

UV Budget Proposal

City of Mission, TX

UV System Refurbishment



prepared for:

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April 26, 2023

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April 26, 2023

City of Mission
Mission WWTP

Project Name: City of Mission WWTP UV System Refurbishment
Account Number: 116653
Quote Numbers: J18010336731
Revision Number: 2

We are pleased to submit the following proposal for the City of Mission WWTP UV System Refurbishment based on the information provided in your inquiry.

As Xylem is the OEM for the Ultraviolet Disinfection System at your site, the City can be assured that all work performed will be of the highest quality, utilizing OEM parts coupled with OEM service procedures. In the following pages you will find a proposed scope of work for the UV System refurbishment upgrade process.

We trust this information meets your expectations. Please don't hesitate to contact us if you have any questions.

We value your business and look forward to working with you.

Sincerely,

Mike Leverett
Aftermarket Territory Manager - Treatment
(817) 905-2879

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1 Xylem Overview

Xylem is a leading global water technology provider, enabling customers to transport, treat, test and efficiently use water in public utility, residential and commercial building services, industrial and agricultural settings. The company does business in more than 150 countries through a number of market-leading product brands, and its people bring broad applications expertise with a strong focus on finding local solutions to the world's most challenging water and wastewater problems.



Xylem's treatment business offers a portfolio of products and systems designed to effectively meet the demands and challenges of treating water and wastewater. From smarter aeration to advanced filtration to chemical-free disinfection, Xylem leverages its well-known Treatment brands, Flygt, Leopold, Sanitaire, and Wedeco, to offer hundreds of solutions backed by a comprehensive, integrated portfolio of services designed to ensure we can meet our customers' needs in a number of different industries including municipal water and wastewater, aquaculture, biogas and agriculture, food and beverages, pharmaceuticals, and mining.

Our scientists and engineers utilize their deep applications expertise and continually listen and learn from our customers' situations to create solutions that not only use less energy and reduce life-cycle costs, but also promote the smarter use of water.



Wedeco has accepted the challenge of the 21st century. With the Wedeco brand for UV Disinfection, ozone oxidation & AOP solutions, we own the advanced technologies for chemical-free and environmentally friendly treatment of drinking water, wastewater and process water as well as further industrial treatment processes. We constantly invest

a large portion of our energy in the development of high-tech components, systems and equipment, as well as in the study of new areas of application for UV, ozone & AOP. In doing so, we have always given special attention to the increase in energy efficiency of our Products equipped with our unique UV lamps and ozone electrodes.



The special characteristics of the Wedeco Ecoray UV lamp are its special doping and the unique long-life coating. Because of these features, a constantly high UV light yield is achieved with a substantially extended lamp service life at the same time. In addition, by using this technology it is not necessary to apply liquid mercury inside the lamp. Wedeco UV lamps cannot be surpassed in economic efficiency.

In relation to expenditure of energy, the High-Intensity/Low-Pressure Technology provides a light yield three times higher than comparable UV lamps of widely used Medium Pressure Technology. A higher light yield also means a lower heat generation at the same time.

Thanks to this, Wedeco UV lamps become less susceptible to varying water temperatures. Even the formation of deposits on the quartz sleeves as well as lamp aging is considerably lower than with alternative UV lamp technologies in Herford and Essen.



WEDECO Ecoray UV lamp



Xylem's Wedeco ozone systems combine maximum flexibility and reliable operating characteristics for small to large ozone capacities. The ozone generator system and control unit can be combined and supplemented with option sets that allow for various application requirements.

Effizon evo 2G ozone electrodes are the core of our technology and achieve an unmatched level of reliability and energy efficiency. The electrodes are manufactured completely from inert materials, without the need for fuses or coatings, making them highly resistant to corrosion. This means that the Wedeco ozone generators are practically maintenance free with no need for regular cleaning or replacement of the electrodes.

