated on site costs for performance testing (independent lab services, bottles, shipment, etc.).

Trojan will be responsible for completing the performance testing as per the testing protocol supplied by Trojan and approved by the Engineer. Trojan will produce the final test report (based on data supplied by the independent lab) and will forward the final report to the Contractor.

**PAYMENT TERMS**

20% after approved submittal

75% upon delivery of equipment to site

5% upon equipment acceptance or 60 days after delivery (whichever occurs first)

Net 30 Days

If UV System Start-up is required within 30 days of shipment, Trojan requires 95% payment unless agreed upon in writing before authorizing system Start-up.

Freight included for all North American projects. Incoterms 2002

Selling price does not include any applicable duties or taxes.

**TERMS AND CONDITIONS - ATTACHED**

Trojan appreciates the opportunity to submit this proposal. Our proposal is submitted subject to and based on Trojan's standard terms and conditions, which we have attached as part of our proposal. We believe these terms and conditions are customary in the trade and respectfully reserve the opportunity to negotiate, fair and reasonable contract terms acceptable to both parties, if Trojan is selected for this project.





## Terms and Conditions of Sale

This document sets forth the Terms & Conditions of Sale for goods manufactured and/or supplied, and services provided, by the seller entity identified on the purchase order ("SELLER") and sold to the original purchaser thereof ("BUYER"). The term "SELLER" includes only SELLER, and none of its affiliates. Unless otherwise specifically stated in a previously-executed written purchase agreement signed by authorized representatives of SELLER and BUYER, these Terms & Conditions of Sale establish the rights, obligations and remedies of SELLER and BUYER which apply to this offer and any resulting order or contract for the sale of SELLER's goods and/or services ("Products").

**1. APPLICABLE TERMS & CONDITIONS:** These Terms & Conditions of Sale are contained directly and/or by reference in SELLER's proposal, offer, order acknowledgment, packing slip, and/or invoice documents. The first of the following acts constitutes an acceptance of SELLER's offer and not a counteroffer and creates a contract of sale ("Contract") in accordance with these Terms & Conditions of Sale: (i) BUYER's issuance of a purchase order document against SELLER's offer; (ii) acknowledgement of BUYER's order by SELLER; or (iii) commencement of any performance by SELLER pursuant to BUYER's order. Provisions contained in BUYER's purchase documents (including electronic commerce interfaces) that materially alter, add to, or subtract from the provisions of these Terms & Conditions of Sale are not a part of the Contract.

**2. CANCELLATION AND RETURN:** The whole or any part of this order may be cancelled only with the prior written consent of SELLER. If SELLER does consent to a cancellation, such consent will be given only upon payment of reasonable cancellation charges in an amount determined by SELLER. In addition, with respect to any Products returned on cancellation, BUYER will pay SELLER's cost of placing the returned Products in a saleable condition, sales expenses incurred by SELLER in connection with such returned Products, a reasonable restocking charge and freight costs incurred in connection with the original shipment and in connection with returning such Products to SELLER, all in such amounts as are advised to the BUYER by SELLER.

**3. DELIVERY:** Delivery will be accomplished EXW or CIP at the point of shipment (Incoterms 2020), unless otherwise expressly agreed between the parties. Legal title and risk of loss or damage pass to BUYER upon transfer to the first carrier, regardless of final destination and mode of transit. SELLER will use commercially reasonable efforts to deliver the Products ordered herein within SELLER's normal lead-time necessary for SELLER to deliver the Products sold hereunder. Products will be boxed or crated as determined appropriate by SELLER for protection against normal handling and there will be an extra charge to the BUYER for additional packaging required by the BUYER with respect to waterproofing or other added protection. BUYER has sole responsibility for off-loading, storage and handling of the Products at the site. Where Buyer is responsible for any delay in the delivery date or installation date, the earlier of the date of delivery or the date on which the Products are ready for shipment by SELLER may be treated as the delivery date for purposes of determining the time of payment of the purchase price. Moreover, BUYER will be responsible for reasonable storage and insurance expenses with respect to such Products. Should BUYER fail to effect pick-up of Product as previously agreed in a timely manner, SELLER may, at its discretion, assess reasonable storage charges to the account of BUYER.

**4. INSPECTION:** BUYER will promptly inspect and accept any Products delivered pursuant to this Contract after receipt of such Products. In the event the Products do not conform to any applicable specifications, BUYER will promptly notify SELLER of such nonconformance in writing. SELLER will have a reasonable opportunity to repair or replace the nonconforming Product at its option. BUYER will be deemed to have accepted any Products delivered hereunder and to have waived any such nonconformance for such Products unless a written notification pursuant to this paragraph is received by SELLER within thirty (30) days of delivery to BUYER destination on order.

**5. PRICES & ORDER SIZES:** Prices do not include any charges for services such as insurance; brokerage fees; sales, use, inventory, or excise taxes; import or export duties; special financing fees; value added tax, income, or royalty taxes imposed outside the U.S. or Canada; consular fees; special permits or licenses; or other charges imposed upon the production, sale, distribution, or delivery of Products. BUYER will either pay any and all such charges or provide SELLER with acceptable exemption certificates, which obligation survives performance under this Contract. Installation, maintenance and any other services which relate to the Products are not included unless specifically set forth in the quotation. SELLER reserves the right to establish minimum order sizes and will advise BUYER accordingly. Any orders below the minimum order size are subject to a fee as set out by SELLER. If SELLER's delivery of Products surpasses one (1) year in length, then at least on an annual basis, or if changes to the Products are requested or needed, the parties shall conduct good faith discussions regarding changes to the prices for the Products, to reflect SELLER's increased costs for which SELLER shall be entitled to additional fair and appropriate compensation.

**6. PAYMENTS:** All payments must be made in agreed-to currency, normally Canadian or U.S. Dollars. Unless other payment terms are expressly set forth in the purchase order or otherwise required by the Seller, invoices are due and payable NET 30 DAYS from date of the invoice, without regard to delays for inspection or transportation, with payments to be made by check to SELLER at the address listed in the purchase order or by bank transfer to the account obtainable from SELLER's Accounts Receivable Manager. In the event payments are not made or not made in a timely manner, SELLER may, in addition to all other remedies provided at law, either: (a) declare BUYER's performance in breach and terminate this Contract for default; (b) withhold future shipments until delinquent payments are made; (c) deliver future shipments on a cash-with-order or cash-in-advance basis even after the delinquency is cured; (d) charge interest on the outstanding balance at a rate of 1.5% per month or the maximum rate permitted by law, if lower, for each month or part thereof that there is an outstanding balance plus applicable storage charges and/or inventory carrying charges; (e) repossess the Products for which payment has not been made; (f) pursue other collection efforts and recover all associated costs including reasonable attorney's fees; or (g) combine any of the above rights and remedies as is practicable and permitted by law. BUYER is prohibited from setting off any and all monies owed under this Contract from any other sums, whether liquidated or not, that are or may be due to the BUYER, which arise out of a different transaction with SELLER or any of its affiliates. Should BUYER's financial condition become unsatisfactory to SELLER in its discretion, SELLER may require payment in advance or other security. If BUYER fails to meet these requirements, SELLER may treat such failure as reasonable grounds for repudiation of this Contract, in which case reasonable cancellation charges shall be due to SELLER. BUYER hereby grants SELLER a security interest in the Products, wherever located, and whether now existing or hereafter arising or acquired from time to time, and in all accessions thereto and replacements or modifications thereof, as well as all proceeds of the foregoing, to secure payment in full of all amounts to Seller, which payment releases the security interest but only if such payment could not be considered an avoidable transfer under applicable laws. The security interest granted hereby constitutes a purchase money security interest under the applicable Uniform Commercial Code or Personal Property Security Act or other applicable law, and SELLER is authorized to make whatever registration or notification or take such other action as SELLER deems necessary or desirable to perfect such security interest. BUYER's insolvency, bankruptcy, assignment for the benefit of creditors, or dissolution or termination of the existence of BUYER, constitutes a default under this Contract and affords SELLER all of the remedies of a secured creditor under applicable law, as well as the remedies stated above for late payment or non-payment.

**7. LIMITED WARRANTY:** Unless specifically provided otherwise in SELLER's quotation, SELLER provides the following Limited Warranty. SELLER warrants that Products sold hereunder will be free from defects in material and workmanship and will, when used in accordance with the manufacturer's operating and maintenance instructions, conform to any express written warranty pertaining to the specific goods purchased, which for Products is for a period of twelve (12) months from delivery. SELLER warrants that services furnished hereunder will be free from defects in workmanship for a period of ninety (90) days from the completion of the services. Products repaired or replaced are not covered by any warranty except to the extent repaired or replaced by SELLER, an authorized representative of SELLER, or under specific instructions by SELLER, in which cases, the Products will be covered under warranty up to the end of the warranty period applicable to the original Products. The above warranties do not include the cost of shipping and handling of returned items. Parts provided by SELLER in the performance of services may be new or refurbished parts functioning equivalent to new parts. Any non-functioning parts that are repaired by SELLER shall become the property of SELLER. No warranties are extended to consumable items such as, without limitation, light bulbs, and for normal wear and tear. All other guarantees, warranties, conditions and representations, either express or implied, whether arising under any statute, law, commercial usage or otherwise, including implied warranties of merchantability and fitness for a particular purpose, are hereby excluded. The sole remedy for Products not meeting this Limited Warranty is replacement, credit or refund of the purchase price, as determined by SELLER in its sole discretion. This remedy will not be deemed to have failed of its essential purpose so long as SELLER is willing to provide such replacement, credit or refund. To make a warranty claim, BUYER must notify SELLER in writing within 5 days of discovery of the defect in question. This notification must include a description of the problem, a copy of the applicable operator's log, a copy of BUYER's maintenance record and any analytical results detailing the problem. Any warranty hereunder or performance guarantees shall only be enforceable if (a) all equipment is properly installed, inspected regularly, and is in good working order, (b) all operations are consistent with SELLER recommendations, (c) operating conditions at the installation site have not materially changed and remain within anticipated specifications, and (d) no reasonably unforeseeable circumstances exist or arise.

**8. INDEMNIFICATION:** Indemnification applies to a party and to such party's successors-in-interest, assignees, affiliates, directors, officers, and employees ("Indemnified Parties"). SELLER is responsible for and will defend, indemnify and hold harmless the BUYER Indemnified Parties against all losses, claims, expenses or damages which may result from accident, injury, damage, or death due to SELLER's breach of the Limited Warranty. BUYER is responsible for and will defend, indemnify and hold harmless SELLER Indemnified Parties against all losses, claims, expenses, or damages which may result from accident, injury, damage, or death due to the negligence or misuse or misapplication of any Products or the breach of any provision of this Contract by the BUYER or any third party affiliated or in privity with BUYER.

**9. PATENT PROTECTION:** Subject to all limitations of liability provided herein, SELLER will, with respect to any Products of SELLER's design or manufacture, indemnify BUYER from any and all damages and costs as finally determined by a court of competent jurisdiction in any suit for infringement of any U.S. or Canadian patent (or European patent for Products that SELLER sells to BUYER for end use in a member state of the E.U. or the U.K.) that has issued as of the delivery date, solely by reason of the sale or normal use of any Products sold to BUYER hereunder and from reasonable expenses incurred by BUYER in defense of such suit if SELLER does not undertake the defense thereof, provided that BUYER promptly notifies SELLER of such suit and offers SELLER either (i) full and exclusive control of the defense of such suit when Products of SELLER only are involved, or (ii) the right to participate in the defense of such suit when products other than those of SELLER are also involved. SELLER's warranty as to use patents only applies to infringement arising solely out of the inherent operation of the Products according to their applications as envisioned by SELLER's specifications. In case the Products are in such suit held to constitute infringement and the use of the Products is enjoined, SELLER will, at its own expense and at its option, either procure for BUYER the right to continue using such Products or replace them with non-infringing products, or modify them so they become non-infringing, or remove the Products and refund the purchase price (prorated for depreciation) and the transportation costs thereof. The foregoing states the entire liability of SELLER for patent

infringement by the Products. Further, to the same extent as set forth in SELLER's above obligation to BUYER, BUYER agrees to defend, indemnify and hold harmless SELLER for patent infringement related to (x) any goods manufactured to the BUYER's design, (y) services provided in accordance with the BUYER's instructions, or (z) SELLER's Products when used in combination with any other devices, parts or software not provided by SELLER hereunder.

**10. TRADEMARKS AND OTHER LABELS:** BUYER agrees not to remove or alter any indicia of manufacturing origin or patent numbers contained on or within the Products, including without limitation the serial numbers or trademarks on nameplates or cast, molded or machined components.

**11. SOFTWARE AND INTELLECTUAL PROPERTY:** All licenses to SELLER's separately provided software products are subject to the separate software license agreement(s) accompanying the software media. In the absence of such express licenses and for all other software, SELLER grants BUYER only a personal, non-exclusive license to access and use the software provided by SELLER with Products purchased hereunder solely as necessary for BUYER to enjoy the benefit of the Products. A portion of the software may contain or consist of open source software, which BUYER may use under the terms and conditions of the specific license under which the open source software is distributed. BUYER agrees that it will be bound by all such license agreements. Title to software remains with the applicable licensor(s). All SELLER contributions to the Products, the results of the services, and any other work designed or provided by SELLER hereunder may contain or result in statutory and non-statutory Intellectual Property, including but not limited to patentable subject matter or trade secrets; and all such Intellectual Property remains the sole property of SELLER; and BUYER shall not disclose (except to the extent inherently necessary during any resale of Product sold hereunder), disassemble, decompile, or any results of the Services, or any Products, or otherwise attempt to learn the underlying processes, source code, structure, algorithms, or ideas.

**12. PROPRIETARY INFORMATION AND PRIVACY:** "Proprietary Information" means any information, technical data, or know-how in whatever form, whether documented, contained in machine readable or physical components, mask works or artwork, or otherwise, which SELLER considers proprietary, including but not limited to service and maintenance manuals. BUYER and its customers, employees, and agents will keep confidential all such Proprietary Information obtained directly or indirectly from SELLER and will not transfer or disclose it without SELLER's prior written consent, or use it for the manufacture, procurement, servicing, or calibration of Products or any similar products, or cause such products to be manufactured, serviced, or calibrated by or procured from any other source, or reproduce or otherwise appropriate it. All such Proprietary Information remains SELLER's property. No right or license is granted to BUYER or its customers, employees or agents, expressly or by implication, with respect to the Proprietary Information or any patent right or other proprietary right of SELLER, except for the limited use licenses implied by law. In respect of personal data supplied by BUYER to SELLER, BUYER warrants that is duly authorized to submit and disclose these data, including but not limited to obtaining data subjects' informed consent. SELLER will manage BUYER's information and personal data in accordance with its Privacy Policy, a copy of which is available to Buyer upon request. In respect of other data and information that SELLER may receive in connection with BUYER's use of the Products including without limitation data that are captured by the Products and transmitted to SELLER, BUYER hereby grants SELLER a non-exclusive, worldwide, royalty-free, perpetual, non-revocable license to use, compile, distribute, display, store, process, reproduce, or create derivative works of such data as needed for Product operation and maintenance, and to aggregate such data for use in an anonymous manner, solely to facilitate marketing, sales and R&D activities of SELLER and its affiliates.

**13. SPECIAL TOOLS, DIES, JIGS, FIXTURES AND PATTERNS:** Any tools, dies, jigs, fixtures, patterns and similar items which are included or required in connection with the manufacture and/or supply of the Products will remain the property of SELLER without credit to the BUYER. SELLER assumes the cost for maintenance and replacement of such items and shall have the right to discard and scrap any such item after it has been inactive for a minimum of one year, without credit to the BUYER.

**14. CHANGES AND ADDITIONAL CHARGES:** SELLER reserves the right to make design changes or improvements to any products of the same general class as Products being delivered hereunder without liability or obligation to incorporate such changes or improvements to Products ordered by BUYER unless agreed upon in writing before the Products' delivery date.

**15. SITE ACCESS / PREPARATION / WORKER SAFETY / ENVIRONMENTAL COMPLIANCE:** In connection with services provided by SELLER, BUYER agrees to permit prompt access to equipment. BUYER assumes full responsibility to back-up or otherwise protect its data against loss, damage or destruction before services are performed. BUYER is the operator and in full control of its premises, including those areas where SELLER employees or contractors are performing service, repair, and maintenance activities. BUYER will ensure that all necessary measures are taken for safety and security of working conditions, sites, and installations during the performance of any services. BUYER is the generator of any resulting wastes, including without limitation hazardous wastes. BUYER is solely responsible to arrange for the disposal of any wastes at its own expense. BUYER will, at its own expense, provide SELLER employees and contractors working on BUYER's premises with all information and training required under applicable safety compliance regulations and BUYER's policies. SELLER has no responsibility for the supervision or actions of BUYER's employees or contractors or for non-SELLER items (e.g., chemicals, equipment) and disclaims all liability and responsibility for any loss or damage that may be suffered as a result of such actions or items, or any other actions or items not under SELLER's control.

**16. LIMITATIONS ON USE:** BUYER will not use any Products for any purpose other than those identified in SELLER's catalogs and literature as intended uses. Unless SELLER has advised the BUYER in writing, in no event will BUYER use any Products in drugs, food additives, food, or cosmetics, or medical applications for humans or animals. In no event will BUYER use in any application any Product that requires FDA 510(k) clearance unless and only to the extent the Product has such clearance. BUYER will not sell, transfer, export, or re-export any SELLER Products or technology for use in activities which involve the design, development, production, use, or stockpiling of nuclear, chemical, or biological weapons or missiles, nor use SELLER Products or technology in any facility which engages in activities relating to such weapons. Unless the "ship-to" address is in California, U.S.A., the Products are not intended for sale in California and may lack markings required by California Proposition 65; accordingly, unless BUYER has ordered Products specifying a California ship-to address, BUYER will not sell or deliver any SELLER Products for use in California. Any warranty granted by SELLER is void if any goods covered by such warranty are used for any purpose not permitted hereunder.

