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FACSIMILE TRANSMITTAL SHEET

TO: **All Potential Bidders**	FROM: C.J. Savoie Consulting Engineers, Inc.
COMPANY:	DATE: MARCH 6, 2015
FAX NUMBER:	TOTAL NO. OF PAGES, INCLUDING COVER: 13
PHONE NUMBER:	SENDER'S REFERENCE NUMBER: 985-369-7735
RE: UV Light Disinfection Assembly Lions Water Treatment Plant -Addendum No. 2	YOUR REFERENCE NUMBER:

☐ URGENT x FOR REVIEW ☐ PLEASE COMMENT X PLEASE REPLY

NOTES/COMMENTS:

Potential Bidders,

Please see attached Addendum No. 2 for the above referenced project dated March 6, 2015. Please have the acknowledgement page signed and faxed to our office (985) 369-7735. A hard copy will follow via mail and e-mail.

ADDENDUM NO. 2

DATE: March 6, 2015

PROJECT: **UV LIGHT DISINFECTION ASSEMBLY**
LIONS WATER TREATMENT PLANT

PROJECT ENGINEER: C.J. Savoie Consulting Engineers, Inc.

BID DATE: The bid date shall be **March 24, 2015**

TIME: Bid submittal time is **2:45 p. m.**

NATURE OF CHANGE:

SPECIFICATIONS

CHANGE AND CLARIFICATION:

REMOVE: Existing Section 11700 Ultraviolet Disinfection Equipment
Pages 11700-1 Through 11700-11

REPLACE: Attached Revised Section 11700 Ultraviolet Disinfection Equipment
Pages 11700-1 Through 11700-11

NATURE OF CHANGE:

PLANS

CHANGE AND CLARIFICATION:

Sheet C.3 UV Disinfection Plan and Details

Clarification Equipment Interconnections

NOTE: Electrical supply shall be 480v/277v 60Hz, 3 Phase 4 Wire + Ground.

C.J. Savoie, P.E.
Parish Engineer

ADDENDUM NO. 2
UV LIGHT DISINFECTION ASSEMBLY
LIONS WATER TREATMENT PLANT
Page 2

PLEASE ACKNOWLEDGE RECEIPT OF ADDENDUM #2 via fax or return mail prior to bid. Fax # (985) 369-7735

_____
Company

_____
Mailing Address

_____

_____
Contractor's Signature

SECTION 011700 – ULTRAVIOLET DISINFECTION EQUIPMENT

PART 1 – GENERAL

SUMMARY

Furnish all labor, materials, equipment and appurtenances required to provide a closed vessel, pressurized flow, high intensity medium pressure lamp, ultraviolet (UV) disinfection system complete with an automatic mechanical/chemical cleaning system and UV intensity monitoring. The UV system shall be complete and operational with all control equipment and accessories specified herein and as shown on the contract drawings.

The UV disinfection system shall be purchased from Trojan Technologies, the Base Bid Manufacturer, by the Contractor. The system shall be installed by the Contractor and tested and commissioned by Trojan Technologies, as specified in this section.

QUALITY ASSURANCE

Pre-qualification Requirements: Any alternate UV Manufacturer that is not named or listed as an approved equal must submit the following fifteen (15) days prior to bid to be considered for approval:

The UV Manufacturer shall be regularly engaged in the manufacture of UV systems with a proven track record of at least one hundred (100) installations in North America, each with a flow rate of at least 1.0 USMGD (158 m^3/hr). The manufacturer shall provide documentation of their experience with UV disinfection systems in municipal drinking water applications.

The UV Manufacturer shall submit a Bioassay Validation Report for the proposed reactor. The bioassay testing and results shall have been validated by a qualified independent third (3rd) party in full compliance with EPA 815-R-06-007, *Ultraviolet Disinfection Guidance Manual For The Final Long Term 2 Enhanced Surface Water Treatment Rule*, released November 2006.

1. Bioassay testing shall evaluate reactor performance over the range of flow rates from 0.2 to 6.5 USMGD, UV Transmittance (UVT) from 70% to 98% (measured at 254 nm, 1 cm path length) and MS2 Reduction Equivalent Dose (RED) ranging from 10 to 110 mJ/cm^2, or T1 Reduction Equivalent Dose (RED) ranging from 2 to 24 mJ/cm^2. The bioassay testing must encompass the range of design and operating conditions described herein. ***Extrapolations to flow rates, UV Transmittance values, or UV doses outside the range actually tested, shall not be permitted.***
2. Bioassay testing shall also verify that the headloss generated by the proposed reactor is less than or equal to the specified limits.
3. Pre-qualification submittals from the UV manufacturer shall include a complete and detailed proposal of equipment offered, including the number of lamps proposed and a detailed description of any exceptions taken to the specification.