We rely on consistently high-quality standards in all divisions of the company. Moreover, product quality and manufacturing operations are constantly monitored and optimized in continuous improvement processes. Established quality controls give Xylem and you the security of knowing that Wedeco UV, Ozone & AOP systems will always operate reliably.

For more information please visit us at <http://www.xylem.com/treatment/>



**WEDECO Effizon® evo 2G
Ozone electrode**

2 General Process Description

2.1 DESIGN

DESCRIPTION	UNITS	VALUE
DESIGN FLOW:	MGD	
Peak		18.0
Average		6
UV DOSE	mJ/cm ²	>37*
BOD5	mg/l	15.0
SUSPENDED SOLIDS:	mg/l	15.0
UV TRANSMITTANCE RANGE (253.7 nm):	%	65.0 (minimum)
EFFLUENT FECAL COLIFORM STANDARD:	FC/100 ml	
30 day geometric mean		200
7 day geometric mean		400
Single Sample Maximum		800.0
EFFLUENT TEMPERATURE:	Min./max. °F	40/100

NOTE

The stated dose of 37 mJ/cm² was calculated at peak flow with the following factors:

- 0.70 Lamp Aging**
- 0.92 Quartz Transparency**
- 0.9 Overall Safety Factor**

Dose is based on the intensity at the end of the guaranteed lamp life.

2.2 PROCESS DESCRIPTION

The proposed UV System is based on a direct replacement to the original design criteria, designed to impart the same UV intensity as the original TAK55L 8-4X2I2W UV system. If the design criteria has changed at all since the original installation, Xylem reserves the right to modify the design, scope and price once the design criteria has been confirmed and a full process review has been performed by Xylem.

3 Technical Description

CONFIGURATION:	TAK55L 8-4X2I2W	
DESCRIPTION	UNITS	VALUE
Total Number of lamps		256
Number of lamps per channel		128
Number of channels		2
Number of banks per channel		2
Number of modules per bank		4
Number of lamps per module		16
CHANNEL DIMENSIONS:	Inches	
Total width		40.56
Water depth		40.56
Total depth		69.0
Approx. length	Feet	38
HEADLOSS (at 13.5 MGD per channel)	Inches	
Across baffle plate		2.0
Across lamp banks (per bank)		0.69
Across level control		21.9

4 Benefits of the system refurbishment

The system refurbishment will replace and upgrade significant control components with newer, more modern technology, provide all new UV channel modules, all new wiper system pneumatic and electrical components, new UV sensors, and replace all ballasts and significant electronics with Xylem staff expertise. This solution will address system concerns that are necessary for reliable operation, maintenance and efficiency. The controls improvement will be fairly direct in existing cabinets and will allow continued operation to meet dose needs for disinfection. The upgrade will ultimately provide longer system life and bring the system up to xylem operating standards. This system refurbishment will afford the plant additional value beyond relief from existing system conditions.