**17. EXPORT AND IMPORT LICENSES AND COMPLIANCE WITH LAWS:** Unless otherwise expressly agreed, BUYER is responsible for obtaining any required export or import licenses necessary for Product delivery. BUYER will comply with all laws and regulations applicable to the installation or use of all Product, including applicable import and export control laws and regulations of the U.S., E.U., and any other country having proper jurisdiction, and will obtain all necessary export or import licenses in connection with any subsequent export, re-export, transfer, and use of all Product and technology delivered hereunder. BUYER will not sell, transfer, export, or re-export any SELLER Product or technology for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical, or biological weapons or missiles, nor use SELLER Product or technology in any facility which engages in activities relating to such weapons. BUYER will comply with all local, national, and other laws of all jurisdictions globally relating to anti-corruption, bribery, extortion, kickbacks, or similar matters which are applicable to BUYER's business activities in connection with this Contract, including but not limited to the U.S. Foreign Corrupt Practices Act of 1977, as amended (the "FCPA"). BUYER agrees that no payment of money or provision of anything of value will be offered, promised, paid, or transferred, directly or indirectly, by any person or entity, to any government official, government employee, or employee of any company owned in part by a government, political party, political party official, or candidate for any government office or political party office to induce such organizations or persons to use their authority or influence to obtain or retain an improper business advantage for BUYER or for SELLER, or which otherwise constitute or have the purpose or effect of public or commercial bribery, acceptance of or acquiescence in extortion, kickbacks, or other unlawful or improper means of

obtaining business or any improper advantage, with respect to any of BUYER's activities related to this Contract. SELLER asks BUYER to "Speak Up!" if aware of any violation of law, regulation, or our Code of Conduct ("CoC") in relation to this Contract. See [www.danaherintegrity.com](http://www.danaherintegrity.com) and [www.danaher.com/how-we-work/integrity-and-compliance](http://www.danaher.com/how-we-work/integrity-and-compliance) for a copy of the CoC and for access to our Helpline portal.

**18. RELATIONSHIP OF PARTIES:** BUYER is not an agent or representative of SELLER and will not present itself as such under any circumstances, unless and to the extent it has been formally screened by SELLER's compliance department and received a separate duly-authorized letter from SELLER setting forth the scope and limitations of such authorization.

**19. FORCE MAJEURE:** SELLER is excused from performance of its obligations under this Contract to the extent caused by acts or omissions that are beyond its control, including but not limited to Government embargoes, blockages, seizures or freezing of assets, delays, or refusals to grant an export or import license, or the suspension or revocation thereof, or any other acts of any Government; fires, floods, severe weather conditions, or any other acts of God; quarantines; epidemics and pandemics; labor strikes or lockouts; riots; strife; insurrections; civil disobedience or acts of criminals or terrorists; war; material shortages or delays in deliveries to SELLER by third parties. In the event of the existence of any force majeure circumstances, the period of time for delivery, payment terms, and payments under any letters of credit will be extended for a period of time equal to the period of delay. If the force majeure circumstances extend for six months, SELLER may, at its option, terminate this Contract without penalty and without being deemed in default or in breach thereof.

**20. NON-ASSIGNMENT AND WAIVER:** BUYER will not transfer or assign this Contract or any rights or interests hereunder without SELLER's prior written consent. Failure of either party to insist upon strict performance of any provision of this Contract, or to exercise any right or privilege contained herein, or the waiver of any breach of the terms or conditions of this Contract, will not be construed as thereafter waiving any such terms, conditions, rights, or privileges, and the same will continue and remain in force and effect as if no waiver had occurred.

**21. FUNDS TRANSFERS:** BUYER and SELLER both recognize that there is a risk of banking fraud when individuals impersonating a business demand payment under new mailing or banking transfer instructions. To avoid this risk, BUYER must verbally confirm any new or changed mailing or banking transfer instructions by calling SELLER and speaking with SELLER's Accounts Receivable Manager before transferring any monies using the new instructions. Both parties agree that they will not institute mailing or banking transfer instruction changes and require immediate payment under the new instructions, but will instead provide a ten (10) day grace period to verify any mailing or banking transfer instruction changes before any new or outstanding payments are due using the new instructions.

**22. LIMITATION OF LIABILITY:** None of SELLER, its successors-in-interest, assignees, affiliates, directors, officers, and employees will be liable to any BUYER Indemnified Parties under any circumstances for any special, treble, incidental, or consequential damages, including without limitation, damage to or loss of property other than for the Products purchased hereunder; damages incurred in installation, repair, or replacement; lost profits, revenue, or opportunity; loss of use; losses resulting from or related to downtime of the Products or inaccurate measurements or reporting; the cost of substitute products; or claims of any BUYER's Indemnified Parties' customers for such damages, howsoever caused, and whether based on warranty, contract, and/or tort (including negligence, strict liability or otherwise). The total liability of SELLER, its successors-in-interest, assignees, affiliates, directors, officers, and employees arising out of the performance or nonperformance hereunder, or SELLER's obligations in connection with the design, manufacture, sale, delivery, and/or use of Products, will in no circumstance exceed the amount actually paid to SELLER for Products delivered hereunder.

**23. APPLICABLE LAW AND DISPUTE RESOLUTION:** All issues relating to the construction, validity, interpretation, enforcement, and performance of this agreement and the rights and obligations of SELLER and the BUYER hereunder shall be governed by the laws of the Province of Ontario and the federal laws of Canada applicable therein. Any provisions of the International Sale of Goods Act or any convention on contracts for the international sale of goods shall not be applicable to this agreement. The parties submit to and consent to the non-exclusive jurisdiction of courts located in the Province of Ontario.

**24. ENTIRE AGREEMENT, TERM & MODIFICATION:** These Terms & Conditions of Sale constitute the entire agreement between the parties and supersede any prior agreements or representations, whether oral or written. Upon thirty (30) days prior written notice, SELLER may, in its sole discretion, elect to terminate any order for the sale of Products and provide a pro-rated refund for any pre-payment of undelivered Products. No change to or modification of these Terms & Conditions shall be binding upon SELLER unless in a written instrument specifically referencing that it is amending these Terms & Conditions of Sale and signed by an authorized representative of SELLER. SELLER rejects any additional or inconsistent Terms & Conditions of Sale offered by BUYER at any time, whether or not such terms or conditions materially alter the Terms & Conditions herein and irrespective of SELLER's acceptance of BUYER's order for the described goods and services.

---

Terms and Conditions Covering Sales of Configured-to-Order Projects and Systems

In addition to all terms and conditions above, the following sections apply to sales of Configured-to-Order Projects, Systems, and the like:

**101. PAYMENT.**

**101.1** Payments will be made per the schedule of payment events set forth in Seller's Quotation; provided that if the Start-Up Date (as defined below) is less than 30 days after the Acceptance Date, 90% of the purchase price is due on or before the Start-Up Date.

**101.2.** In the event that achievement of a scheduled payment event is delayed or suspended due to the Buyer's convenience or other reasons for which the Buyer or its representatives is responsible, such payment event will be deemed to have occurred and Seller shall be entitled to invoice Buyer as if achievement of such payment event had been achieved. In such circumstances, Buyer must notify Seller in writing of the reasons for the delay and anticipated duration of the delay. Seller will mark the Products (or parts thereof) as the Buyer's property and shall store the Products (or parts thereof) in a segregated area until actual delivery.

**102. DELIVERY**

**102.1** SELLER will request the BUYER to provide a firm date for delivery of the Products to the project site (the "Delivery Date") which SELLER will then use to establish the production schedule for the Products. The Delivery Date will then be binding on the BUYER except for any changes made in accordance with the provisions below.

**102.2** The BUYER can request a rescheduling of the Delivery Date on one occasion only by notifying SELLER in writing not less than four weeks prior to the scheduled Delivery Date. The BUYER may request that the Delivery Date be extended by a period up to six weeks, without penalty, but may not request that the Delivery Date be moved forward. The BUYER may also request that the Delivery Date be extended beyond a six-week period but, SELLER may not agree to such extension, beyond the maximum six-week extension period

**102.3** SELLER may, in its sole discretion, agree to change the Delivery Date on more than one occasion or if less than four weeks' prior notice is provided of a requested change, but is under no obligation to do so.

**102.4** SELLER reserves the right to reschedule the Delivery Date to a date prior to or subsequent to the scheduled Delivery Date in order to accommodate its shipping, production or other requirements. This right to reschedule will be applicable unless otherwise agreed in writing by an authorized officer of SELLER. SELLER will provide the BUYER or its representative with a minimum of 24 hours' notice of any such rescheduling.

**102.5** Where any change to the Delivery Date is made at BUYER's request, for all purposes with respect to the warranty and payment provided by SELLER in connection with the Products, the initial Delivery Date will be considered to be the Delivery Date regardless of any change later made to the Delivery Date.

### **103. ACCEPTANCE**

**103.1** During the period between the Delivery Date and the Start-up Date, the BUYER shall prepare the Products and the project site for installation and start-up and, unless otherwise agreed in writing by an authorized representative of SELLER, shall complete acceptance testing with respect to the Products. The Products shall be deemed to be accepted on the earliest to occur of the following dates (the "Acceptance Date"): (a) that date on which the Products can function in either manual or automatic operation and provide disinfection in accordance with criteria specified in the Quotation, or (b) 60 days after the Delivery Date.

**103.2** All amounts which remain owing by the BUYER for the Products, including any amount which is specified to be payable on the Acceptance Date, will be paid by the BUYER to SELLER within 30 days after the Acceptance Date, unless otherwise agreed in writing by an authorized representative of SELLER.

**103.3** Written notification must be given by the BUYER to SELLER within seven days after the Acceptance Date listing any outstanding deficiencies with respect to the Products and SELLER will use all reasonable efforts to correct such deficiencies promptly.

### **104. START-UP**

**104.1** SELLER will request a firm date for start-up of the Equipment (the "Start-Up Date"). Trojan will then schedule its technician to be on-site for the Start-up Date. The Start-up Date is binding except for any changes made in accordance with the provisions below.

**104.2** On the Start-up Date, BUYER must have the Equipment and site ready as provided in the Installation Preparation Checklist contained in the Contractor Installation Package sent to BUYER and must have paid all amounts then due and payable to SELLER.

**104.3** BUYER can request a rescheduling of the Start-up Date by notifying SELLER in writing not less than three weeks prior to the Start-up Date. BUYER may request that the Start-up Date be extended but may not request that the Start-up Date be moved forward. SELLER requires a minimum extension period of two weeks between the existing Start-up Date and the requested new Start-up Date in order to reschedule its technician.

**104.4** SELLER may, in its sole discretion, agree to reschedule the Start-up Date where a BUYER requests less than a two-week extension but is under no obligation to do so. In the event that SELLER does agree to less than a two-week extension or that BUYER requests more than two changes to the Start-up Date, BUYER will be charged an administration fee in an amount determined by SELLER.

**104.5** SELLER reserves the right to reschedule the Start-up Date to a date which is prior to or subsequent to the scheduled Start-up Date in order to accommodate its resource availability. This right to reschedule will be applicable unless otherwise agreed in writing by an authorized officer of SELLER. SELLER will provide BUYER or its representative with a minimum of 72 hours' notice of any such change to the Start-up Date.



**104.6** In the event that SELLER'S technician arrives at the project site and finds that the Equipment or the project site is not ready for start-up as defined in the Contractor Installation Package, or any amounts then due and payable to SELLER remain unpaid, BUYER may either:

(a) provided all amounts then due and payable to SELLER have been paid, issue a purchase order for all costs involved in having SELLER correct the deficiencies, or

(b) have SELLER'S technician leave the site and then reschedule the Start-up Date to a date when all deficiencies will be corrected, and the Equipment will be ready for start-up as defined in the Contractor Installation Package. If BUYER selects this option, the cost of rescheduling will be not less than a minimum amount specified by SELLER, with the final cost being determined by SELLER based on its costs and expenses incurred in connection with the rescheduling.

## SYSTEM OVERVIEW





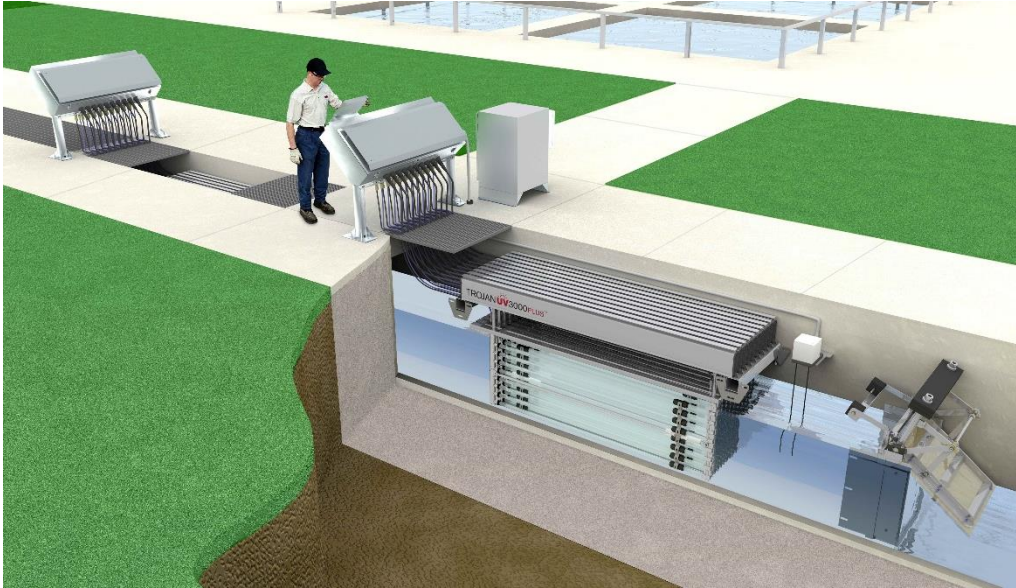
---

## SYSTEM OVERVIEW

The TrojanUV3000Plus™ is a highly flexible and reliable UV disinfection system with demonstrated performance in almost 3000 installations around the world. The TrojanUV3000Plus™ consists of several components:

- UV Modules - Contains germicidal lamps and electronic ballasts
- System Control Center (SCC) - Controls the functions of the UV Modules
- Power Distribution Center(s) (PDC) - Provides the power for each UV Module.
- ActiClean™ Cleaning System (ACS) and Hydraulic System Center (HSC) (optional) -Automatically cleans the quartz sleeves of the UV Modules to ensure proper disinfection. This cleaning system is hydraulically driven by the HSC
- UV Sensor(s) - Measures the UV intensity.
- On-line UV Transmittance Controller and Sensor (optional) - Measures the UV Transmittance of the water. The SCC uses this information and adjusts the lamp parameters to maintain UV dose and disinfection.
- Water Level Sensor - Ensures all lamps are submerged
- Water Level Controller (Optional) - Maintains effluent level within UV channel
- Module Support Rack - Supports UV module bank within the channel.





## SYSTEM COMPONENTS

### UV MODULES

The module is the support structure for the UV lamps, enclosed in quartz sleeves, and for the ActiClean™ Cleaning System. The module enclosure contains the ballasts, module control boards and wiring from each ballast to lamp. All ballast and lamp wiring runs inside the module frame to shield them from the harsh effluent environment and exposure to UV. The module is 6P rated – air and water tight – to ensure all components are protected from the harsh effluent, dust and moisture.

Modules are installed in open channels parallel to the flow direction. A series of modules placed side by side across the channel defines a bank or reactor. The number of lamps and lamp spacing depends on effluent quality and flow rate.

Systems are available in 4, 6, or 8 lamp modules. The module/bank configuration, number of channels and channel width is determined by Trojan Technologies based on information collected from the site.



UV Module



### SYSTEM CONTROL CENTER (SCC)

The SCC encompasses all of the hardware required to control the UV system. It includes a PLC or a microcontroller, Operator Interface, input/output connections and communication hardware. The SCC is also equipped with an extensive alarm reporting system to ensure fast and accurate diagnosing of system processes and maintenance alarms. The SCC can be located as a stand alone unit mounted on a wall/pedestal or it can be housed in one of the Power Distribution Center's.



System Control Center (SCC) - PLC

### POWER DISTRIBUTION CENTER (PDC)

The PDC powers each bank of modules and typically spans the width of the channel. The PDC distributes power from the main electrical service out to the modules in the bank. It contains the communication and control equipment for the bank of modules.



PDC





---

## **ACTICLEAN™ CLEANING SYSTEM (ACS) AND HYDRAULIC SYSTEMS CENTER (HSC)**

When the ACS is used, a magnetically coupled submersible wiper drive is supplied on each UV module. This patented design drives a wiper carriage assembly with attached wiper canisters along the UV modules. The wiper canisters surround each quartz lamp sleeve and are filled with a Trojan approved cleaning agent. The cleaning fluid in the wiper canisters contacts the lamp sleeves between two wiper seals and maintains the sleeve transmittance to ensure disinfection.

Cleaning is achieved mechanically with the scraping action of the wiper seals and chemically by the chemical reaction between the cleaning agent and the build-up on the sleeves. The cleaning takes place while the lamps are submersed and operating.

All the lamp sleeves within the bank are cleaned simultaneously. The frequency of cleaning is adjustable at the Operator Interface on the SCC.

The ACS is hydraulically actuated by the HSC, which is located in close proximity to the UV channel. The HSC contains the pump, valves, and reservoir for the ACS.



*Hydraulic System Center Compact  
(HSC Compact)*

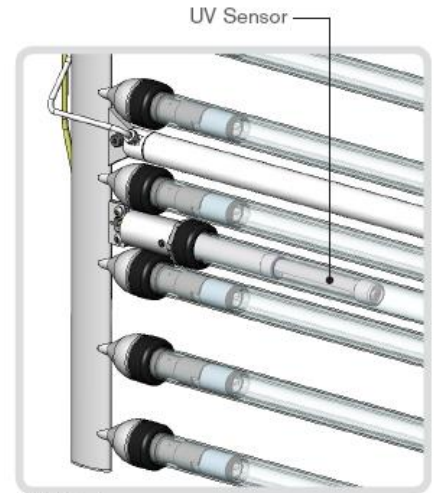




## UV SENSOR

The patented UV Sensor measures the UV intensity within each bank of modules. As only one UV Sensor is required per bank of lamps, the sensor is located in the center module of the bank's lamps.

The UV Sensor incorporates a radiant collector that detects light from the adjacent lamps. The light is funneled to the photosensitive material and is converted into an analog signal displayed in milliwatts per square centimeter at the Operator Interface on the SCC.



UV Module

## ON-LINE UV TRANSMITTANCE CONTROLLER AND SENSOR (optional)

The optional Hach UV Transmittance instrument samples and measures the percent of UV transmittance (%T) in the effluent. The results are communicated to the SCC and are used to adjust the UV dose in conjunction with flow signals and lamp age to maintain disinfection and minimize power consumption. In systems that do not use the UV Transmittance Controller and Sensor, the percent transmittance is measured by other means (e.g. UV Photometer) and a single value is input into the SCC at the Operator Interface.



Hach UVAS sc Sensor



## WATER LEVEL SENSOR

Another feature is the standard Low Water Level Sensor and an optional High Water Level Sensor. These sensors are positioned in each channel downstream of the UV system banks. A high or low water level will trigger an alarm at the SCC and shutdown the UV system.