4. Documentation of the UV manufacturer's service capabilities including location and experience.
5. All UV manufacturers shall be required to pre-qualify, unless the manufacturer is the Base Bid Manufacturer.

SYSTEM DESCRIPTION

Design Criteria:

The UV Manufacturer shall provide equipment to disinfect water with the following characteristics:

Peak (Design) Flow:	6	MGD(US)
Average Flow:	3	MGD(US)
Min Flow:	xxx	MGD(US)
Design UVT:	85	% (at 254 nm, 1 cm path length)
Water Temperature:	1 °C to 30 °C	
Turbidity:	<5 NTU	
Max. Inlet Pressure:	xxx	psig

Design Dose: The UV disinfection system shall be designed to deliver the Reduction Equivalent Dose (RED) specified in Section 1.3.C, Performance Requirements. To ensure the UV system can deliver the RED at the end of lamp life, with fouled sleeves, the RED shall incorporate a Combined Aging and Fouling Factor (CAF) calculated as CAF = EOLL x FF, where EOLL is the ratio of the lamp output at the end of the lamp life relative to the new lamp output, and FF is the Fouling Factor. The FF shall be 0.5 for UV Systems with no sleeve wiping system, 0.75 for UV Systems with mechanical only sleeve wiping system, or 0.95 for UV Systems with an *on-line* combined chemical and mechanical sleeve wiping system. EOLL (End Of Lamp Life) output shall be 80% of the specified new lamp output. A higher value shall be permitted only if the EOLL output has been validated by 3rd Party witnessed testing of the output at the end of the warranted lamp life.

a) The RED shall be delivered under the Peak (Design) Flow and Design UVT condition specified in 1.3.A.1, with the largest unit out of service.

b) Systems without an automatic on-line mechanical and chemical cleaning system shall include provisions to automatically chemically clean the lamps.

c) RED must be verified by third party witnessed bioassay testing per Section 1.2.A.3.

2. Hydraulics:

a) Headloss through each UV reactor shall not exceed 30 1 water column (in w.c.) under peak flow conditions.

B. System Components:

1. The UV system shall be comprised of the following components:

   a) UV Reactors: 2

   b) Number of lamps per reactor: 4

   c) Control Power Panel(s): 1 per reactor

   d) UV Intensity Sensor(s): 1 per lamp

   e) Automatic Cleaning System: On-line Chemical/Mechanical

C. Performance Requirements:

1. The UV Manufacturer shall provide a written guarantee that the equipment will continuously meet the specified performance requirements for each unit as follows:

   The UV disinfection system shall be capable of providing 1.0 log of Cryptosporidium at the Peak (Design) Flow and Design UVT condition specified in 1.3.A.1.

   The UV Manufacturer must have a 3rd Party Validation report meeting the requirements of 1.2.A.3 and 1.2.A.4. The Validation report must substantiate that the UV system is capable of delivering an RED (Reduction Equivalent Dose) mJ/cm^2, for the design conditions stated in 1.3.A.1, and the design dose considerations in 1.3.A.2, as follows:

   $RED = D_{req'd} * VF * SF$, where

   $D_{req'd}$ (dose required) = 2.5 mJ/cm^2 for 1.0 log credit for cryptosporidium (Ref Table 1.4 *Ultraviolet Disinfection Guidance Manual* (UVDGM); for example, 12 mJ/cm^2 for 3.0 log credit for Cryptosporidium)

   VF = UV system Validation Factor calculated using the method outlined in the UVDGM (unique to each manufacturer and system)

   SF = Safety factor to account for site uncertainties (flowmeter accuracy, online UVT accuracy, flow split differentials, minor upstream/downstream piping differences etc.) = 1.25 (value at discretion of the engineer)

   At the time of bid, the UV Manufacturer must provide a Validation Certificate, to demonstrate that they have obtained 3rd Party Validation that covers the full range of design and operating conditions (flow rate and UVT) described in Section 1.3.A.1. The selected UV Manufacturer must provide the Validation Report as part of the submittal package to substantiate the dose delivery (RED), and calculation of the Validation Factor used above.