5 Price & Scope of Supply

5.1 XYLEM SCOPE OF SUPPLY

- 5.1.1 **SCE Control Panel Refurbishment (1):** One (1) SCE panel will be refurbished to new condition. All PLC hardware installed in the SCE panel at end of life or approaching end of life will be upgraded to the modern equivalent providing years of product reliability and support. Factory trained Xylem personnel shall remove one (1) legacy PLC processor, one (1) legacy Ethernet module, one (1) legacy control net module and one (1) HMI. Factory trained Xylem personnel shall be responsible for supplying and installing one (1) new PLC processor, one (1) new Power Supply, two (2) new Ethernet modules, one (1) new Ethernet switch and one (1) new 10" HMI in one (1) SCE control panel. All restoration work will be performed by Xylem Service Engineer on site. Xylem Service Engineer will transmit all uninstalled items to Owner at Owner's direction.
- 5.1.2 **Ballast Panel Refurbishment (2):** One (1) ballast cabinet (EBE-1A & EBE-1B) will be refurbished to new condition during each of the phases. The existing two (2) back panels and eight (8) ballast frames will be equipped with Eighty (80) Ecoray TDS 55 ballasts, sixteen (16) ballast interface boards, two (2) matrix boards, two (2) UV sensor boards (Kome boards) and two (2) PLC remote I/O adapters will be upgraded to modern modules with Ethernet I/P connectivity. All restoration work will be performed by Factory trained Xylem Technician on site. Xylem Technician will transmit all uninstalled items to Owner at Owner's direction.
- 5.1.3 **Junction Box Refurbishment (2):** Two (2) Junction boxes will be restored to new condition by supplying new solenoids, manifolds, air line connectors and air line tubing during each of the two phases. All restoration work will be performed by factory trained Xylem personnel on site.
- 5.1.4 **Ultrasonic Level Transmitter (2):** One (1) new Ultrasonic Level transmitter will be provided in each of the two phases. Factory trained Xylem personnel shall be responsible for removal of two (2) existing ultrasonic level transmitters and installation of two (2) new ultrasonic transmitters.
- 5.1.5 **PLC programming of new PLC Processor:** Factory trained Wedeco Controls Engineer shall be responsible for programming one new PLC processor
- 5.1.6 **HMI programming of new HMI:** Factory trained Wedeco Controls Engineer shall be responsible for programming one new HMI.
- 5.1.7 **UV Modules (16):** Eight (8) UV modules will be supplied during each phase completely assembled containing UV lamps, quartz sleeves, wiping equipment, flexible conduit and wiring terminated at quick connectors (Harting Connectors). Each module contains fourteen (14) UV lamp assemblies. Module installation by factory trained Xylem personnel on site.
Material: Stainless steel 316 frame
- 5.1.8 **UV Sensors (4):** Two (2) UV Sensors will be supplied during each of the two phases, one for each bank. The UV Sensors will be installed in the UV Modules at the Xylem factory in Germany prior to shipment.

- 5.1.9 **SCE, PDE-1, PDE-2 interconnecting wiring (1 lot):** New Ethernet cable between SCE, PDE-1 and PDE-2 will be supplied, installed and terminated.
- 5.1.10 **Documentation (1):** Control panel and ballast panel as-built drawings and supplement bill of material (BOM) will be provided for insertion into Owners existing O&M manuals.
- 5.1.11 **Field Services:** Xylem will provide the services of one (1) factory trained Service Technician for up to sixteen (16) days, four (4) trips for ballast panel refurbishment, junction box refurbishment, new module installation and level transmitter installation and one (1) factory trained Controls Engineer for up to three (3) days, one (1) trip for SCE control panel legacy hardware de-termination and removal, new hardware installation, interconnecting Ethernet cable installation, wire re-termination, point to point testing, loop checks, start-up, commissioning, and operator training of one (1) TAK55L 8-4X2I2W UV System.

5.2 PRICE SUMMARY

DESCRIPTION	PRICE
UV System Model TAK 55 as defined in scope of supply	
<u>Channel One Phase will include:</u> <ul style="list-style-type: none"> One (1) ballast cabinet refurbishment One (1) junction box refurbishment Eight (8) complete modules, two (2) new UV sensors w/ hardware Two (2) trips for eight (8) days total of Field Service Technician to install ballast panel refurbishment, junction box refurbishment, new module installation, level transmitter installation 	\$209,366
<u>Channel Two Phase will include:</u> <ul style="list-style-type: none"> One (1) ballast cabinet refurbishment One (1) junction box refurbishment Eight (8) complete modules, two (2) new UV sensors w/ hardware Two (2) trips for eight (8) days total of Field Service Technician to install ballast panel refurbishment, junction box refurbishment, new module installation, level transmitter installation 	\$209,366
<u>Controls Upgrade Phase will include:</u> <ul style="list-style-type: none"> The controls upgrade hardware and PLC & HMI programming One (1) factory trained Controls Engineer for up to three (3) days, one (1) trip to install controls upgrade and provide operator training 	\$41,200
TOTAL:	\$459,932