## WATER LEVEL CONTROLLER

A weir, ALC (automatic level controller), or motorized weir gate is used to maintain the optimal water level over the lamps at all flows. Maintaining control of the water level ensures uniform UV exposure for proper disinfection and protects the system by keeping the lamps submerged.



*Automatic Level Controller (ALC)*

## OPERATIONS OVERVIEW

### CONTROL SYSTEM OVERVIEW

The TrojanUV3000Plus™ is designed to operate automatically. Each system is custom sized and programmed to meet site-specific objectives. The operation of the TrojanUV3000Plus™ is managed at the SCC by its controller (either PLC or microcontroller based), which continuously monitors and controls the system's functions. The controller is the brain of the TrojanUV3000Plus™ system and communicates with the Operator Interface, PDC and HSC (optional). The Operator Interface on the SCC allows complete control and monitoring of the TrojanUV3000Plus™.

The TrojanUV3000Plus™ operates using an automatic dose paced control system that ensures disinfection requirements are continuously achieved for the effluent flow conditions; while conserving power. The power to the UV lamps is automatically adjusted in response to analog inputs from the flow meter and UVT Sensor. If the UVT Sensor is not used, a single representative UV transmittance value can be manually input. These inputs are continually monitored in the SCC and the corresponding power setting is adjusted (i.e., turned up/down or on/off) in response to changes in flow or effluent quality. As the lamps age, power is also







---

increased to make sure that the required dose is continuously met. The SCC acts as the brain of the system as it receives input from all of the system monitoring devices and enables the lamps to respond accordingly.

A level control device is positioned just downstream of the reactor to maintain the correct water level over the lamps at all flows.

Each module bank uses a Communications Control Board (CCB), which controls and monitors the lamp, ballast and bank status. The CCB is located with the PDC. The SCC polls each CCB in sequence to continually update the status of modules and ballasts. The messages are decoded by the controller and then checked for errors prior to displaying the data on the Status screen.

The SCC can receive two analog signals that indicate:

- flow from the plant effluent flow meter
- percent Transmittance (%T) from the optional UV Transmittance Controller and Sensor
- optional auxiliary equipment (e.g. ultrasonic level sensor)

Alarm History and Alarm Summary screens provide the operator with an indication of system faults as they occur.

An optional auto answer modem located in the SCC permits off-site Trojan personnel to monitor system performance and assist in diagnosing faults.

## **ACTICLEAN™ CLEANING SYSTEM**

The frequency of ActiClean™ cleaning is set by the operator and then implemented by the SCC.

Cleaning frequency is adjusted depending on the fouling rates (site specific) and may be programmed to operate as frequently as every 2 hours. The recommended cleaning schedule for typical conditions is once every 12 hours.

The cleaning system can also be manually controlled using the Wiper Selector switches located on the HSC.

All modules in a bank are cleaned simultaneously. Each module is fitted with a robust magnetically coupled wiper drive and one wiping canister per lamp. Hydraulic fluid pushes the rods internal piston to extend or retract depending on the direction of flow.

During a cleaning sequence, a solenoid opens and distributes hydraulic fluid from the HSC to the manifold beneath the PDC which then distributes fluid to each module via the hydraulic extend line. To retract the wiper drive, the solenoid switches the direction of hydraulic fluid flow.



**CONTROLS PHILOSOPHY (CP)**

**UV3000PLUS CONTROLS PHILOSOPHY – City, State**

**Project # XXXXXX  
Build Sheet Rev. X**

**Table of Contents**

1.	UV3000PLUS SYSTEM.....	3
1.01	Acronyms and Abbreviations .....	3
1.02	PLC I/O Layout .....	3
1.03	Site Specific Design Data .....	5
1.04	Site Specific Control Strategy .....	6
1.05	Control Strategies Priorities .....	7
1.06	Safety Features.....	7
2.	CONTROL SYSTEM OVERVIEW .....	7
2.01	General Description .....	7
2.02	System Fault Conditions .....	7
3.	BANK CONTROL.....	13
3.01	Bank Control Modes .....	13
3.02	Bank Control Mode Operation .....	13
3.03	Bank Fault System Control Behavior.....	14
4.	HYDRAULIC SYSTEM CENTER (HSC) .....	15
4.01	Wiping Control Modes .....	15
4.02	Wiping Fault System Control Behavior .....	16
5.	FLOW INPUT .....	17
5.01	Flow Measurement Modes .....	17
5.02	Flow Fault System Control Behavior .....	18
6.	UVT INPUT .....	19
6.01	UVT Measurement Modes .....	19
6.02	UVT Fault System Control Behavior.....	19
<b>7.</b>	<b>TURBIDITY INPUT .....</b>	<b>20</b>
7.01	Turbidity Measurement Mode .....	20
7.02	Turbidity Fault System Control Behavior .....	20
8.	INTENSITY INPUT .....	20
8.01	Intensity Measurement Modes.....	20
8.02	Intensity Fault System Control Behavior .....	20
9.	DOSE PACING .....	21
9.01	Dose Pacing Control.....	21
9.02	Bank Priority.....	21
<b>9.03</b>	<b>Not Enough Healthy Channels (remove for Multiple Channels/section duplicated).....</b>	<b>22</b>
<b>10.</b>	<b>MULTIPLE CHANNEL CONTROL .....</b>	<b>22</b>
10.01	Channel Control Operation .....	22
10.02	Channel Priority .....	23
<b>11.</b>	<b>INLET GATE CONTROL .....</b>	<b>24</b>
11.01	Inlet Gate Control Architecture .....	24
11.02	Inlet Gate Control Modes.....	24
11.03	Inlet Gate Fault System Control Behavior .....	25
<b>12.</b>	<b>MODULATING WEIR GATE .....</b>	<b>26</b>
12.01	Modulating Weir Gate Control Architecture .....	26

## **CONTROLS PHILOSOPHY (CP)**

12.02	Modulating Weir Gate Control Modes .....	26
12.03	Fault and Out of Service Response.....	28
12.04	Weir Gate Dynamic Setpoint .....	28
13.	POWER FAILURE DETECTION .....	29
13.01	Power Failure at SCC .....	29
13.02	Power Failure Detection by PDC .....	29
13.03	Power Failure Detection by SCC .....	29
14.	SYSTEM TRENDING .....	29
15.	PLANT SCADA INTERFACE .....	31
15.01	Plant SCADA Interface Architecture .....	31

## CONTROLS PHILOSOPHY (CP)

### 1. UV3000PLUS SYSTEM

The objective of this document is to provide details regarding the control strategy for the UV3000Plus System. The control philosophy outlines the major hardware components, system status, alarm conditions, and modes of operation of the UV System.

#### 1.01 Acronyms and Abbreviations

CCB	Communication Control Board
HSC	Hydraulic System Center
OIT	Operator Interface Terminal
PDC	Power Distribution Center
PLC	Programmable Logic Controller
RED	Reduction Equivalent Dose
SBC	Sensor Based Control
SBR	Sequencing Batch Reactor
SCADA	Supervisory Control And Data Acquisition
SCC	System Control Center
UV	Ultraviolet
UVT	Ultraviolet Transmittance
UVI	Ultraviolet Intensity

#### 1.02 PLC I/O Layout

The following is the list of PLC hardware that is included in the SCC.

Type	Details
PLC Processor	Allen Bradley CompactLogix L33ER
PDC / HSC Communications	ProSoft Modbus RS485 MVI69E-MBS
Analog Input Card(s)	1769-IF4 (4 Channel)
Analog Output Card(s)	1769-OF2 (2 Channel)
Discrete Output Card(s)	1769-OB16 (16 Channel)
Discrete Input Card(s)	1769-IQ16 (16 Channel)
SCADA Communications	ProSoft Modbus Ethernet MVI69-MNET
Communications	Ethernet/IP Onboard Processor
Operator Interface	Allen Bradley 7" Colour Touchscreen PanelView Plus Beijer 7" Colour Touchscreen

Type	Details
PLC Processor	Allen Bradley ControlLogix L71

## CONTROLS PHILOSOPHY (CP)

PDC / HSC Communications	ProSoft Modbus RS485 MVI56E-MCM
Analog Input Card(s)	1756-IF8 (8 Channel)
Analog Output Card(s)	1756-OF4 (4 Channel)
Discrete Output Card(s)	1756-OB16E (16 Channel)
Discrete Input Card(s)	1756-IB16 (16 Channel)
<b>SCADA Communications</b>	<b>ProSoft Modbus Ethernet MVI56E-MNET</b>
Communications	Ethernet/IP Onboard Processor
Communications	1756-ENBT
Operator Interface	<b>Allen Bradley 7" Colour Touchscreen PanelView Plus</b> <b>Beijer 7" Colour Touchscreen</b>

### ProSoft Modbus Communications

Port No.	Function	Devices	Addresses
1	Channel 1 Communication Channel 2 Communication HSC Communication	Bank 1A, Bank 1B, Bank 1C Bank 2A, Bank 2B, Bank 2C HSC 1	1, 2, 3 4, 5, 6 21
2	Spare		

### Analog Input Card

- Flow Signal
- UV Transmittance
- **Turbidity (NWRI Option)**
- **Water Level (1 per Channel)**
- **Weir Gate Position (1 per Channel)**

### Discrete Output Card

- No Common Minor Alarm
- No Common Major Alarm
- No Common Critical Alarm
- Bank On/Off Status (1 per Bank)
- **Inlet Slide Gate Open (1 per Channel)**
- **Inlet Slide Gate Close (1 per Channel)**
- **Weir Gate Open (1 per Channel)**
- **Weir Gate Close (1 per Channel)**
- **NWRI Critical Alarm (NWRI Only)**

### Discrete Input Card

- **Inlet Gate Ready (Remote) (1 per Channel)**
- **Inlet Gate Opened (1 per Channel)**
- **Inlet Gate Closed (1 per Channel)**

## CONTROLS PHILOSOPHY (CP)

- Outlet Weir Gate Ready (Remote) (1 per Channel)
- Outlet Weir Gate Fault (1 per Channel)
- Channel High Water Level (1 per Channel)
- SBR/Permissive Run
- On UPS Battery
- No UPS Alarm

### Analog Output Card

- Weir Gate Position Control (1 per Channel)

### 1.03 Site Specific Design Data

The following parameters were used to configure the UV system and are specific for this site

Item	Configuration	Description
Number of Channels	2	
Number of Banks per Channel	3	
Number of Modules per Bank	8	
Number of Lamps per Module	8	
Number of HSCs	2	
Number of Wiper Groups per HSC	2	
Redundant Banks per Channel	0	
Minimum Banks On per Channel	1	
High Water Level Sensing	Yes No	1/Channel
Low Water Level Sensing	Yes	1/Channel
Analog Water Level Sensing	Yes No	1/Channel
UVT Measurement	Analog SCADA Manual	
Flow Measurement	Analog SBR SBR Analog SCADA Analog SCADA SBR Manual	
SCADA	Ethernet	
UPS	Yes No	
NWRI Controls	No	

## CONTROLS PHILOSOPHY (CP)

Item	Configuration	Description
OIT Language	English	
<b>Inlet Gate Present</b>	Yes – Control Yes – Monitor Only No	
<b>Outlet Gate Present</b>	Yes – Modulating Weir No	
System Peak Flow	XX.X MGD	
Peak Flow Per Channel	XX.X MGD	
<b>Dose Type</b>	4.0" NWRI Mean MS2 V2.1A Greenway 4.0" 2012 NWRI MS2 04/2014 4.0" NWRI LC75 MS2 V1.0 Carollo LAC05+CF 4.0" Dillon Mean TC V1.0 4.0" NWRI Mean T1 V2.1B Greenway 4.0" UVDGM Mean T1MS2Br V1.0 Greenway 3.5" NWRI LC75 MS2 V1.0 Wild Horse Pass 3.5" Dillon (SPSS) Mean V1.0 3.0" Dillon Mean FC V1.0 3.0" NWRI Mean MS2 V2.0 Low UVT 1-Bank 3.0" NWRI Mean T1 V2.0A Low UVT 4.0 UVDIS Mean V1.0 3.5 UVDIS Mean V1.0 3.0 UVDIS Mean V1.0 3.0 UVDIS Low%T V1.0 4.0 UVDIS High%T V1.0	
Design Dose Target	XX.X mW·s/cm <sup>2</sup>	
Base Retention Time	2.38 Seconds	
EOL Output	0.98	
Lamp Type:	Heraeus	
Fouling Factor	0.95	
Design UVT	XX%	

### 1.04 Site Specific Control Strategy

The following items are non-standard control features for this system which deviates from the Trojan's UV3000Plus 07 control strategy.

- Not applicable for this project.

## CONTROLS PHILOSOPHY (CP)

- Examples of custom features: Known IP addresses, Individual lamp hours, analog weir gates, expansions beyond 2x3 size, communication modules for SCADA, SCADA control of inlet gates, outlet gates, drain valves, bypass channel, witness test.

### 1.05 Control Strategies Priorities

The strategic operational priorities of the UV3000Plus controls are as follows (arranged in order of priority):

- Operator and equipment safety
- Prevention of flood conditions (for multi-channel systems with gate control)
- Maintain dose at or above operator setpoint at all times including during equipment failure conditions

### 1.06 Safety Features

The UV3000Plus control strategy employs a minimum of equipment protection interlocks but does monitor several alarm conditions that will result in control action designed to maintain the delivered dose.

The only critical interlock condition that will disable a bank of UV lamps is a low water level alarm. This alarm input is wired directly to each PDC and will override all lamps to an off state for all modules wired to that PDC. Certain other alarm conditions will trigger a control action that may result in a bank being shut down and another bank coming on in its place or will result in all banks running at full power. Examples of this type of alarm would be a multiple lamp failure, or bank communication fault. These alarm conditions are more fully described later in this document.

## 2. CONTROL SYSTEM OVERVIEW

### 2.01 General Description

The control system for a UV3000Plus system consists of a PLC with associated I/O in a local rack, an OIT for operator interface and system configuration, one or more CCBs which provides I/O termination points and local control for one bank, and one or more HSCs which provide I/O termination points and local control for the wiper control groups. A plant SCADA network may optionally be connected to the PLC through available network protocols and will be able to access designated read and write integer arrays.

The PLC communicates to the PDCs and HSCs via an RS485 Modbus communication card. The PLC polls each PDC and HSC in sequence continually communicating to these devices. Each device, when polled, will respond with a message string that contains status information about modules, ballasts, lamps and the hydraulic system. After sending a polling message, the PLC will check for a valid response from each device. If a device fails to respond within a pre-set time period, a communication failure timer will begin. Each of these devices uses Modbus RS485 protocol to communicate with the PLC. If communication is lost between the PLC and an associated PDC, the PDC will respond according to the "Communication Loss" bank setting and either turn on to full power or remain on and go to full power.

### 2.02 System Fault Conditions

The UV system is subject to several fault conditions, which may be minor, major or critical in nature. All alarms are subject to a minor, major, critical or individually configured alarm delay timer. The following table describes the alarm structure.



## CONTROLS PHILOSOPHY (CP)

<b>Critical Alarms:</b>	Alarms indicate a condition where disinfection may not be met. Alarms may be latched and require a reset from the Operator Interface after the alarm condition is remedied.		
<b>System Level</b>	<b>Alarm Name</b>	<b>Description</b>	<b>Controls Action In Remote Auto</b>
System	<b>Flowmeter Signal Fault</b>	The 4-20mA Flow signal input is below 2mA or above 20.5mA	Use "Default Flow" and run the system at full capacity for disinfection.
	Low Low UV Transmittance (NWRI Alarms Enabled)	UVT is below Low Low UVT setpoint.	Open all channels and run all available banks at full power
	<b>UVT Signal Fault</b>	The 4-20mA UVT signal input is below 2mA or above 20.5mA for the "UVT Meter Fault Delay"	Use "Default UVT" and run the system at full capacity for disinfection.
	Hydraulic Max (Peak Flow) Exceeded	The flow for the number of open channels exceeds the configured Channel Peak Flow Limit	No control action taken.
	Not Enough Healthy Channels (latched)	System requires more healthy channels for disinfection than are available	Open all channels and run all available banks at full power
	Low UV Dose	Calculated Dose is below the configured Alarm Offset %	No control action taken. Additional alarms will occur if prolonged
	Controller Fault	Controller/module fault exists.	Controller faults out. No action can be taken.
	Low Low UV Dose	Calculated Dose is below the configured Alarm Offset %	No control action taken. Additional alarms will occur if prolonged
	<b>Turbidity Signal Fault</b>	The 4-20mA Turbidity signal input is below 2mA or above 20.5mA	If NWRI Alarm Actions Enabled, run all banks at 100%
	<b>High High Turbidity</b>	Turbidity is above high high limit setpoint	If NWRI Alarm Actions Enabled, run all banks at 100%
	NWRI Critical Alarm (Contingency Plan Response)	NWRI Alarms is enabled and one or more of the NWRI alarms are active	Open all channels and run all available banks at full power
	Prosoft Card Not Running	Modbus communications using the Prosoft Card are interrupted	Check that the IO module in slot 1 is enabled
	Channel	<b>Inlet Gate Fail to Completely Open</b>	Gate is commanded to open but the Open Limit Switch is not closed. (Latched)
<b>Inlet Gate Fail to Completely Close</b>		Gate is commanded to close but the Closed Limit Switch is not closed. (Latched)	Channel is flagged as unhealthy and banks in channel stay on. Inlet Gate will not be commanded to move. Another channel will be brought online if possible.

## CONTROLS PHILOSOPHY (CP)

System Level	Alarm Name	Description	Controls Action In Remote Auto
	Inlet Gate Failed To Start Opening	Gate is commanded to open but the Closed Limit Switch is still closed. (Latched)	Channel is flagged as unhealthy and banks in channel time-off for 2 minutes once warmup is completed. Inlet Gate will not be commanded to move. Another channel will be brought online if possible.
	Inlet Gate Fail to Start Closing	Gate is commanded to close but the Open Limit Switch is still closed. (Latched)	Channel is flagged as unhealthy and banks in channel stay on. Inlet Gate will not be commanded to move. Another channel will be brought online if possible.
	Not Enough Healthy Banks Available	UV Controller is unable to meet the dose target with currently available healthy equipment	All banks in the channel are run at 100% power until another healthy channel can be brought online (if available) or the fault is cleared.
	Water Level Signal Fault	The 4-20mA signal from the channel water level sensor is below 2mA or above 20.5mA.	Channel is flagged as unhealthy. Another channel will be brought online if possible. Weir gate will be commanded to the "Safe" position.  If flow is selected as weir calculated the "Default Channel Flow" will be used as the channel flow
	High Water Level	Channel water level is above the high discrete signal or analog setpoint	No control action
	Weir Gate Position Signal Fault	The 4-20mA signal from the weir gate is below 2mA or above 20.5mA	Channel is flagged as unhealthy and weir gate will not be commanded to move. Another channel will be brought online if possible  If flow is selected as weir calculated the "Default Channel Flow" will be used as the channel flow
Bank	Low Water Level	With flow present, channel water level is below the low mechanical setpoint	CCB will immediately turn off bank. Channel is flagged as unhealthy. Another channel will be brought online if possible. Wiping is disabled

<b>Major Alarms:</b>	Alarms indicate a condition where UV equipment has failed or is not setup correctly so that a control action may have taken place to ensure disinfection
----------------------	--

System Level	Alarm Name	Description	Controls Action In Remote Auto
System	High Flow – Out of Validation Range	Flow is above validated range selected dose types only	No control action taken.
	Low UVT Alarm	UVT is below pre-set low limit setpoint.	No control action taken.