2. The system shall be able to continue providing disinfection while the automatic cleaning system is in operation.
3. The system shall be able to continue providing disinfection while the UV intensity sensor calibration is being checked.
3. System shall be designed to operate in an environment with ambient relative humidity of 5-90% and ambient air temperature of 0-40°C.

SUBMITTALS

Submit for review, engineering drawings showing the following:

Complete description in sufficient detail to permit comparison with the specifications.

Dimensions and installation requirements.

Descriptive information including catalogue cuts and manufacturers' specifications for all major components.

Electrical schematics and layouts.

GUARANTEE

Equipment: The equipment furnished under this section (excluding UV lamps) shall be free of defects in materials and workmanship, including damages that may be incurred during shipping for a period of one (1) year from start-up or 18 months after shipment, whichever occurs first.

UV Lamps: The UV lamps shall be warranted for 5,000 hours of operation (prorated after 3,000 hours) or 36 calendar months from shipment, whichever occurs first.

PART 2-PRODUCTS

MANUFACTURER

The physical layout of the system shown on the contract drawings and the equipment specified herein are based solely upon the Trojan UVSwift™, as manufactured by Trojan Technologies, London, Ontario, Canada or prior approved equal.

A. To be acceptable, the UV system must operate in a closed vessel, use high intensity medium pressure UV lamps, use fully electronic ballasts with multiple power settings, and incorporate an automatic on-line mechanical/chemical sleeve cleaning system for both lamp sleeves and sensor sleeves/windows.

B. To be acceptable, the UV system must fit within the given dimensions with no modifications.

C. To be considered as an alternate, in addition to the Pre-Qualification Requirements listed in Section 1.2.A, UV disinfection systems that use only mechanical wiping must have the ability to periodically be cleaned using a chemical recirculation tank. To be acceptable, the cleaning solution must be ANSI/NSF Standard 60 Certified for Drinking

Water Treatment Chemicals. All tanks, cleaning chemicals, valves, power supplies and associated piping shall be supplied by the UV manufacturer. The UV manufacturer shall be responsible for supplying all equipment including any equipment not specifically listed that may be required to perform chemical cleaning, including complete controls integration. Contractor shall be responsible for installation. Contractor to make suitable arrangements for chemical to be safely drained from site. **UV disinfection systems that do not have a mechanical and chemical cleaning system will not be accepted.**

DESIGN, CONSTRUCTION AND MATERIALS

UV Reactor:

1. The UV Reactor shall be of welded construction manufactured from Type 316L stainless steel. The UV Reactor shall be pickled, passivated and bead blasted for uniform external finish.
2. UV Reactor shall occupy a plan footprint no greater than 6 ft^2. To be considered as an alternate, UV Manufacturers whose reactors occupy greater than 6 ft^2 shall demonstrate to the satisfaction of the Engineer the proper placement of the reactor within the current design layout.
3. The UV Reactor shall be designed to handle a maximum operating pressure of 150 psig, and shall be fully assembled and hydrostatically tested to 1.5 times the rated operating pressure, for at least 10 minutes without leakage, in the factory prior to shipment.
4. Each UV Reactor shall be supplied with 12 inch ANSI 150 lb flanged inlet/outlet connections.
5. Each UV Reactor shall be a nominal 12 inches in diameter.
6. Each UV Reactor shall fit within a 21 inch pipe length.
7. Each UV reactor shall consist of high intensity medium pressure UV lamps arranged horizontally and perpendicular to the direction of flow.
8. Each lamp shall be enclosed in an individual quartz sleeve, one end of which shall be closed and the other sealed with compressed o-rings.
9. Each quartz sleeve shall be independently sealed within the reactor.
10. The UV reactor shall be designed such that operating personnel at the plant can change the lamps without draining the reactor.
11. The UV reactor shall be provided with access ports for easy access to the quartz sleeves and cleaning system.

12. All access for reactor components, including lamps, sleeves and cleaning system shall be from the same side. Designs requiring access from more than one side of the reactor are not permitted.
13. Piping shall be designed so that the reactor will be full of water at all times. Air trapped in the reactor shall result in reactor shut down to avoid overheating.
14. The UV reactor shall be installed either vertically or horizontally, however lamps must be installed horizontally.
15. The UV Lamps shall reach maximum UV output within three (3) minutes (defined as the warm-up period). If discharging water that *may* not have received specified dose levels during the warm-up period is not acceptable, then a separate cooling water line *may* be required. Cooling water is *not required* for reactor start-up as long as the minimum in-line flow rates are initiated within the allowable "zero flow" operation time. If it is expected that the minimum in-line flow rates can not be initiated within the allowable "zero flow" operation time, or if the plant desires to operate the reactors in "Hot Standby" mode (i.e. the lamps are powered, but process water is not being passed through the reactor), then cooling water is required.
16. Dry weight of the reactor shall not exceed 300 lbs / 136 kg.
17. Wet weight of the reactor shall not exceed 430 lbs / 195 kg. If pipe supports are necessary, they shall be supplied by Others.
18. All wetted components within the reactor shall be NSF 61 certified.