<p><u>Option 1</u></p> <ul style="list-style-type: none"> Lamp cables, Two hundred fifty-six (256) 25m in length each Actuator (Material only, installation by Mission WWTP provided labor) 	<p>\$61,000</p>
<p><u>Option 2</u></p> <ul style="list-style-type: none"> Outlet Gate Actuator, One (1) Auma Gate Actuator (Actuator only, installation by Mission WWTP provided labor) 	<p>\$7,500</p>

NOTE:

- Parts suggested are based on the nature of the issues reported. All parts may not be used.
- Phased approach and option pricing are subject to inflationary increases after validity date.
- Existing UV system commodity items such as fuse holders, fuses, miscellaneous panel wire, terminals etc. are expected to be in proper working condition and evaluation of these items will be possible once the major components of the system, which are included in this proposal, have been installed.

6 Commercial Terms & Conditions

Incoterm: DAP - Delivered At Place **Named Place:** Jobsite

Incoterms 2010 clarify responsibility for costs, risks, & tasks associated with the shipment of goods to the named place.

Validity: This Quote is valid for forty-five (45) days.

Terms of payment:

Price is based upon the following payment terms (net 30 days):

- 30% net 30 days upon receipt of purchase order
- 60% net 30 days from shipment of the product
- 10% installation of the Xylem equipment, NTE 150 days after shipment (whichever comes first)

Please make purchase orders out to:

Xylem Water Solutions USA, Inc.
4828 Parkway Plaza Blvd., Suite 200
Charlotte NC 28217
704-409-9700
Fax 704-409-9839

Xylem's payment shall not be dependent upon Purchaser being paid by any third party unless Owner denies payment due to reasons solely attributable to items related to the equipment being provided by Xylem Inc.

General Equipment / Workmanship Warranty: Standard warranty terms apply to the items in this quotation.

Schedule: Submittals will be provided for record purposes only. Delivery lead times for service are subject to technician availability after order acceptance.

Due to the continuing disruptions of COVID-19, including extended production timeframes from our suppliers as a result of raw materials shortages, related labor constraints, and transportation and logistics-related delays due to a shortage of both truckers and containers, we can at this time only state what our current lead-time is expected to be. Once an order is received we will work closely with you to meet your needs as best possible in this uncertain time.

Terms of Delivery: PP/Add Actual Surcharge

Terms and Conditions: This quotation is subject to the Standard Terms and Conditions of Sale – Xylem Americas effective on the date the order is accepted which terms are available at <http://www.xylem.com/en-us/Pages/terms-conditions-of-sale.aspx> and are incorporated herein by reference and made a part of the agreement between the parties

Back charges: Purchaser shall not make purchases nor shall Purchaser incur any labor that would result in a back charge to Seller without prior written consent of an authorized employee of Seller.

Shortages: Seller will not be responsible for any apparent shipment shortages or damages incurred in shipment that are not reported within two weeks from delivery to the jobsite. Damages should be noted on the receiving slip and the truck driver advised of the damages. Please contact our office as soon as possible to report damages or shortages so that replacement items can be shipped and the appropriate claims made.

Taxes: The prices quoted above do not include any state, federal, or local sales tax or use taxes. Any such taxes as applicable must be added to the quoted prices.

Customer Acceptance: A signed facsimile copy of this quote is acceptable as a binding contract.

Signature: _____ Name: _____
(PLEASE PRINT)

Email: _____ Phone: _____

Date: _____ PO#: _____

7 Additional Information

7.1 NEW AND IMPROVED AIR CYLINDER

Wedeco has a new and improved wiper cylinder available that should be considered even if you currently are not having issues but are approaching the expected end of life. What differentiates the new cylinder are the new polyurethane sealing band and piston seals which reduce air leakage by up to 93%. The efficiency of the new wiper cylinder may then be further maximized by installing new air tubing and pneumatic connectors. This provides for the three-fold benefit of lower energy costs, reduced maintenance and increased compressor life. Since the wiper system keeps the quartz sleeves clean, upgrading the wiper system in the prescribed manner provides for optimal system efficiency by allowing maximum UV energy to pass through to the water.