## CONTROLS PHILOSOPHY (CP)

System Level	Alarm Name	Description	Controls Action In Remote Auto
HSC	Communication Fault	The HSC is not responding to polling from SCC.	Remote wiping disabled for this HSC.
	Motor Run Fault	Hydraulic pump motor has tripped its overload circuit or has no power	Wiping is disabled for this device until reset at HSC
	Power On Reset	HSC reports power failure by setting POR bit for 1 minute	No control action taken.
	High Fluid Pressure Fault	Hydraulic fluid pressure is high when wiping and sequence shut down	Wiping is disabled for this device until reset at HSC
	Low Fluid Level Fault	Hydraulic fluid reservoir level is low	Wiping is disabled for this device until reset at HSC
	General Pump Fault	Hydraulic pump has tripped its overload circuit	Wiping is disabled for this device until reset at HSC
	Wiper Group Not In Remote	Wiper is not in Remote at HSC	No control action taken.
	Wiper Group Motor Run Fault	Hydraulic pump motor has tripped its overload circuit or has no power	Wiping is disabled for this device until reset at HSC
	Wiper Group Low Fluid Level Shutdown	Hydraulic fluid reservoir level is low	Wiping is disabled for this device until reset at HSC
	Wiper Group High Fluid Pressure Shutdown	Hydraulic fluid pressure is high when wiping and sequence shut down	Wiping is disabled for this device until reset at HSC
Channel	Inlet Gate Not In Remote Auto	Gate is not in Remote Auto.	Channel is flagged as unhealthy and the Inlet Gate will not be commanded to move. Banks will remain on. Another channel will be brought online if possible.
	Weir Gate Discrete Fault	The discrete fault input from the gate is active.	Channel is flagged as unhealthy and banks in channel stay on. Weir Gate will not be commanded to move. Another channel will be brought online if possible.
	Weir Gate Not In Remote Auto	Gate is not in Remote Auto.	Channel is flagged as unhealthy and banks in channel stay on. Weir Gate will not be commanded to move. Another channel will be brought online if possible.
	Weir Gate Failed to Move	Gate is commanded to move but the position feedback signal did not change. (Latched)	Channel is flagged as unhealthy and banks in channel stay on. Weir Gate will not be commanded to move. Another channel will be brought online if possible.
Bank	Multiple Ballast Failure	Number of failed ballasts has exceeded Multiple Lamp Failure Setpoint after warmup (Latched)	Bank is flagged as unhealthy. Another bank will be brought online if possible.
	Multiple Lamp Failure	Number of failed lamps has exceeded Multiple Lamp Failure Setpoint after warmup (Latched)	Bank is flagged as unhealthy. Another bank will be brought online if possible

## CONTROLS PHILOSOPHY (CP)

System Level	Alarm Name	Description	Controls Action In Remote Auto
	Module Comm Fault	One or more modules are not communicating with its CCB	Bank is flagged as unhealthy. Another bank will be brought online if possible
	Not in Remote Auto	Bank is either not in Remote at PDC or not in Auto at SCC	Bank is flagged as unhealthy
	Communication Fault	The CCB is not responding to polling from the SCC.	Bank is flagged as unhealthy. The bank operates as per Comm Failure Mode option selected at Operator Interface
	Power Lost Fault	The number of lamps that are off after warmup exceeds the setpoint	CCB will attempt to restart the bank by requesting a warmup
	Low Low UV Intensity (NWRI Alarms Enabled)	Measured Intensity % is below configured setpoint	Bank is flagged as unhealthy. Another bank will be brought online if possible.
	Adjacent Lamp Failure (NWRI Alarms Enabled)	Lamps have failed that are next to each other either vertically, horizontally or diagonally	Bank is flagged as unhealthy. Another bank will be brought online if possible.

<b>Minor Alarms:</b>	Indicates that the UV system requires maintenance but it is operating in compliance. Alarms are not latched and no reset is required. No other actions will be taken.
----------------------	---

System Level	Alarm Name	Description	Controls Action In Remote Auto
System	Low Flow	Flow is below setpoint.	All banks will time-off if minimum number of banks configured as "0"
	Low Flow - Out of Validation Range	Flow is below validated range selected dose types only	No control action taken.
	Low UVT - Out of Validation Range	UVT is below validated range selected dose types only	No control action taken.
	High UVT - Out of Validation Range	UVT is above validated range selected dose types only	No control action taken.
	Controller Battery Low	The battery in the controller is low and will not be able to maintain the program in the event of a power failure.	No control action taken.
	SCADA Communication Fault	The Plant SCADA network has stopped communication with the Controller.	If SCADA is used to provide flow and the SCADA Fault Control Action system setting is set to "Alarm and Default", the "Default" Flow will be used.
	Winterization Mode	The system is in winterization mode and will not transmit data to SCADA	No control action taken.
	High Turbidity	Turbidity is above high limit setpoint	No control action taken.
	SCC Running on UPS Power	The SCC is running on UPS power after a SCC power loss.	No control action taken.
UPS Fault	The UPS backup for the SCC has a fault.	No control action taken.	

**CONTROLS PHILOSOPHY (CP)**

HSC	Wiper Group Disabled	A wiper group is currently disabled and will not automatically wipe the bank	No control action taken.
Bank	Ballast Failure	A ballast is off that was commanded to be on	No control action taken.
	Lamp Failure	A lamp is off that was commanded to be on	No control action taken.
	Low UV Intensity	Measured Intensity % is below configured setpoint	No control action taken.
	Maximum Lamp Hours Exceeded	Lamps in the bank have been operated for a period longer than the EOL Hours setpoint	No control action taken.
	Power on Reset	CCB reports power failure by setting POR bit for 1 minute	Banks currently running are forced into warm-up.
	Low Water Level Bypassed	Low Water level alarm is bypassed on CCB (DIP Switch 8)	No control action taken.
	Adjacent Lamp Failure (NWR1 Alarms Disabled)	Lamps have failed that are next to each other either vertically, horizontally or diagonally	No control action taken.
	One Or More Modules Disabled	One or more modules within the bank are currently disabled	No control action taken.
	Power Monitor Signal Fault	The signal reported from the power monitor is less than 4mA or greater than 20mA	No control action taken.
	UVI Sensor Input Shorted	CCB is reporting the UVI input has shorted	No control action taken.

## CONTROLS PHILOSOPHY (CP)

### 3. BANK CONTROL

Each UV3000Plus bank consists of a PDC connected to two or more modules. Each module contains two three four ballasts and four six eight lamps. A single ballast is used to monitor and control two lamps. Modules are connected, through individual RS485 communication links, to a custom module board which receives commands from the bank's CCB and generates the necessary signals to control the ballast. Lamp and ballast status information is passed through the module board back to the CCB.

A PDC consists of an electrical power distribution network, used to route power to each module and a CCB used to monitor and control the UV modules, monitor critical system interlocks and monitor a UV intensity sensor for each bank.

#### 3.01 Bank Control Modes

A UV bank can be operated in "Local Off", "Local On" or "Remote" control modes. The selection of "Local Off", "Local On" or "Remote" mode is made through a 3-way selector switch mounted on the associated PDC, which is wired to the CCB. When a bank is in "Local Off" mode all modules are de-energized. When a bank is in "Local On" mode the CCB will energize the bank at full power. When a bank is in the "Remote" mode of operation the SCC is in control of the bank. There are 3 modes of operation for a bank that is in "Remote" mode: "Off"; "Hand" and "Auto".

#### 3.02 Bank Control Mode Operation

There are five possible operational modes that a bank can be placed into: "Local On", "Local Off", "Remote Off", "Remote On" and "Remote Auto". When a bank is in "Local" Mode ("Local On" or "Local Off"), the SCC has no control over the bank. When a bank is in "Remote" Mode, the SCC is responsible for controlling the bank.

##### 3.02.1 "Local Off"

When a bank is placed into "Local Off", the bank will be commanded to turn off immediately if it was running. The bank will remain off while in this mode of operation.

##### 3.02.2 "Local On"

When a bank is placed into "Local On", the bank will operate at 100% power level.

##### 3.02.3 "Remote Off"

When a bank is placed into "Remote Off", the bank will be commanded to turn off immediately if it was running. The bank will remain off while in this mode of operation.

##### 3.02.4 "Remote Hand"

When a bank is placed into "Remote Hand", it is energized for an initial configured warm-up time, and then will drop to a power level that is operator enterable.

## CONTROLS PHILOSOPHY (CP)

### 3.02.5 “Remote Auto”

A bank in “Remote Auto” is controlled by the UV Controller. The SCC will control the number of banks that are operating and the power level of each bank in order to maintain the current delivered UV dose above the entered setpoint.

In “Remote Auto” Mode, all banks are requested to turn on for a configured warm-up time. They will change to the power level that is requested by the UV Controller once the warm-up and dampen timers expire. Additionally, all banks running in “Remote Auto” Mode within a channel will be forced to full power any time another bank within the channel is in a warm-up phase. When a bank is no longer required by the UV Controller, the bank will remain running at a minimum power level until the configured Bank Time-Off period expires. UV System dose pacing is further described in Section 9 DOSE .

The following table further summarizes the available control modes:

Bank Mode	Controlled By	Power Level
Local Off	CCB	Off
Local On	CCB	100%
Remote Off	PLC	Off
Remote Hand	PLC	60% -100% Operator Set
Remote Auto	PLC	Off or 60% - 100% As required by dose pacing

In all modes, individual modules can be disabled by an operator. If the bank is in remote mode, modules can be forced to go through a reset function.

As a bank operates, the CCB will record the Bank Hours, Bank Cycles, and Bank Lamp Hours. An operator can reset/override the Bank Lamp Hours from the operator interface.

### 3.03 Bank Fault System Control Behavior

Banks are subject to several fault conditions with different priority levels. Faults may be a minor priority and identify a service requirement. When in “Remote Auto” mode, a major fault will result in a bank either being shut down or run at full power, as required. A critical fault will prevent the bank from running in any mode. All alarms are subject to a minor, major, critical or individually configured alarm delay timer. Refer Section 2.02 System Fault Conditions for more information.

## CONTROLS PHILOSOPHY (CP)

### 4. HYDRAULIC SYSTEM CENTER (HSC)

Each Hydraulic System Center (HSC) can control the hydraulic wiping of up to eight (8) banks in the system. The SCC communicates to each HSC separately at uniquely configured addresses and will wipe each bank in sequence. Each wiper group is connected to two (2) or more modules through hydraulic manifolds and piping.

The HSC contains a controller which is used to monitor the inputs related to hydraulic operation and to control the wiping functionality of each bank. The SCC Controller communicates with each HSC Controller using a Modbus RS-485 network. Through this network, the SCC Controller can send commands and configuration settings to the HSC and read HSC and Wiper Group statuses.

#### 4.01 Wiping Control Modes

Each bank in the system will have a separate wiper group assigned to it. Each wiper group can be set to “Local Off”, “Local On” or “Remote” control modes. The mode selection is made through a 3-way selector switch mounted on the HSC, which is wired to discrete inputs at the HSC Controller.

##### 4.01.1 Wiper Group “Local Off” Mode

When a Wiper Group Control Mode is set to “Local Off” the wiper will be inhibited from wiping.

##### 4.01.2 Wiper Group “Local On” Mode

When a Wiper Group Control Mode is set to “Local On”, the wiper group will wipe based on local commands made through the Wiper Operation Selection Switch: “Extend”, “Retract” or “Sequence”. If more than one wiper group in an HSC is placed into “Local On” mode, only the first wiper group placed into “Local On” will begin to operate. All other wiper groups set to “Local On” will be ignored. The HSC is only capable of wiping one group at a time. When the HSC Wiper Operation Selection Switch is switched to “Local Retract”, a wiper retract sequence will occur and then the hydraulic system will be shut down. When the HSC Wiper Operation Selection Switch is set to “Local Extend”, a wiper extend sequence will occur and then the hydraulic system will be shut down. When the HSC Wiper Operation Selection Switch is switched to “Local Sequence”, a wiper extend sequence will occur, followed immediately by a wiper retract sequence and then the hydraulic system will be shut down.

##### 4.01.3 Wiper Group “Remote” Mode

When a wiper group is in “Remote”, a wipe sequence may be manually initiated by an operator through the Operator Interface (Manual Wipe Request) or automatically initiated by the HSC after an operator selectable time period has elapsed (Automatic Wipe Request).

#### Manual Remote Wipe Request

Through the “Wiper Overview” Screen on the Operator Interface, the operator can request a manual remote wipe sequence of a single wiper group when in “Remote” Mode. Only one wiper group can operate at a time. As a result, if any wiper group in an HSC is currently in operation the Manual Remote Wipe Request is not available to the operator for any wiper groups in that HSC.



## CONTROLS PHILOSOPHY (CP)

### Automatic Wipe Request

All wiper groups in “Remote” Mode in an HSC will be scheduled by the SCC for an automatic wipe when the “Wiper Cycle Time Delay” has elapsed. This time delay is an operator enterable system setting from the Operator Interface. The UV Controller will initiate a wipe to all HSCs simultaneously. An operator can disable individual wiper groups if desired.

The following table further summarizes the available control modes:

Mode	Initiated By	Wiper Action
Local Off	HSC	Off
Local Extend	HSC	Initiate extend sequence for duration of extend time
Local Retract	HSC	Initiate retract sequence for duration of retract time
Local Sequence	HSC	Initiate extend and then retract sequence
Remote Auto	SCC	Automatic sequence initiated for all enabled wiper groups or OIT initiated sequence for individual wiper group

### 4.02 Wiping Fault System Control Behavior

Wipers are subject to several fault conditions which may be critical in nature and result in an HSC being shut off. Some wiper fault conditions, whether they are critical, major, or minor, must be reset by placing each wiper groups of the HSC into “Local Off” mode. All alarms are subject to a minor, major or critical alarm delay timers. Refer to Section 2.02 *System Fault Conditions* for more information.

Additionally, the following conditions will result in a suspension of timed automatic wiping functions and will display a warning message on the wiping screen, but will not generate an Alarm History message:

- Flow Limit for Wiping Exceeded – indicates that flow is greater than the configured limit for a channel and so timed automatic wiping sequences are suspended until the condition is cleared.
- Low Water – indicates that the water level in a channel is low and so automatic timed wiping sequences are suspended until the condition is cleared (indicated by all banks in a channel at low level)

Wipers already in sequence will complete their sequence regardless of these conditions but a new automatic wipe sequence will not be initiated.

## CONTROLS PHILOSOPHY (CP)

### 5. FLOW INPUT

A flow signal is required in order to provide dose pacing functionality for the UV3000Plus system. The UV System uses one (1) flow signal for control and assumes that the flow is split evenly between active channels and that all the flow allocated to a channel will pass through all banks in that channel. Flow can be displayed in US MGD, L/S, m<sup>3</sup>/Day, gpm, MLD or m<sup>3</sup>/h units as standard options.

#### 5.01 Flow Measurement Modes

##### 5.01.1 Analog Flow Signal

A 4-20mA analog flow signal is brought into the SCC Controller analog input card and scaled to a configurable engineering unit range. The raw signal counts are passed through a signal scaling routine to convert to the configured engineering unit value and then passed through a debouncing filter routine. If an analog flow meter fault occurs, the system flow will be set to the “Default” Flow system setting. An operator may adjust the “Default” Flow value at any time through the system settings screen of the Operator Interface.

The operator can manually override the flow from the System Overview screen of the Operator Interface.

##### 5.01.2 SCADA Analog Flow Signal

An analog flow signal is passed from a Plant Network through a configured SCADA system to a designated address in the SCC Controller. The signal must be passed as a 16-bit integer value that represents an engineering unit signal multiplied by a variable scaling factor. The UV Controller will divide this value by the variable scaling factor to get a scaled flow with 1 or more decimal places of accuracy. When flow is received from SCADA, the debouncing filter routine will not be used. If a SCADA communication fault occurs with the “SCADA Alarm Action” system setting set to “Alarm and Default”, the system flow will be set to the “Default Flow” system setting. An operator may adjust the “Default” Flow value at any time through the system settings screen of the Operator Interface.

The operator can manually override the flow from the System Overview screen of the Operator Interface.

##### 5.01.3 Sequencing Batch Reactor (SBR)

A single discrete SCC Controller input will signal when flow is being passed through the UV system. When the SBR input is on, the system flow is set to the “Default Flow” system setting. An operator may adjust the “Default” Flow value at any time through the system settings screen of the Operator Interface. When the SBR input is off, the system flow is set to zero.

The operator can manually override the flow from the System Overview screen of the Operator Interface.

##### 5.01.4 Sequencing Batch Reactor (SBR) Analog

A 4-20mA analog flow signal is brought into the SCC Controller analog input card and scaled to a configurable engineering units range. The raw signal counts are passed through a signal scaling routine to convert to the configured engineering units value, and then passed through a debouncing filter routine.

## CONTROLS PHILOSOPHY (CP)

A discrete SCC Controller input will signal when flow is being passed through the UV system. When the SBR input is on, the system flow is set to the scaled and debounced analog flow value. When the SBR input is off, the system flow is set to zero.

If an analog flow meter fault occurs while the SBR input is on, the system flow will be set to the “Default Flow” system setting. An operator may adjust the “Default” Flow value at any time through the system settings screen of the Operator Interface.

The operator can manually override the flow from the System Overview screen of the Operator Interface.

### 5.01.5 SCADA Sequencing Batch Reactor (SBR)

A SCADA SBR bit may be passed from a Plant Network through a configured SCADA system to a designated address in the SCC Controller. This bit will signal when flow is being passed through the UV system. When the SCADA SBR bit is on, the system flow is set to the “Default Flow” system setting. When the SCADA SBR bit is off, the system flow is set to zero. If a SCADA communication fault occurs with the “SCADA Alarm Action” system setting set to “Alarm and Default”, the system flow will be set to the “Default” Flow system setting. An operator may adjust the “Default” Flow value at any time through the system settings screen of the Operator Interface.

The operator can manually override the flow from the System Overview screen of the Operator Interface.

### 5.01.6 Calculated Flow Over Weir

Flow is calculated by the UV Controller and is based on the weir gate dimensions, gate position and water level position. The analog water level signal is passed through a signal scaling routine and then passed through a debouncing filter routine. The flow is calculated in the selected engineering units; the system flow is the sum of all open channels calculated flow.

If either a channel water level or channel weir gate position signal fault occur the channel flow will be set to the “Channel Default Flow” system setting and the channel will become unhealthy. A replacement channel will be brought online if available. An operator may adjust the “Channel Default Flow” value at any time through the system settings screen of the operator interface.

The operator can manually override the flow from the system overview screen of the operator interface.

**NOTE: With calculated flow, accurate measurements of each channel and weir gate using a laser level will be required.**

## 5.02 Flow Fault System Control Behavior

Depending on channel flow conditions and/or flow meter status, a critical or major alarm could be generated, resulting in the system running at full capacity for disinfection. All alarms are subject to a minor, major, critical or individually configured alarm delay timer. Refer to section 2.02 *System Fault Conditions* for more information.

## CONTROLS PHILOSOPHY (CP)

### 6. UVT INPUT

A UVT signal is required for the UV3000Plus system dose pacing functionality. The UV3000Plus will use one (1) UVT signal input for control and assume that the effluent flow through all operating banks has the same UVT value. UVT is displayed as a percentage (%).

#### 6.01 UVT Measurement Modes

##### 6.01.1 Analog UVT Signal

A 4-20mA analog UVT signal is brought into the SCC Controller analog input card. The raw signal counts are passed through a signal scaling routine to convert to the percentage value and then passed through a debouncing filter routine. If an analog UVT meter fault occurs, the system UVT will be set to the “Default UVT” system setting. An operator may adjust the “Default” UVT value at any time through the system settings screen of the Operator Interface.

The operator can manually override the UVT from the System Overview screen of the Operator Interface.

##### 6.01.2 SCADA UVT Signal

An analog UVT signal is passed from a Plant Network through a configured SCADA system to a designated address in the SCC Controller. The signal must be passed as a 16-bit integer value that represents a percent multiplied by 10. The SCC Controller will divide this value by 10 to get a scaled UVT with 1 decimal place of accuracy. When UVT is received from SCADA, the debouncing filter routine will not be used. If a SCADA communication fault occurs with the SCADA Alarm Action system setting set to “Alarm and Default”, the system UVT will be set to the “Default” UVT system setting. An operator may adjust the “Default” UVT value at any time through the system settings screen of the Operator Interface.

The operator can manually override the UVT from the System Overview screen of the Operator Interface.

##### 6.01.3 Manual UVT Entry

The operator manually sets the system UVT value from the System Overview screen on the Operator Interface.

#### 6.02 UVT Fault System Control Behavior

UVT faults may be major in nature resulting in the system running at full capacity for disinfection or minor with no control action taken. Refer to section 2.02 *System Fault Conditions* for more information.

## CONTROLS PHILOSOPHY (CP)

### 7. TURBIDITY INPUT

A turbidity signal is available for operator display purposes and is not used for dose pacing control. The UV3000Plus system will use one turbidity input for control and assume that the effluent flow through all operating banks is at the same value. Turbidity is displayed in NTU.

#### 7.01 Turbidity Measurement Mode

##### 7.01.1 Analog Turbidity Signal

A 4-20 mA input signal is scaled from 0 to a user enterable value in NTU. The raw signal counts are passed through a signal scaling routine to convert to NTU and then passed through a debouncing filter routine.

There is no manual override for the turbidity.

#### 7.02 Turbidity Fault System Control Behavior

Turbidity faults may be critical or major in nature resulting in the system running at full capacity for disinfection or minor with no control action taken. Refer to section 2.02 *System Fault Conditions* for more information.

### 8. INTENSITY INPUT

A UV Intensity signal is provided for each UV bank. This signal originates from a 4-20 mA sensor probe mounted on the middle module of a bank of lamps and is terminated at the CCB.

#### 8.01 Intensity Measurement Modes

Measured Intensity is used for operator display purposes as an indication of poor UV disinfection performance but is never used for dose pacing. The intensity display is OEM selectable between Measured % and Measured Engineering Units modes.

Measured Intensity in % is derived by comparing the measured current from the UV Intensity sensor against a theoretical current at the present UVT, bank power level and lamp age. The result is displayed as a percentage value from 0 to 100%.

Measured Intensity in Engineering Units is derived by comparing the measured current from the UV Intensity sensor against a theoretical current based on the present UVT and full bank power and multiplying by the theoretical intensity from the UVD<sub>is</sub> calculation.

#### 8.02 Intensity Fault System Control Behavior

Intensity faults may be major in nature resulting in the affected bank being flagged as unhealthy or minor with no control action taken. Refer to Section 2.02 *System Fault Conditions* for more information.

## CONTROLS PHILOSOPHY (CP)

### 9. DOSE PACING

#### 9.01 Dose Pacing Control

Dose pacing is used to control the number of UV banks that are operating as well as the bank power level. All lamps within each UV bank and all UV banks will operate at the same power level and be modulated between 60 and 100 percent power as determined by the UV Controller. The UV Controller will attempt to maintain the fewest number of operating banks at the minimum power level required to keep the calculated dose above the entered setpoint.

If the number of healthy banks in a channel is less than the number of banks required to meet the target dose, a “Not Enough Healthy Banks” alarm is generated for that channel. The channel will become unhealthy and another channel will be called to operate if available.

When the UV Controller determines that a bank must increase in power or that more banks are required to be started, the request is processed immediately. If a bank is requested to operate, the UV Controller will energize the lamps in the bank and hold them at full power for the configured warm-up time period. During this time, all banks in the channel will be commanded to run at full power. Once all energized banks are warmed up in the channel and the dampen timer expires, they will go to the power level assigned by the UV Controller.

When the UV Controller determines that the bank(s) must decrease in power, the UV Controller will initiate a Power Dampen timer (typically 2 minutes), that must expire before power can decrease. The Dampen timer will reset if at any time the bank power level is requested to be at or above its current power level. The Dampen timer serves to minimize the number of power level changes a bank will experience due to fluctuating process conditions.

If the UV Controller determines that a bank is no longer required and must be shut down, the UV Controller will initiate a Bank Time Off timer (typically 15 to 30 minutes). The Bank Time Off timer will reset if at any time the UV Controller requests the bank. Once the timer expires, the bank will be shut off. The Bank Time Off timer serves to minimize the number of bank on/off cycles due to fluctuating process conditions.

#### 9.02 Bank Priority

Banks are started based on their priority. The highest priority bank in an operating channel will always be requested first and, when additional banks are required to meet dose, the subsequent prioritized banks will be energized.

The automatic priority selection of the banks will occur when the current highest priority bank's lamp life hours meet or exceed the End of Lamp Life hours setpoint. When this occurs, a rotation will take place where the current highest priority bank will become the lowest priority, and all other banks will increase their priority level by one. If the new highest priority bank is at its End of Lamp Life hours, another rotation will occur until a bank is assigned that is not at the End of Lamp Life. If all banks in a channel have an End of Lamp Life condition, then the rotation function will not take place within that channel.

An operator can override the automatic rotation at any time and assign any bank in a channel to any priority desired.

The automatic rotation may be completely disabled through the plant settings screens.

## CONTROLS PHILOSOPHY (CP)

A setting “Rotate Last Bank in Channel” allows operators to optionally remove the lowest prioritized bank in a channel from the automatic rotation cycle. This feature allows a bank (usually the last bank in a channel), to be permanently assigned as the lowest priority if desired, while the other banks in the channel will rotate as described above.

### 9.03 Not Enough Healthy Channels (remove for Multiple Channels/section duplicated)

If the number of healthy channels is less than the number of channels required to meet the current flows, a “Not Enough Healthy Channels” alarm is latched for the system. When this alarm is active, all channels in the system will be opened. All latched alarms will be reset one time to attempt to open all channels. All banks in all channels will be run at full power, including any banks previously shut down for multiple lamp, multiple ballast or module communication faults. It is possible in this condition for some banks to remain off as a result of not being in Remote Auto, or of having either Communication or Low-Level shutdown faults. Some banks may turn on but, if the inlet gate fails to open or for some reason the channel is closed, the banks will also turn off despite the “Not Enough Healthy Channel” alarm.

## 10. MULTIPLE CHANNEL CONTROL

### 10.01 Channel Control Operation

The UV3000Plus control always maintains one (1) channel in operation as a minimum. The control priority is to ensure that the flow of effluent through the UV channels does not exceed hydraulic design capacities at any time, regardless of the current system disinfection capabilities. Although this strategy may result in undisinfected effluent being passed through a UV channel, it ensures that flooding conditions are avoided if possible. Each channel maintains a separate channel low level status bit that is set if any bank in the channel reports a low level. This bit determines whether wiping for any wiper groups may be initiated in that channel.

#### 10.01.1 Number of Channels Required

The UV Controller will determine how many channels are to operate based on the following evaluation criteria:

- Hydraulic Flow Requirements
- Dose Capacity Requirements
- Minimum Number of Channels setpoint requested from the operator interface.

To determine the number of channels required for Hydraulic Flow requirements, a “Channel Peak Flow” multiplied by a “Maximum Flow Percentage (of Peak Flow)” limit is calculated for the system. The System Flow will be compared to the “Peak Flow x Percentage” limit to determine how many channels are required to operate. The Peak Flow per channel may be determined and adjusted based on head loss, flow velocity and plant operating strategy.

The UV Controller will calculate the dose capacity based on the available banks in the channel, the predicted flow, current system parameters and system settings. The number of channels required to meet the dose capacity criteria is calculated by determining how many channels are required to ensure each channel in operation can meet the System Dose target.

## CONTROLS PHILOSOPHY (CP)

The number of channels required to be in operation will always be the **greater** of: the number of channels required for Hydraulic Flow, the number of channels required to meet dose capacity requirements or the minimum number of channels.

### 10.01.2 Opening Channels

If the target number of channels is greater than the current number of channels operating a lag channel will be immediately called to operate. The way the channel is opened depends on whether a Low Water Level situation is present.

If all banks within the channel do not have an active Low Water Level status, the required number of banks in the channel will be requested to energize. After the banks have been requested for the “Channel Opening Delay”, the inlet gate will be requested to open.

If any of the banks within the channel have an active Low Water Level status, the inlet gate will be requested to open immediately. Banks in the channel that have an active Low Water Level Alarm will not be able to energize until enough water level is present to clear the alarm status. Once the inlet gate starts to open a “Channel Fill Delay” timer will begin. If the Low Water Level condition is not cleared before the fill delay timer expires, the bank will be shut down with a Critical Low Water Level Alarm initiated by the UV Controller. If there are not enough healthy banks in the channel to meet the dose setpoint, the channel will become unhealthy.

### 10.01.3 Closing Channels

If the target number of channels is less than the current number of channels operating a lag channel will begin a “Channel Closing Delay” timer (typically 15 to 30 minutes) and will remain open until the timer expires. If at any time the system requests the lag channel to operate while it is timing off, the Channel Closing Delay timer will be reset. Once the Channel Closing Delay Timer expires, the inlet gate will begin to close. When the inlet gate reaches the fully closed position, all banks in the channel will advance their Bank Time-Off timer 2 minutes and will be shut off when this timer expires.

### 10.01.4 Not Enough Healthy Channels

If the number of healthy channels is less than the number of channels required to meet the current flows, a “Not Enough Healthy Channels” alarm is latched for the system. When this alarm is active, all channels in the system will be opened. All latched alarms will be reset one time to attempt to open all channels. All banks in all channels will be run at full power, including any banks previously shut down for multiple lamp, multiple ballast or module communication faults. It is possible in this condition for some banks to remain off as a result of not being in Remote Auto, or of having either Communication or Low-Level shutdown faults. Some banks may turn on but, if the inlet gate fails to open or for some reason the channel is closed, the banks will also turn off despite the “Not Enough Healthy Channel” alarm.

## 10.02 Channel Priority

Channels are assigned a Lead/Lag status by the UV Controller, and will be changed every time a rotation occurs. Lag channels are brought in and out of service by the UV Controller as required. Each channel maintains a



## CONTROLS PHILOSOPHY (CP)

channel healthy status which requires that there be no **inlet gate**, **outlet gate** or **water level sensor** alarms for the channel, and that the required number of banks for dose pacing in that channel are healthy. If these conditions are not met, the Channel Healthy status will be cleared.

### 11. INLET GATE CONTROL

#### 11.01 Inlet Gate Control Architecture

UV3000Plus provides “Remote Auto” or “Remote Manual” control of a single upstream inlet gate for each UV channel. The Inlet gate control is based upon a 5-wire electrical interface where the following signals are used:

- Gate Ready (Remote) signal – contact from gate is closed when gate is ready for UV Controller control
- Gate Open Limit signal – contact from gate is closed when gate is fully open
- Gate Closed Limit signal – contact from gate is closed when gate is fully closed
- Gate Open Command signal – contact to gate is closed when gate is requested to open
- Gate Close Command signal – contact to gate is closed when gate is requested to close

The command output signals from the UV Controller will only stay closed while the gate is in a transition phase and will open once the gate reaches the correct limit switch.

#### 11.02 Inlet Gate Control Modes

##### 11.02.1 Monitor and Control

The UV3000Plus SCC Controller will monitor and control the inlet gate and will allow “Local”, “Remote Manual” and “Remote Auto” control of one Inlet Gate per channel.

##### 11.02.1.1 “Local” Inlet Gate Control Mode

When an Inlet Gate is operated locally (“Local” mode of operation), the Gate Ready (Remote) signal will not be active. The SCC Controller will continue to monitor the position of the Inlet Gate but will no longer have remote control of the gate.

##### 11.02.1.2 “Remote Manual” Inlet Gate Control Mode

When the Gate Ready (Remote) signal is active, the gate is ready for SCC Controller control (Remote Mode). When in the “Remote Manual” mode of operation, an inlet gate will be able to be commanded opened or closed by an operator from the Operator Interface. While in “Remote Manual”, all inlet gate travel alarms will be able to be activated if the inlet gate fails to respond in the expected manner.

##### 11.02.1.3 “Remote Auto” Inlet Gate Control Mode

When the Gate Ready (Remote) signal is active, the gate is ready for SCC Controller control (Remote Mode). Inlet gates that are in the “Remote Auto” mode of operation will be opened or closed as required by the UV Controller in order to meet the current flow conditions or dose requirements of the system.

## CONTROLS PHILOSOPHY (CP)

### 11.02.1.4 Inlet Gate Cracking

A system that is configured to allow the UV Controller to control Inlet Gate Cracking will request the inlet gate to open for an adjustable amount of time when a low water level condition exists in the channel once it is called to operate. The gate opening will pause until one of three conditions occur: the low water level in the channel clears; the water level reaches an adjustable level setpoint; or, the inlet gate cracking “Maximum Wait Time” delay expires.

Each Inlet Gate that is controlled by the UV Controller can generate latched alarm conditions as described in the following section. An Inlet Gate that is faulted will open all command output contacts and will not respond to further command requests from the UV Controller until the operator unlatches the gate alarms on the Channel Overview screen of the Operator Interface. If an alarm is generated, all latched inlet gate alarms will be automatically reset one time in order to allow the UV Controller to try to get as many available inlet gates to open as possible under the following conditions:

- “Not Enough Healthy Channels” alarm is generated
- “Peak Flow in a Channel Exceeded” alarm is generated

### 11.02.2 Monitor Only

The UV3000Plus SCC Controller will “Monitor Only” one inlet gate per channel. The UV Controller will read two discrete inputs from the inlet gate (Gate Open Limit signal and Gate Closed Limit signal). These signals indicate when a channel is required to disinfect process flow. A channel that is designated as closed will begin timing-off the banks in that channel for a “Closed Channel” time off delay and all flow will be assumed to be passed through the remaining open channel(s).

### 11.03 Inlet Gate Fault System Control Behavior

Inlet Gate faults may be critical in nature resulting in the channel to be flagged as unhealthy and the banks in the affected channel to time-off for the Closed Channel Delay time. Major and minor faults result in the channel to be flagged as unhealthy and the banks in the affected channel to stay on. In any Inlet Gate fault condition, the Inlet Gate will not be commanded to move. Refer to Section 2.02 *System Fault Conditions* for more information.

## CONTROLS PHILOSOPHY (CP)

### 12. MODULATING WEIR GATE

#### 12.01 Modulating Weir Gate Control Architecture

UV3000Plus provides “Remote Auto” or “Remote Manual” control of a single downstream modulating weir gate for each UV channel. The weir gate control is based upon an electrical interface where the following signals are used:

- Ultrasonic Level signal – 4-20mA analog input from the water level sensor indicating the effluent level
- Gate Position signal – 4-20mA analog input from gate indicating gate position
- Gate Ready (remote) signal – contact from gate is closed when gate is ready for UV Controller control
- Weir Gate Fault signal – contact from gate indicating a fault has occurred
- Gate Open Command signal – contact to gate is closed when gate is requested to open
- Gate Close Command signal – contact to gate is closed when gate is requested to close

#### 12.02 Modulating Weir Gate Control Modes

The SCC Controller will allow “Local”, “Remote Manual” and “Remote Auto” control of one modulating weir gate per channel.

##### 12.02.1 “Local” Weir Gate Control Mode

When a weir gate is operated locally (“Local” mode of operation), the Gate Ready (Remote) signal will not be active. The SCC Controller will continue to monitor the position of the weir gate but will no longer have remote control of the gate.

##### 12.02.2 “Remote Manual” Weir Gate Control Mode

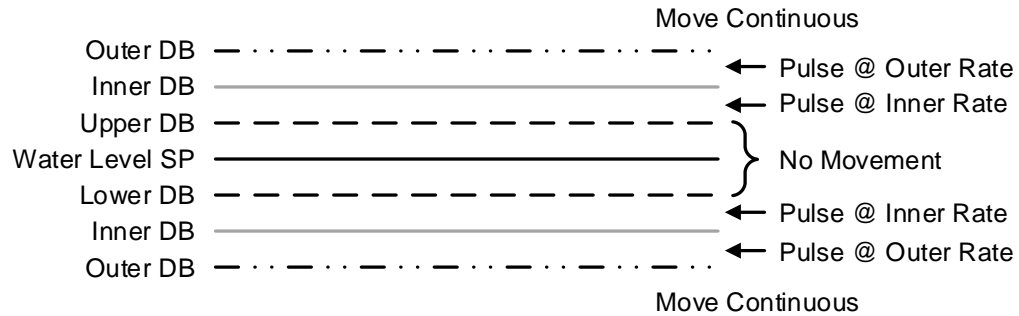
When the Gate Ready (Remote) signal is active, the gate is ready for SCC control (Remote Mode). When in the “Remote Manual” mode of operation, a weir gate can be commanded to be lowered or raised by an operator from the Operator Interface.