7.2 MODULE REPLACEMENT

7.2.1 LAMP CABLE, HARNESS AND FLEX CONDUIT REPLACEMENT

A proactive lamp cable service can be performed at this time as well. This option will provide for the most reliable system performance, ensuring all lamps are operating properly. Such a refurbishment involves replacing the entire cable assembly including the flexible conduit, Harting connector and all wiring/air lines within the conduit. With this option, all the cables have already been fed through the flex conduit and terminated in the Harting connector prior to being shipped to site. The benefit of reduced labor commitments and decreased margin for error make this pre-fabricated unit the best option for servicing lamp cables.

7.2.2 QUARTZ SLEEVE REPLACEMENT

The quartz sleeves provided with the system are warranted for 20 years for manufacturing defects. The quartz is very resistant to photochemical degradation affecting UV output. Complete replacement should however be considered when the sleeves become excessively scratched. The contaminants in the water and manual cleaning methods used will dictate the time when replacement is necessary. Scratched sleeves can't be cleaned as well by the wiper rings and additional manual cleanings become necessary. The benefit for complete replacement is reduced labor time from the additional manual cleaning and increased UV disinfection performance due to peak UV transmission through the sleeves.

7.2.3 INTENSITY SENSOR UPGRADE

An accurate UV intensity sensor is vital to properly determining the UV dose being applied to treated wastewater and ensuring compliance with discharge permits. Upgrading the UV intensity sensor to the latest technology can optimize the accuracy of dose calculations. The proposed UCT sensor is 99% selective at 254 nm, the wavelength most intensely emitted by Wedeco low pressure UV lamps. This selectivity translates to a highly accurate determination of lamp output.

In addition to accuracy improvements, the new UCT sensor is also more reliable when performing maintenance on your UV system. Compared to the M-type sensor, which requires recalibration when

changing out a bank of lamps, the UCT sensor is able to maintain accurate calibration when being pulled from a module to perform maintenance on lamps. Implementation of a new sensor involves installation of a new module, a KOME control board, and ancillary mounting/wiring equipment to provide for highly improved accuracy and reliability of UV output calculation. The legacy module then gains new value as a spare non-sensor module

7.3 BALLAST UPGRADE

Wedeco's latest electronic TDS ballast technology provides for more robust and efficient operation of ECORAY high power, low-pressure UV-C germicidal lamps when compared to previous version ballasts. Increased robustness of your Wedeco UV system is bolstered by three key ballast improvements. The new TDS models can operate in a broad range of ambient cabinet temperatures from 32 to 122°F. Within air conditioned cabinets, increased air flow can also be observed due to the fact that the TDS ballasts require 30% less space than previous models. Lamp life is significantly increased, especially after 7,000 hours, when upgrading to the TDS ballasts due to the change from a sinusoidal waveform signal to a rectangular waveform signal used to trigger the lamps.

The shift to a rectangular waveform signal can also decrease lamp energy consumption by up to 10% as compared to previous ballast technology while maintaining the same UV output levels. Energy savings may be further harnessed when installing the new TDS ballasts by taking advantage of the TDS ballast's ability to vary UV output from 50 to 100%, depending upon flow conditions and target dose. Increased reliability of your Wedeco UV system may be observed since the new TDS ballasts enable at least one of the two lamps to remain in operation even when one lamp fails. When lamp failures do arise, troubleshooting the ballasts is assisted by three LED indicators on the ballasts, indicating whether the supply power is engaged and whether the lamps are on. Additional ballast status and troubleshooting information is also provided via these LED's on the ballast card.