A separate open and close push-button is available on the screen that must be held down by the operator for the desired duration of gate movement.

##### 12.02.3 Automatic Weir Gate Control Mode

When the Gate Ready (Remote) signal is active, the gate is ready for SCC control (Remote Mode). Weir gates that are in the “Remote Auto” mode of operation will be lowered or raised as required by UV Controller in order to maintain the channel effluent level within a configured deadband region at the desired water level setpoint. The UV Controller continuously compares the water level setpoint (either a static entered setpoint or a dynamic calculated setpoint if dynamic setpoint is enabled) against the water level measured by the analog level sensor in each channel. The control algorithm will either command the weir gate to open or close to correct the water level once it moves outside of the configured deadband.

## CONTROLS PHILOSOPHY (CP)



If the measured water level error is outside of the deadband (“Lower DB”, “Upper DB” system settings) but is less than or equal to the “Inner DB” limit system setting, the weir gate will be commanded to move for a calculated pulse duration and then wait for the “Update Inner” time period system setting in order to measure the resultant water level effect.

If the measured water level error is greater than the “Inner DB” limit and less than or equal to the “Upper DB” limit system setting, the weir gate will be commanded to move for a calculated pulse duration and then wait for the “Update Outer” time period system setting in order to measure the resultant water level effect.

If the water level error is greater than the “Outer DB” limit, the weir gate will move continuously until the measured water level error is less than the “Outer DB” limit at which time the gate will be commanded to move for a calculated pulse duration as described above.

Movements of the weir gate will create ripples that travel down the channel and are reflected up the channel. The extended wait times implemented during the pulsed weir gate movement allow these ripples to dissipate before initiating additional movements.

### 12.02.4 Modulating Weir Gate Predefined Positions

Weir gates have two predefined positions which are configurable through the system settings on the Operator Interface: “Safe” position and “Max” position.

The weir gate will be commanded to the “Safe” position when a Water Level Signal Fault is active for that channel. This position is configured to prevent flooding the system when the channel water level is unknown.

The “Max” position is also known as the “Parked” position and represents the weir gate position considered to be fully closed. This position is not necessarily the weir gate fully closed position. The weir gate will be commanded to the “Max” position when one of the following conditions is met:

#### System Configured with Inlet Gates “Present”

- Inlet gate is fully closed
- Inlet gate is closing and the “Max Position Delay Time” system setting has expired

#### System Configured with Inlet Gates “Not Present”

- Channel is disabled via the “Enable/Disable” button on the Operator Interface

## CONTROLS PHILOSOPHY (CP)

When moving to a predefined position (“Max” or “Safe” position), the weir gate will be commanded to open or close continuously until the analog gate position feedback signal is within a deadband region relative to the commanded position (“Weir Position Deadband” system setting).

### 12.03 Fault and Out of Service Response

Modulating weir gate faults are major in nature resulting in the affected channels being flagged as unhealthy. Refer to Section 2.02 *System Fault Conditions* for more information.

### 12.04 Weir Gate Dynamic Setpoint

A system with modulating weir gates may optionally utilize a dynamic setpoint technique to allow the water level setpoint to be controlled independently in each channel. Using this technique allows simultaneous control of water level as a function of flow within any one channel as well as balancing of total flow across multiple channels by changing the hydraulic gradient through each channel separately. The capability of simultaneously controlling both parameters is of critical importance for maintaining proper disinfection performance in multiple parallel channels.

The dynamic setpoint consists of three components that can be enabled and disabled separately, flow balancing, draw down effect and head loss effect. A fixed limit is imposed on the dynamic water level setpoint such that it cannot deviate more than a maximum of 2 inches (5 cm) from the configured channel static water level setpoint system setting.

#### 12.04.1 Flow Balancing

A system that is configured to allow the UV Controller to flow balance will compensate both for imperfections within civil works as well as flow tendencies toward one channel. These effects can be compensated for by calculating a dynamic offset of the water level setpoint in each channel.

The Flow Balancing algorithm will continuously calculate a water level setpoint offset in each channel in order to compensate for these relative differences in elevation or other flow tendencies by continuously seeking to balance the flow over the weir values that are calculated in each channel. The algorithm will continuously adjust each channel's water level setpoint in order to achieve a flow over weir balance across all channels within configured deadband limits.

**NOTE: If flow balancing is enabled, accurate measurements of each channel and weir gate using a laser level will be required.**

#### 12.04.2 Draw Down Effect

A system that is configured to allow the UV Controller to compensate for a draw down effect will consider the distance from the level sensor to the weir gate. If the sensor is within the estimated draw down region the UV Controller will calculate an offset to the calculated channel level setpoint in order to ensure correct water levels are maintained in the UV banks.

#### 12.04.3 Head Loss Effect

A system that is configured to allow the UV Controller to compensate for a head loss effect will consider the length of the channel and the number of banks within each channel. The UV Controller will calculate an offset

## CONTROLS PHILOSOPHY (CP)

to the channel water level setpoint to ensure the level at the first bank in the channel is high enough to cover the top lamps but is not operating in a lamp bypass condition under high flow.

### 13. POWER FAILURE DETECTION

#### 13.01 Power Failure at SCC

When a power failure occurs at the SCC controller, the control program will detect that it is running its first pass of the program. When this occurs, the control logic will force all banks that are currently running to go back through their warm-up cycle.

When the SCC is in a power failure state, BCBs that are in "Remote Auto" Mode will operate in accordance with the "Communication Failure Action" system setting: "Remain On" or "Turn On". When the system is configured for "Remain On" operation, if a bank in "Remote Auto" was running when communications were lost with the SCC, the CCB would run the bank at full power. Otherwise, if the bank in "Remote Auto" was off when communications were lost with the SCC, the bank would remain off. If the system is configured for "Turn On" operation, a bank in "Remote Auto" will be run at full power by the CCB when communications are lost with the SCC.

#### 13.02 Power Failure Detection by PDC

When a power failure occurs at the PDC for a duration greater than 150 ms, the CCB for any banks that experience the power failure will set a Power on Reset bit for 1 minute. When this bit is set, the SCC control program will force the banks in this condition to go through a warm-up time and system will return to normal Dose Pacing. No banks that were previously off will be started unless required by the UV Controller to meet current dose demands.

#### 13.03 Power Failure Detection by SCC

When a power failure occurs at the PDC for a duration less than 150 ms, the CCB for any banks that experience the power failure will not detect the failure and will be unable to set the Power on Reset bit. This condition is detected if a bank reports that a configurable percentage of its lamps are suddenly off and no other major alarms have been latched for that bank. When the SCC detects this condition, it will force the banks affected to go through a warm-up cycle. If the condition does not correct after warmup is complete and the major alarm delay expires, the bank will be flagged unhealthy and will not repeat the attempt to be restarted.

### 14. SYSTEM TRENDING

The Operator Interface will store data in files that are accessible for file transfer while the UV system is in operation (either through removable media or file transfer). The data files can be imported into Excel for diagnostic purposes. Some logged data will also be available for display on Trending screens available to the UV system operators. All data logged will be sampled on change with a maximum sampling rate of 60 seconds and stored to a data log file. A maximum of 1,000,000 points are available for storing data, providing approximately 30 days worth of data. If the storage card is removed, the OIT application must be re-started in order to re-start the data-logging functionality. This can be achieved by power cycling the OIT. The following data points will be logged:

- Current Filtered Flow
- Current Filtered UVT
- Total Dose

## CONTROLS PHILOSOPHY (CP)

- Channel Weir Position 1/channel
- Channel Water Level 1/channel
- Channel Flow Rate 1/channel
- Bank Power Level 1/bank
- Bank UVI 1/bank

A trend display will be configured that will display System Flow, UVT and Dose on the same screen. The trend display will be configured with a moving 8-hour timescale and will display System Flow, UVT and Dose as engineering units.

Additional trend information will be available to tune each modulating weir gate including channel flow, water level, and weir position.

## CONTROLS PHILOSOPHY (CP)

### 15. PLANT SCADA INTERFACE

#### 15.01 Plant SCADA Interface Architecture

The UV system provides a selection of data which is available to the plant SCADA system to allow remote monitoring of the UV system. **The UV Controller is configured with an XXX SCADA interface protocol as specified for this project.** The UV Controller will act as a slave node only and will not initiate any communication messaging or data transfers but will respond to polling messages on the required network address. SCADA information will be available in a selection of contiguous 16-bit integer addresses as defined in the data table which is to be provided. A minimal amount of data will also be able to be transferred from a SCADA system to the UV Controller to allow limited remote-control functions.

##### 15.01.1 Plant SCADA Interface Read Data

The following data will be available to be read from the UV Controller and reports information relating to general system operation:

**PASTE TABLE HERE**

##### 15.01.2 Plant SCADA Interface Write Data

**PASTE TABLE HERE**

The following data can be written from the SCADA PLC to the UV Controller:

The SCADA heartbeat signal will be monitored at the UV PLC and will start a failure timer if it does not toggle at the expected rate. Once the SCADA failure alarm is set, a control action can be selected which will result in one of the following: no action (no alarm), no action (with alarm), system goes to default flow value and alarm is posted. A SCADA Winterization mode may be selected from the Plant General settings. This mode will clear all SCADA values except for a bit signaling that this mode is enabled and is used to prevent unnecessary alarming when the UV system is shut down.

### Revision History

Rev	Description	Revision By	Approved By	Date
1.0	For Submittal Approval			April 20, 2020
1.1	Added m3/h and other minor Prosoft communication to accompany template update	MF	MCM	April 27, 2021



# Section 7 Startup and Shutdown

## DANGER



Obey all warning and caution statements. Refer to [Section 2](#).







Read and understand this Operation and Maintenance Manual before operating this equipment. Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.



Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

### 7.1 Startup Procedure for the System




1. Make sure that all the modules in each UV Bank are inserted into the channel in the correct orientation ([Section 10.4.3](#)).
2. Fill the wiper cylinder with food grade grease.
3. Fill the wiper canisters with ActiClean Gel ([Section 10.6.1.2](#))
4. UV Bank mode selector switch on the PDC →  or (OFF) position.
5. Set all wiper mode selector switches on the HSC →  or (OFF) positions.
6. Turn (ON) the main power switch (disconnect switch or breaker) for the SCC.
7. Turn (ON) the main power switch (disconnect switch or breaker) for the PDC.
8. Turn on the main power switch (disconnect switch or breaker) for the HSC. Set breakers in the HSC to on. If any of the breakers trip, refer to [Section 11.4](#) to determine the source of the fault.
9. Set the UV Bank mode selector switch on the PDC → REMOTE.
10. At the SCC, verify UV Bank is set → REMOTE AUTO.
11. At the HSC, set the wiper control switch to  or (SEQ), then set the wiper mode selector switch for UV Bank 1A to  or (LOC). This will initiate a wiper sequence to confirm that the wiper functions correctly. When the wipe sequence is complete set the wiper mode selector for UV Bank 1A to  or (REM).
12. Set the HSC wiper control switch →  or (RET).
13. Repeat for additional UV Banks.

### 7.2 Shutdown Procedures

For sites with seasonal treatment, the manufacturer recommends that the UV equipment is winterized while not in use.

#### 7.2.1 Shutdown Procedure for the System

1. At the SCC:
  - a. UV Bank Control Screen → Set all UV Banks to REMOTE OFF.
  - b. Wiper Control Screen → Set the wipers to REMOTE OFF.
2. At the PDC, set the UV Bank mode selector switches → OFF position.
3. At the HSC, set the wiper mode selector switches →  or (OFF) position.

## Startup and Shutdown


### 7.2.2 Shutdown Procedure for the PDC for Extended Periods of Time

1. Disconnect and lock out the main high voltage service to each PDC.
2. Unplug all of the module power cables from the PDC, ensure that they do not fall into the channel. Put the protective caps on the UV Module power cords.
3. Disconnect the quick-connect hydraulic fittings from the manifold under each PDC, ensure that they do not fall into the channel. Put the protective caps on the hydraulic fittings.

### 7.2.3 Shutdown Procedure for UV Modules for Extended Periods of Time

1. Shutdown the System. ([Section 7.2.1](#))
2. Shutdown the PDC. ([Section 7.2.2.](#))
3. Remove UV Modules from the UV Channel. ([Section 10.4.2](#))  
*Note: DO NOT leave UV Modules in the UV Channel in standing water where freezing conditions may occur. Remove UV Modules and follow storage procedures.*
4. Drain each of the wiper canisters to remove the chemical cleaning solution. ([Section 10.6.1](#)).
5. Fill the hydraulic cylinder with food-grade grease ([Section 10.6.3.2](#)).
6. Store the UV Modules upright, in a clean and dry environment (removed from UV Channel).

### 7.2.4 Shutdown Procedure for the HSC

1. At the SCC User Interface, set the wiper system to OFF
2. At the HSC, set the wiper mode selector switches to  or (OFF).
3. Turn off the main power switch (disconnect switch or breaker) for the HSC.
4. Make sure that the enclosure doors are securely closed.

### 7.2.5 Shutdown Procedure for the UVT Controller and Sensor

If the UVT controller and sensor are shut down for an extended period of time (such as for winter months), use this procedure.

## NOTICE

Use either diluted acid or bleach to clean the UVT sensor. Do not use both.

1. Shut down all power to UVT controller.
2. Disconnect the UVT sensor from the controller.
3. Clean the UVT sensor, especially the optical path. Dry the UVT sensor.
4. Disconnect the controller. Store both the controller and sensor in a dry, clean location where the temperature is above freezing.

## 7.3 Long Term Storage (i.e. Winterization) Procedures

Ensure power is retained to the SCC, PDC (s) and HSC (s) by leaving the disconnects on for all equipment.

### 7.3.1 Storage Procedure for the SCC

Make sure the winterization mode is enabled in the General Settings screen. When this option is enabled, all user interface and SCADA alarms are cleared. This option is used to mask nuisance alarms during seasonal equipment shutdown.

### 7.3.2 Storage Procedure for the Davit Crane

Cover the winch with a tarpaulin to avoid exposure to ice and snow. Make sure the bottom is open for ventilation.

### 7.3.3 Storage Procedure for the ACS

1. Drain the wiper system ([Section 10.6.1.1](#)).
2. Close the top wiper filler plug. Put protective caps (provided by the manufacturer) on the PDC hydraulic manifold and UV module power cord connections.
3. Cap the hydraulic manifold couplers and hydraulic hose ends with the attached protective caps.
4. Fill the hydraulic cylinder with food grade grease provided in the kit ([Section 10.6.3.2](#)).

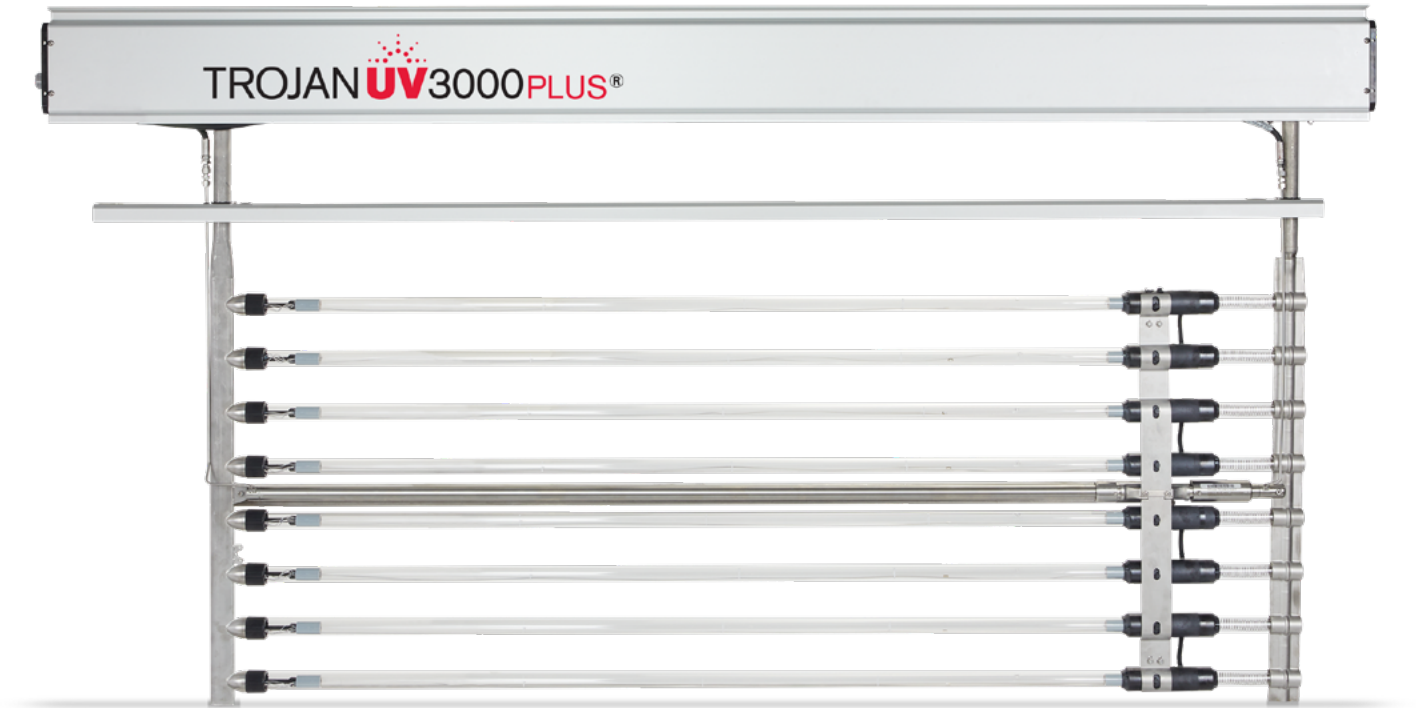
Store the UV module (without cleaning agent or water) in a clean and dry environment.

TROJANUV3000PLUS®

# Wastewater Treatment

TROJAN  UV®

# TROJAN UV3000PLUS®



## A reference standard in wastewater UV treatment

UV is a simple and cost-effective way to treat wastewater. A key advantage is its ability to treat *Cryptosporidium* and *Giardia*, which if released into lakes and rivers increases the potential of contamination in communities that rely on these same bodies of water for their drinking water source and recreational use.

The TrojanUV3000Plus® is one of the reasons why UV is now a favored technology in wastewater treatment. This highly flexible system has demonstrated effective and reliable performance around the world in combined sewer overflow, primary and tertiary wastewater, and reuse applications.

The proven infrastructure of the TrojanUV3000Plus has been continuously refined to enhance easy operation. The result is more dependable performance, simplified maintenance and maximized UV lamp output at end-of-lamp life. The TrojanUV3000Plus incorporates innovative features to reduce operation and maintenance (O&M) costs, such as our integrated Integra™ lamp assembly, variable output electronic lamp drivers and our ActiClean® sleeve cleaning system.

# TROJAN UV3000PLUS®

Designed for efficient, reliable performance

## System Control Center (SCC)

The SCC monitors and controls all UV functions. Designed by Trojan engineers, the TouchSmart line of controllers offer a full suite of features and functionality. Large, outdoor-rated screens are easy to navigate for rapid monitoring, diagnosis and adjustment of UV system operation. TouchSmart controllers offer SCADA connectivity, dose-pacing control, and data logging for trending and analysis (flow, power, UVT, UV intensity and dose). Programmable Logic Controllers (PLC) are also available.



TouchSmart controllers feature large and outdoor rated screens allowing user-friendly and easy to-navigate system monitoring and control.

## Power Distribution Center (PDC)

The PDC powers each bank of modules. Its ergonomic, angled design provides easy access to module power cables and hoses for the ActiClean cleaning system. The robust stainless steel enclosure is mounted across the channel, with module fuses and interlock relays visually aligned with module receptacles for fast diagnostics. Modules are individually overload-protected for safety. Like all TrojanUV3000Plus components, the PDC can be installed outdoors and requires no shelter, heating, ventilation or air conditioning.

## UV Intensity Sensor

The UV intensity sensor continually monitors UV lamp output. The ActiClean system automatically cleans both the lamp and sensor sleeves simultaneously.

## Electronic Lamp Drivers



The variable-output (60–100% power) electronic lamp driver is mounted in its own TYPE 6P (IP67) rated enclosure within the module frame. Features “quick connect” electrical connections. Cooling is by convection and requires no air conditioning.

## ActiClean Sleeve Cleaning System

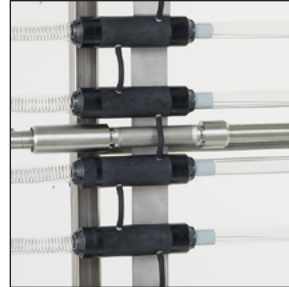
The system consists of two components:

### 1. Hydraulic System Center (HSC)

The HSC is mounted close to the channel in a stainless steel enclosure. It contains the pump, valves and ancillary equipment required to operate the cleaning system and links to the extend/retract hoses of the module wiper drives via a manifold located on the underside of the PDC.

### 2. ActiClean Wiper Assembly

A submersible wiper drive on each UV module drives the wiper carriage assembly along the module. Attached wiper canisters surround the quartz sleeves, and are filled with ActiClean Gel. The gel uses food grade ingredients and contacts the lamp sleeves between the two wiper seals. Cleaning takes place while the lamps are submerged and while they are operating.



## Water Level Sensor

The system includes an externally powered electrode low water level sensor for each channel. If effluent levels fall below defined parameters, an alarm will be activated.

## Integra Lamp Assembly

Lamps and sleeves are pre assembled, and factory sealed together into a water-tight assembly. This allows operators to remove and replace these components as a single unit. O-rings and seals are permanently built-in, preventing water from getting inside the assembly.

## Water Level Controller

A fixed weir, motorized weir gate, or Automatic Level Control gate (shown), is required in the channel to maintain the appropriate water level over the lamps. Trojan engineers will work with you to select the appropriate level control device for your application.

# Key Benefits

## TrojanUV3000Plus

**Reduces operating costs by as much as 30% per year.** Long-lasting amalgam lamps and lamp dimming capabilities optimize UV output to manage real-time treatment conditions and maximize system efficiency.

**Dual-action sleeve cleaning system improves performance and reduces labor costs.** The ActiClean automatic chemical/mechanical cleaning system maintains sleeve transmittance of at least 95%, and works online – eliminating the need for removing lamp banks to manually clean sleeves.

**Integra lamp and sleeve assembly.** Lamps and sleeves are preassembled, and factory sealed together as a single unit for more efficient lamp replacement that also reduces the chance of lamp or sleeve damage. O-rings and seals are permanently built-in, preventing water from getting inside the assembly.

**Reduced installation costs.** The compact TrojanUV3000Plus can be retrofitted into existing chlorine contact tanks, or existing UV channels and comes pre-tested, pre-assembled and pre-wired to minimize installation costs.

**Outdoor operation.** Can be installed outdoors, eliminating the need and costs of a building, shelter and possible heating or cooling of the equipment.

**Validation through microbial testing.** The TrojanUV3000Plus has been validated through microbial testing. Through this testing, performance data has been generated for UV dose delivery to inactivate microorganisms *Escherichia coli* (*E. coli*) and fecal coliform.

**Guaranteed performance and comprehensive warranty.** TrojanUV systems include a Lifetime Performance Guarantee\* and comprehensive warranties for systems and parts.



# ActiClean Dual-Action, Automatic Cleaning System

Chemical/mechanical cleaning system eliminates sleeve fouling

## Benefits:

- Cleans 50% more effectively than mechanical wiping alone
- Operating costs are reduced by maximizing the output of the UV lamps
- Lowers capital expenses by reducing equipment requirements
- Online operation requires no system shut-down
- Large gel canisters require infrequent gel re-fills
- Maximizes UV treatment in plants with heavy fouling and high solids

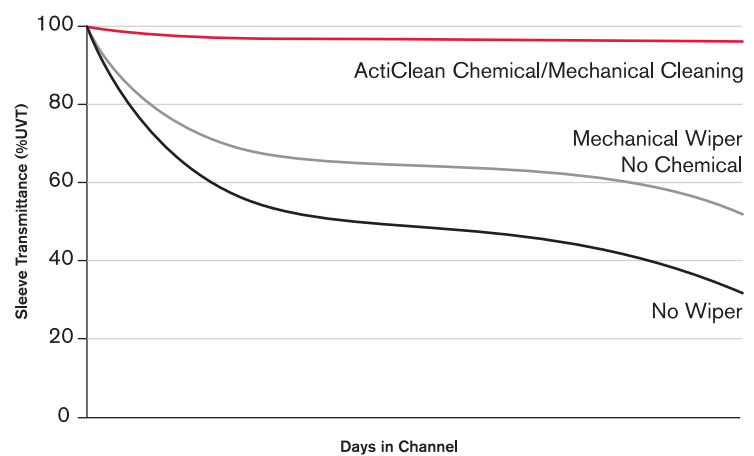


The dual-action, chemical/mechanical cleaning with the ActiClean system provides superior sleeve cleaning and reduces maintenance costs. Fouling and residue build-up on quartz sleeves reduces system efficiency. ActiClean maintains at least 95% transmittance, ensuring sleeves are clean and the system is consistently delivering accurate dosing while reducing power consumption.

## ActiClean Gel is Safe to Handle

- ActiClean Gel is NSF60 certified and safe for use in all waters
- Quick connects allow for easy refill of gel solution
- Lubricating action of gel maximizes life of wiper seals

### Efficacy of Cleaning Technologies to Control Sleeve Fouling



# Integra Lamp Assembly Simplifies Maintenance

- Lamps and sleeves preassembled, and factory sealed together as a single unit
- Reduces chance of lamp or sleeve damage during maintenance
- O-rings and seals permanently built-in, preventing problems with reassembly and water leaks
- Fewer parts to keep track of, remove and reassemble
- Clean fresh sleeve every time to ensure the maximum amount of UV light is reaching the water



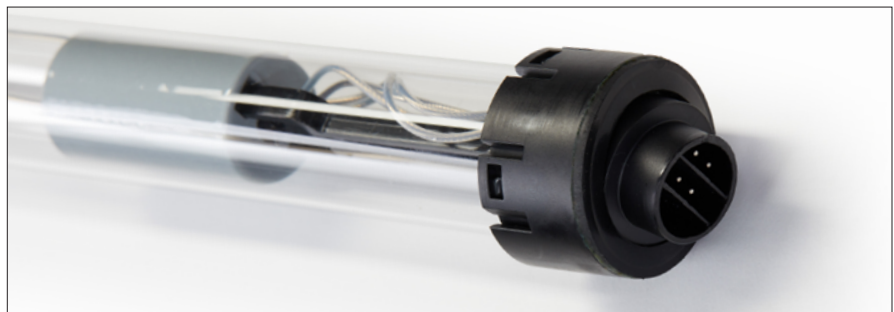
Lamps and sleeves are preassembled, and factory sealed into a single unit with easy screw caps.

# Amalgam Lamps Require Less Energy

Require fewer lamps and reduce O&M costs

## Benefits:

- Stable UV output over a wide range of water temperatures
- Fewer lamps are required to deliver the required dose, which reduces O&M costs
- Can treat lower quality wastewater such as primary effluents, combined sewer overflows and storm water
- Fewer lamps allow systems to be located in compact spaces, reducing installation costs



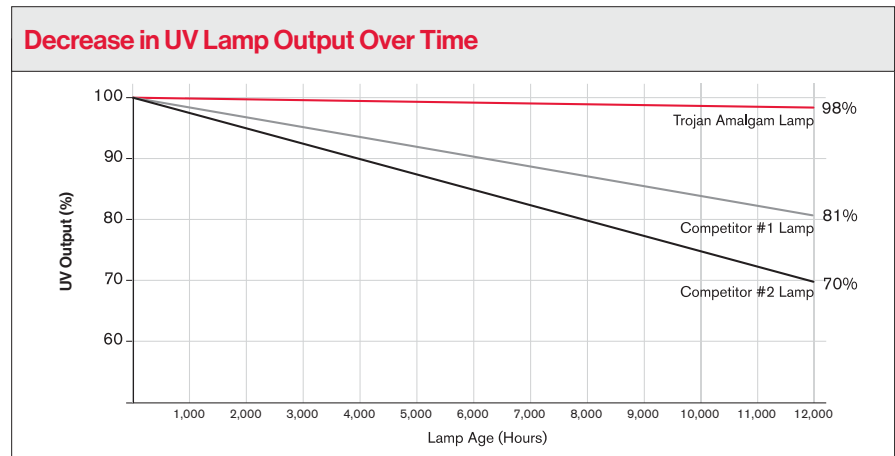
High-efficiency amalgam lamps generate stable UV output in a wide range of water temperatures.

# Amalgam Lamps Maintain Maximum UV Output

Delivers 98% of full UV output after more than one year of use

## Benefits:

- Delivers consistent UV output
- 20% less decline in UV output after 12,000 hours of use compared to competitive UV lamps
- Validated performance assures you of reliable dose delivery and prolonged lamp life



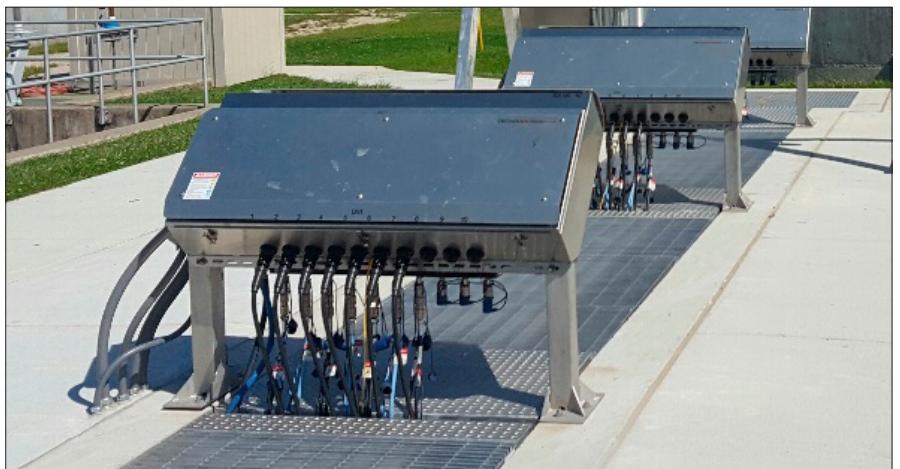
The lamps used on the TrojanUV3000Plus system have been independently validated in accordance with standards set in the AwwaRF/NWRI 2003 Guidelines for Drinking Water and Water Reuse to maintain 98% of original output after 12,000 hours of operation.

# Open-Channel Architecture Designed for Outdoor Installation

Cost-effective to install and expand

## Benefits:

- Compact, open-channel design allows cost-effective installation in existing effluent channels and chlorine contact chambers
- System can be installed outdoors to reduce capital costs – no building, shelter or HVAC is required
- Gravity-fed design eliminates costs of pressurized vessels, piping and pumps
- Scalable architecture allows precise sizing – reduces capital and O&M costs associated with oversizing
- Modular design is readily expandable to meet new regulatory or capacity requirements
- Thorough design approach ensures that effluent quality, upstream treatment processes, and O&M needs are addressed in system configurations
- Horizontal lamp mounting delivers optimal hydraulic performance. This arrangement induces turbulence and dispersion, maximizing wastewater exposure to UV output



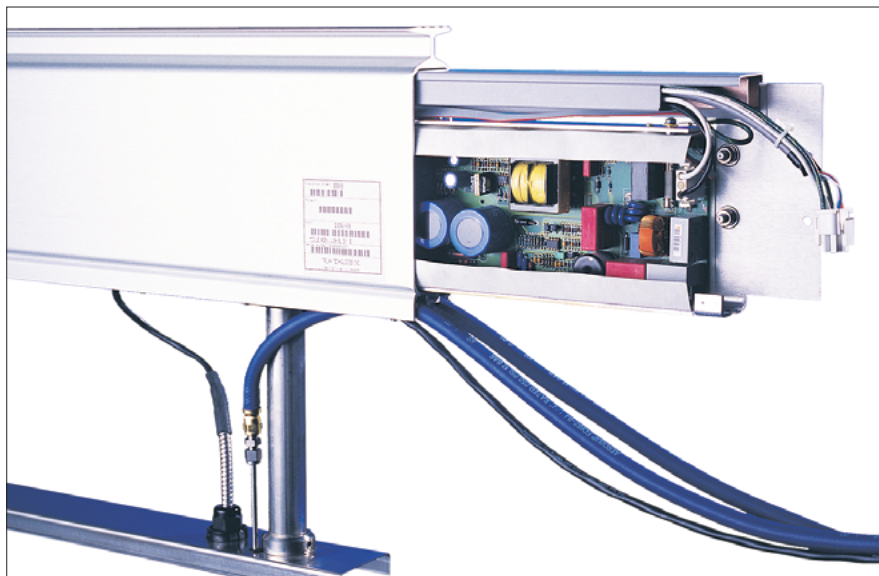
The TrojanUV3000Plus system delivers flexibility and cost savings through its simple installation in existing channels and chlorine contact chambers. The system can be installed outdoors with no additional building, shelter or cooling requirements.

# Advanced, Self-Contained UV Module

Reducing footprint and maintenance

## Benefits:

- Electronic lamp drivers installed in the module eliminate the need for separate external cabinets
- Lamp driver enclosures are rated TYPE 6P (IP67) – air/water tight
- Module leg and lamp connector have a hydrodynamic profile to reduce headloss
- TrojanUV3000Plus lamps are warranted for 12,000 hours
- Modular design allows for maintenance on one module without disrupting treatment performance



# Bioassay Validation

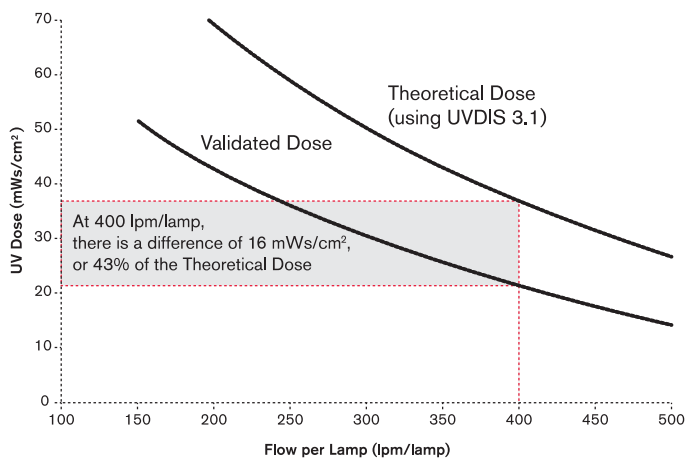
Real-world testing ensures accurate dose delivery

## Benefits:

- Validated through microbial testing – through this testing, performance data has been generated for UV dose delivery to inactivate *Escherichia coli* (*E. coli*) and fecal coliform
- In-field bioassay testing offers the peace of mind of verified dose delivery – not theoretical calculations
- The TrojanUV3000Plus has third-party validations to USEPA and NWRI guidelines for secondary and high-level reuse applications

### Field Validated Dose vs. Theoretical Dose at 65% UVT

(Before Fouling & Lamp Aging Are Taken into Account)



This shows the validated dose of an actual working system and the theoretical dose calculated using UVDIS. Note that the UVDIS 3.1 dose calculation overestimates the system performance.

## System Specifications

System Characteristics	TrojanUV3000Plus
Typical Applications	Wide range of wastewater treatment plants
Lamp Type	High-efficiency Amalgam
Lamp Driver Type	Electronic, variable output (60 to 100% power)
Input Power Per Lamp	250 Watts
Lamp Configuration	Horizontal, parallel flow
Module Configuration	4, 6 or 8 lamps per module
Level Control Device Options	ALC, fixed weir or motorized weir gate
Water Level Sensor	1 electrode low water level sensor per channel
<b>Enclosure Ratings:</b>	
Module Frame / Lamp Driver Enclosure	TYPE 6P (IP68) / TYPE 6P (IP67)
All Other Enclosures	TYPE 4X (IP56)
Lamp Driver Cooling Method	Convection; no air conditioning or forced air required
Installation Location	Indoor or outdoor
<b>Sleeve Cleaning System:</b>	
ActiClean Cleaning System	Optional Automatic Chemical/Mechanical Cleaning System
ActiClean Gel	Non-corrosive
Recommended Fouling Factor	1.0
<b>System Control Center:</b>	
Controller	TouchSmart Controller, TouchSmart Plus Controller or PLC-based
Analog Inputs (Typical)	Flow (4-20 mA) and UVT (4-20 mA)
Discrete Outputs (Typical)	Bank status, common alarms and SCADA communication
Maximum Distance from UV Channel	656 ft. (200 m)
<b>Electrical Requirements:</b>	
Power Distribution Center	208V, 3 phase, 3 wire + GND, 60 Hz (Max. 8 modules per PDC) 480Y/277V, 3 phase, 4 wire + GND, 60 Hz 380Y/220V, 3 phase, 4 wire + GND, 50/60 Hz 400Y/230V, 3 phase, 4 wire + GND, 50/60 Hz 415Y/240V, 3 phase, 4 wire + GND, 50/60 Hz
System Control Center (stand alone)	120V, single phase, 2 wire + GND, 60 Hz, 1.1 kVA 220/230/240V, single phase, 2 wire + GND, 50/60 Hz, 1.1kVA
Hydraulic System Center (for Sleeve Cleaning System)	G4 HSC (1-8 Banks) separate power line 380 VAC 50Hz, 3 Phase, 3 Wire + GND (3A, 2kVA) 400 VAC 50Hz, 3 Phase, 3 Wire + GND (3A, 2.1kVA) 415 VAC 50Hz, 3 Phase, 3 Wire + GND (3A, 2.2kVA) 380 VAC 60Hz, 3 Phase, 3 Wire + GND (3A, 2kVA) 400 VAC 60Hz, 3 Phase, 3 Wire + GND (3A, 2.1kVA) 480 VAC 60Hz, 3 Phase, 3 Wire + GND (3A, 2.5kVA) 208 VAC 60Hz, 3 Phase, 3 Wire + GND (7A, 2.5kVA) or G4 HSC (1-8 Banks) powered from PDC (same as above)
Water Level Sensor	24VDC powered from PDC

\* When you use TrojanUV parts, we guarantee that your system will meet the treatment requirement specified at purchase, provided that the system's original design parameters haven't changed (e.g., flow rate, UV Transmittance) and maintenance is completed per the UV System O&M manual. Should you experience an issue, our Service Technicians will work with you to resolve it as fast as possible.

To learn more about the brands and affiliates of Trojan Technologies, please visit [www.trojan technologies.com](http://www.trojan technologies.com)



## SERVICEABILITY

TROJAN ™

**10. Serviceability.** The following information should be included:

The Proponent shall provide the following information.

- a) Service Centre: including location, number of staff, number of certified and trained representatives and number of approved field service representatives;
- b) Availability of Spare Parts: Indicate if spare parts are stocked at local service centre including the turnaround time for spare parts; and,
- c) Typical Response Time: for service and emergency situations. Time for any emergencies shall be less than 5 hours.

**TROJAN'S RESPONSE:**

- a) Technical service and support for Little River will be provided by Trojan. There are also more than 50 factory service technicians trained and certified by Trojan at various locations across North America. Construction and Post-installation technical services, warranty claims, spare parts and problem solving assistance are available to any customer, regardless of the location or size of the project. If the site problem is classified as a critical issue, a service technician can be at the site within 24 hours of notification.
- b) For parts needs, factory operators can call our trojan service toll-free number to purchase or order warranty parts as needed. Depending on the severity of the problem, parts can be shipped for next day delivery. Trojan currently has a spare parts warehouse from which we ship our products, located in London, Ontario.
- c) Depending on the severity of the problem, parts can be shipped for next day delivery. Trojan offers 24/7 telephone technical support via our toll-free number 1-866-388-0488 or by email, [tac@trojanuv.com](mailto:tac@trojanuv.com). Trojan can provide in-person support from our local technicians. The response time of the local technician is generally 24 hours or less (subject to availability).



## CLOSEST SERVICE CENTRES

Service Center Location	Service Center Description	Service Center Capabilities	Parts Stored at Service Centre	Number of Factory Trained Service Representatives
London, ON	Factory	All inclusive	Yes	25

## 24/7 TECHNICAL SERVICE CALL CENTRE

Technical Call Centre Location	Technical Call Centre Telephone Numbers	Technical Call Centre Hours of Operation*	Number of Service Representatives
3020 Gore Rd. London, Ontario, Canada.	1 (866) 388-0488 (North America)	Monday to Friday, 8:00 a.m. to 5:00 p.m. (EST) after hours on call 24/7	5
*referenced to Eastern Time Zone. Include information regarding holiday and weekend operation.			



## SERVICE RESPONSE TIME

Service Required	List of Minor/Major Parts	Guaranteed Response Time
On-site inspection and evaluation of equipment	-	Non-emergency 3-5 days Emergency 2- 48 hrs
On-site review of programming logic	-	Non-emergency 3-5 days Emergency 2- 48 hrs
On-site equipment repairs for minor part replacement (also list minor parts)	Lamps, sleeves, drivers, wipers	Non-emergency 3-5 days Emergency 2- 48 hrs
On-site equipment repairs for major part replacement (also list major parts)	Control panel, SCC, PDC	Non-emergency 3-5 days Emergency 2- 48 hrs

DRAFT

## PARTS DELIVERY TIME

<b>Parts Available (Type)</b>	<b>Parts Available (Number)</b>	<b>Time From the Placement of Order to Delivery of the Replacement Parts to the Plant</b>
UV Lamp	500	Next Day
Quartz Sleeve	500	Next Day
Lamp End Seal O-ring	10,000	Next Day
Ballast	500	Next Day
UV Intensity Sensor	50	Next Day
Wiper Seals with Accessories	10,000	Next Day
Mercury Spill Kit	30	Next Day
NSF Cleaning Solution (if required)	200	Next Day



# MAINTENANCE REQUIREMENTS



**11. Maintenance Requirements.** The following information should be included:

The Proponent shall provide the following maintenance information.

- a) A list of preventive maintenance required on a weekly, monthly, quarterly, semi-annually and annual basis;
- b) A list of spare parts and special maintenance tools not specifically required in the technical Specifications which are required for the equipment;
- c) Detailed list outlining the expected parts replacement frequency; and
- d) Identification of the number of staff and time required to replace parts and equipment.

**TROJAN'S RESPONSE:**

- a) Please see excerpt from O & M Manual 'Section 10.3 Startup and Preventive Maintenance Schedules'.
- b) Please see below list of spare parts. There are no special maintenance tools not specifically required in the technical Specifications which are required for the equipment.
  - UV Lamp/Sleeve
  - Ballasts
  - Wiper Seals
  - Operators Kit
  - Acticlean Gel
- c) Please see below table for expected parts replacement frequency. For the ballasts and quartz sleeve, replacement is not required unless defective.

Part Description	Expected Part Replacement Frequency
UV Lamp/Sleeve	12,000 hours
Ballast	5 years
Wiper Seals	2 years
Operators Kit	Not Applicable
Acticlean Gel	6 months

- d) Please see below table for number of staff and time required to replace parts and equipment. Only one person should be required to complete part replacement, assuming crane on site to remove module out of channel. Below times also assume module has already been removed from channel.

Part Description	Expected Replacement time
UV Lamp/Sleeve	10 minutes
Ballast	20 minutes
Wiper Seals	15 minutes
Operators Kit	Not applicable
Acticlean Gel	15 minutes



### 10.3 Preventive Maintenance Schedules

Table 20 shows required periodic maintenance.

**Table 20 Required Preventive Maintenance Schedule**

System Component	Maintenance Requirement	On Removal	Daily	Weekly	Monthly	Every 2 Months	Semi-Annually	Annually	12,000 hour	Every 2 years
UV system	Visual walk-about inspection ( <a href="#">Table 21</a> )		X							
	Clean the UV channel around the UV system. Perform semi-annually for poor water quality conditions.							X		

**Table 20 Required Preventive Maintenance Schedule (continued)**

System Component	Maintenance Requirement	On Removal	Daily	Weekly	Monthly	Every 2 Months	Semi-Annually	Annually	12,000 hour	Every 2 years
Hydraulic System Center	Inspect HSC and Hydraulic System Components (Section 10.5.2).				X					
	Initiate wipe sequence and check the HSC pressure is within range (180–200 psi) (Section 10.5.3)				X					
	Check the hydraulic fluid level (Section 10.5.4)			X						
	Replace the filter (Section 10.5.3)							X		
	Inspect the hydraulic hoses for wear. Replace hoses if bulges, splits, cracks or nicks are apparent. Perform when recharging the ActiClean™ Gel (Section 10.5.5)	X							X	
	Replace hydraulic fluid (Section 10.5.3)									X
Level Sensor(s)	Check Level Sensor for debris, algae or damage. Clean the sensor rods as needed with a wire brush. Replace if worn. Perform once every two weeks for poor water quality conditions.				X					
Water Level Control	Inspect for debris and remove as needed. Perform once every two weeks for poor water quality conditions.				X					
	Inspect grouting/seals and repair/replace if any signs of cracking or damage							X		
UV Module	Inspect and if required remove debris from module. Use low pressure washer (e.g. a garden hose). Perform once every two months for poor water quality conditions.	X				X				
	Remove the module. Replace UV lamps and lamp sleeve O-ring seals (Section 10.4).								X	
	Check the module power cable strain relief for tightness.					X				
	Replace end cap seal (Section 10.4.6.2).	X								
ActiClean™ Cleaning System	Remove module debris and fill the wiper collars with ActiClean™ Gel (Section 10.6.1)	X					X			
	Apply grease to the wiper cylinder—done at same time as filling the ActiClean™ Gel (Section 10.7.1.2)						X			
	Flush and clean entire cleaning system and replace ActiClean™ Gel (perform at the same time as replacing UV lamps at EOLL) or every 18 months. (Section 10.6.1) Perform annually for poor water quality conditions.								X	
	Replace Wiper Seals (Section 10.6.2.1)									X

**Table 21 Daily Visual Walk-about Inspection Checklist**

System component	Inspection activity
SCC	Check Alarm Status screen for new faults and record new alarms
SCC	Check the Alarm History screen to get an overview of past faults
SCC	Check the Overview screen(s) on the user interface to make sure that all the UV Banks are in REMOTE AUTO and that all Modules are enabled
ActiClean™ Cleaning System	Check the Wiper Control screen(s) on the user interface to make sure that all the wiper groups are in REMOTE AUTO and that all wiper groups are enabled.

## Maintenance

**Table 21 Daily Visual Walk-about Inspection Checklist**

System component	Inspection activity
Level sensor	Visually inspect water level sensor for debris build up. Clean as needed.
Hydraulic System Center	Visually inspect Manifold and HSC for Hydraulic fluid leaks.

## 10.4 UV Modules

### NOTICE

The Lamp Driver enclosure is tested and certified to UL50 performance requirements to provide a degree of protection against hose-directed water, the entry of water during temporary submersion at a limited depth and damage from external ice formation. Because the rating is dependent upon how the system is handled, operated and maintained, the manufacturer only guarantees the rating for one year from system commissioning. If the enclosure is stored, handled, operated and maintained according to the instructions in this user manual, environmental protection may last for the life of the product.

When a module is removed from the UV channel for maintenance, perform the inspection actions listed in [Table 22](#).

**Table 22 Recommended UV Module Inspection**

Component	Action
Lamp sleeves	Check to make sure that there is no visual fouling or hazing on the exterior of the lamp sleeve. If any signs of fouling are present, make sure the ActiClean™ Gel in the wiper collars is full. Manually clean sleeves as required.
	Make sure that the lamp sleeve nuts are hand tight to prevent moisture leaks into the lamp sleeve. Over-tightening may damage the seal and allow moisture to enter the lamp sleeve.
	Visually inspect the lamp sleeves for internal moisture. If more than a few pin-head type droplets are present, clean and dry the affected lamp sleeves and UV lamps.
Support Rack	Inspect the module support rack spacer clips for broken clips. Replace clips as needed.
Hydraulics	Inspect hydraulic hoses for cracks, leaks, etc. Replace hoses as needed.
Module Power Cable	Check to make sure that there are no bent pins. If any pins are bent, immediately remove the module from service and replace the Module Power Cable.
	Check pins for corrosion (observed as a white discoloration or patina on the surface of the pin). Manually cleaned using a soft metal wire brush, such as brass, or emery cloth with a 90 or finer grade. Ensure all debris is removed. Once the pins are clean, Trojan recommends applying a corrosion preventative compound to prevent future occurrences of corrosion. 'Corrosion Zero' is known to be compatible with all components of the power cord connector and is approved by Trojan for this purpose.



# PROPOSERS TASK SCHEDULE





**12. Proponent's Task Schedue.** The following information should be included:

Each Proponent in their proposal shall provide a letter signed by a senior officer of the company guaranteeing field service, submission, and delivery time for the following tasks below. If the timing requirements cannot be met, Proponent shall propose an alternate time in their proposal. Proponent shall allow 15 days for the City and the Consultant to review shop drawings.

The Tentative schedule for the project is as follows:

- a. Shop Drawing Submittals of UV Disinfection Equipment for Consultant Review – January 2024
- b. Tender (General Contract) – March 2024
- c. Start of Construction – November 2024. The general construction contract is anticipated to be for a period of five (5) months with Substantial Performance in April 2025.
- d. Delivery of the UV Disinfection Equipment – August 2024

Task Schedule

TASK SCHEDULE	TIMING REQUIREMENTS
Field Verification Assessments	Two (2) weeks (10 business days) following written authorization to proceed
Submission of shop drawings	Three (3) weeks (15 business days) following written authorization to proceed
Delivery of equipment to site	Six (6) months (120 business days) following approved shop drawings

**TROJAN'S RESPONSE:**

Please see sections below taken from the scope of supply for project timings. The bid and it's contents are signed by a senior officer. As per Addendum 3, Six (6) weeks is OK to prepare and supply submittals.



## **DOCUMENTATION (SHOP DRAWINGS AND O & M MANUALS)**

### ***Trojan's Responsibility:***

The following documentation will be supplied to the contractor by Trojan per the following schedule:

1 electronic copy of submittal shop drawings 6-8 weeks after receipt of written purchase order.

1 electronic copy of Trojan Standard O&M manuals at time of equipment delivery.

## **DELIVERY, START-UP AND TRAINING**

Equipment shipped **18-20** weeks after approval of Shop Drawings.

### ***Installation Contractor's Responsibility:***

The Contractor is responsible for:

- Un loading of the components supplied by Trojan, storage of all components, if required in a clean dry environment
- Installing the equipment outlined in the scope of Supply in accordance with contract drawings, Trojan's shop drawings, instructions and installation checklist.
- Supplying all conduits and conductors and components per the sites state regulations and components indicated as supplied by others,
- Completing the Checklist and returned at least two (2) weeks prior to date requested for commissioning.

The following start-up services will be provided by Trojan-certified technicians:

- Installation assistance as required by phone or fax. Technical Assistance Center 1-866-388-0488 or [tac@trojanuv.com](mailto:tac@trojanuv.com)
- Start-up and testing of the installed UV equipment.
  - If the Trojan's Certified Service Technician determines the Contractor work is not complete and the start-up cannot be completed in the allotted time a return visit will be scheduled at the Contractors expense.
- Classroom and/or jobsite training for operations staff
  - If trainees are not available a return visit will be scheduled at the Contractors expense.
- Performance testing.



# HEALTH AND SAFETY AND WORKPLACE VIOLENCE AND HARRASMENT ACKNOWLEDGEMENT



LRPCP UV DISINFECTION EQUIPMENT PRE-PURCHASE

APPENDIX "F" - HEALTH, SAFETY AND WORKPLACE VIOLENCE AND HARASSMENT ACKNOWLEDGEMENT FORM

All work performed under this Proposal must be carried out in accordance with the terms and conditions of the OCCUPATIONAL HEALTH & SAFETY ACT, R.S.O. 1990, as amended and any other applicable legislation. Furthermore, all pertinent safety rules and regulations of the City must be followed. The City reserves the right to obtain the Health and Safety records from the appropriate Ontario Government Ministry of the selected Proponent and may determine its selection of the Successful Proponent based upon these records. Responsibility for compliance with the Act and Regulations rests exclusively with the Proponent and may be subject to the scrutiny of the City. Regulations are available from the Ministry of Labour offices.

Failure to comply with Safety Regulations, as set out above, may result in the immediate cancellation of this contract. The Successful Proponent shall become familiar with the City's Health & Safety policies and procedures, and shall be required to submit a copy of their company Health & Safety procedures. All work performed must comply with WHMIS Legislation & Regulations.

I acknowledge that I understand my responsibilities under the Occupational Health & Safety Act, R.S.O. 1990, as amended, and agree that all workers under my employment will comply with this Act and all other applicable regulations.

I acknowledge that willful or persistent violations of the Occupational Health and Safety Act and Regulations for this service will be cause for termination of service.

The City maintains a zero-tolerance approach to all forms of workplace violence and harassment. The Contractor, its employees, servants and agents shall abide by all policies and procedures established by the City in respect of the prevention of workplace violence and harassment, including but not limited to the Workplace Violence and Workplace Harassment policies. All such policies will be provided by the City to the Contractor at the Contractor's request.

Signed [Signature] (Authorized Agent) Tom Siller
Trojan Technologies Group ULC (Company name) Name printed
3020 Gore Road, London, Ontario N5V 4T7 (Address)

-END OF APPENDIX "F" -



# Your clearance(s) / Vos certificats de décharge

We confirm that the business(es) listed below are active and in good standing with us.

Nous confirmons que la ou les entreprises énumérées ci-dessous sont actives et que leurs comptes sont en règle.

Contractor legal or trade name / Raison sociale ou appellation commerciale de l'entrepreneur	Contractor address / Adresse de l'entrepreneur	Contractor NAICS Code and Code Description / Code du SCIAN de l'entrepreneur et description	Clearance certificate number / Numéro du certificat de décharge	Validity period (dd-mmm-yyyy) / Période de validité (jj- mmm-aaaa)
TROJAN TECHNOLOGIES GROUP ULC / TROJAN TECHNOLOGIES GROUP	3020 GORE RD, LONDON, ON, N5V4T7, CA	333248: All other industrial machinery manufacturing	A0000IU7RG	20-Nov-2023 to 19-Feb-2024

Under Section 141 of the *Workplace Safety and Insurance Act*, the WSIB waives our right to hold the principal (the business that has entered into a contractual agreement with the contractor/subcontractor) liable for any unpaid premiums and other amounts the contractor may owe us for the validity period specified.

Aux termes de l'article 141 de la *Loi sur la sécurité professionnelle et l'assurance contre les accidents du travail*, la WSIB renonce à son droit de tenir l'entrepreneur principal (l'entreprise qui a conclu une entente contractuelle avec l'entrepreneur ou le sous-traitant) responsable de toute prime impayée et autre montant que l'entrepreneur pourrait lui devoir pour la période de validité indiquée.

WSIB Head Office: 200 Front Street West  
Toronto, Ontario, Canada M5V 3J1

Siège social : 200, rue Front Ouest  
Toronto (Ontario) Canada M5V 3J1

1-800-387-0750 | TTY/ATS 1-800-387-0050  
employeraccounts@wsib.on.ca | wsib.ca



**OTHER INFORMATION**