<u>UV Lamps</u>:

1. The UV lamps shall be high intensity, medium pressure type with a 12 inch arc length and a maximum power input of 3.0 kW.
2. The filament shall be significantly rugged to withstand shock and vibration.
3. The lamp bases shall be resistant to UV and ozone.
4. The lamps shall be operated by variable output electronic ballasts with 1% power increments, from 26% to 100% of full rated output.

<u>UV Lamp Sleeves</u>:

1. The UV lamp sleeves shall be manufactured from Type 021 AL, fully annealed clear fused quartz tubing.
2. Lamp sleeves shall be domed at one end.
3. The open end of the lamp sleeve shall be sealed by means of an o-ring and Type 316 stainless steel compression plate.

<u>UV Intensity Sensor(s)</u>:

1. The UV Intensity Sensor(s) shall be located inside the reactor and contained within protective quartz sleeves.

2. One (1) sensor shall be provided per lamp.
3. Sensor(s) shall incorporate SiC diodes, and provide NIST-traceable measurement with a total absolute uncertainty of 15% or less at an 80% confidence level.
4. Sensor(s) must meet the requirements of the EPA 815-R-06-007. Sensor(s) must filter out wavelengths below 240 nm, and have a spectral response peaking between 250 nm and 280 nm with less than 10% coming from wavelengths greater than 300 nm.
5. The complete Sensor assembly and the internal circuit board containing the diode shall each be serialized.

Ballasts:

1. Ballasts shall be of a high frequency output, fully electronic design with a minimum efficiency of 94% at full load, and a power factor of 98% or better.
2. Ballasts shall have a variable operation range of 30% to 100% of full rated output and be adjustable in 1% increments.
3. The maximum allowable total current harmonic distortion (current THD) shall not exceed 10% at the maximum power level.
4. Each ballast shall supply power to one (1) lamp only.
5. Ballasts shall have a mean design life expectancy of at least 10 years.

Control Power Panel (CPP):

1. Power distribution and control for each UV Reactor shall be through the associated CPP. The CPP shall house all power supplies and control hardware.
2. The CPP shall be designed to operate with the following electrical supply:

   480/277 VAC 3 phase 60Hz, 4 wire + ground
3. The maximum total power consumption rating per CPP shall be no greater than 25.1 amps maximum current per phase (unbalanced load).
4. The CPP enclosure shall be epoxy painted carbon steel.
5. The CPP enclosure shall be Type 12 (IP54), ventilated.
6. The CPP enclosure shall be forced-air cooled.
7. Signal wiring interfacing the UV Reactor with the CPP, shall be as shown on the contract drawings.
8. The CPP shall be installed within 20 feet (6 meters) (external running cable length) of the UV Reactor.
9. Each CPP shall be provided with a lockable disconnect handle that shall shut down the reactor/cabinet power when the cabinet door is opened.
10. CPP enclosure shall be floor mounted.

11. CPP enclosure dimensions shall not exceed 48" (1219 mm) high x 36" (914 mm) wide x 18" (457 mm) deep. Weight shall not exceed 300 lbs (136 kg).

Control and Instrumentation:

1. General
   a) One (1) Control Power Panel (CPP) is provided for each UV Reactor. All control hardware and software for a given reactor is contained within the associated CPP.
   b) Each UV reactor shall be controlled independently.
   c) Each UV reactor shall be controlled by an Allen Bradley Compact Logix L35E which continuously monitors and controls the UV reactor's functions. Custom electronics, an input flow signal (supplied by others), and the UV sensor(s), provide the PLC with the necessary indications of system parameters.
   d) Control of multiple reactors shall be accomplished through SCADA (by Others).
2. Operator Interface
   a) Complete control and monitoring of each UVSWIFT™ reactor shall be accomplished through the operator interface located on the CPP.
   b) The operator interface shall be the Allen Bradley Panelview+ 700.
   c) The operator interface shall be menu driven, and shall display the following system information when prompted: reactor status, individual lamp status, lamp operating hours, RED (dose), UV Intensity, power level, alarms, alarm history.
   d) The most recent alarms shall be displayed on the operator interface when prompted, recorded by alarm type, date and time of occurrence, and date and time of correction.
3. Remote Monitoring/Control
   a) The communication between the UV reactors and the plant control center shall be through the following protocol:
      - Allen Bradley – Ethernet
   b) Each reactor shall be capable of being placed in either Local or Remote mode.
   c) Each system shall be provided with the following customer interface hardwired I/O:
      - Discrete input for Reactor On/Off Control from remote location.
      - Discrete output indicating Critical Alarm.
      - Discrete output indicating Major Alarm.
      - Discrete output indicating Minor Alarm.
      - Discrete output indicating System Ready.
      - Discrete ON/OFF status.
      - 4-20ma Flow Signal Analog input.

- 4-20ma UV Dose Analog output.
- 4-20ma UV Intensity Analog output.

Dose-Pacing:

1. A dose-pacing system shall be supplied to modulate the lamp power levels based on the flow rate, UV sensor signal(s) and UV transmission values according to the Validation report.
2. The system shall be dose-paced such that as the flow rate, water quality, and lamp conditions change, the UV RED (dose) target shall be achieved while conserving power.

Safety Features:

1. Each UV Reactor shall be equipped with a temperature switch to prevent the reactor from overheating. The temperature switch shall be wired to the CPP, and shall shut the reactor down and initiate a critical alarm condition when activated.
2. Each UV Reactor shall be equipped with a water level sensor to prevent operation of the UV lamps in air. The level sensor shall be wired to the CPP and shall shut the reactor down and initiate a critical alarm condition if low water level is detected.
3. Each UV Reactor shall be equipped with a cover to protect the lamps electrical connections. For Operator safety, the protective cover shall be equipped with a switch to disconnect power to the lamps when the cover is removed.
4. Each CPP and reactor shall be equipped with an Emergency Stop button to shut off power to the lamps.

On-line UV Transmission Monitor (Trojan OptiView™):

1. An on-line UV Transmission (UVT) monitor shall be supplied to automatically monitor the UV Transmission of the process stream (measured at 254 nm, 1 cm pathlength). UV Transmission range shall be 70% to 100%.
2. The UVT Monitor shall include a UV lamp, UV sensor, drive system, system controller and operator interface.
3. The operator interface shall display the system status and allow for manual on/off system control. The operator interface of the Trojan OptiView™ system shall be located on the door of the enclosure.
4. Enclosure shall be stainless steel, Type 4X. Enclosure shall wall mounted and weigh no more than 65 pounds / 30 kg.
5. Inlet/outlet fittings to be 3/8" female for connection to process stream and drain. Supply tubing/piping (by Others) shall be a maximum of 1/4" internal diameter.
6. Enclosure dimensions shall be no greater than 20 inches (508 mm) wide by 20 inches (508 mm) high and 10 inches (254 mm) deep.

7. A 4-20 mA output shall be provided for data transmission to remote devices. A discrete common alarm shall be provided for remote indication of alarm condition.
8. The system shall be designed to handle flow rates of 0.1 gpm (0.4 l/min.) – 0.5 gpm (2.0 l/min) at a maximum inlet pressure of 30 psi. If flow regulators and/or pressure reducers are required to maintain specified minimum and maximum values, they shall be provided by Others.
9. Power supply to the OptiView™ system shall be 120V, single phase, 60 Hz, 250 VA.
10. OptiView™ panel shall be UL, CSA, and CE approved.
11. OptiView™ panel to be to be installed in an indoor, non-freezing environment.
12. The process stream temperature range to be 36-104°F (2-40°C).
13. The expected life of the OptiView™ lamp shall be 9,000 hours.

Cleaning System:

1. Each UV Reactor shall be equipped with an automatic on-line sleeve cleaning system.
2. The cleaning system shall be driven by an electric motor via an internal screw drive.
3. The cleaning system shall provide both mechanical and chemical cleaning abilities for the lamp sleeves, and mechanical cleaning abilities for the UV Sensor sleeves/windows, complete with an automatically initiated and controlled cleaning cycle. The cleaning system shall be fully operational while still providing disinfection.
4. Cleaning cycle intervals shall be field adjustable via the operator interface. Manual cleaning system control shall also be through the operator interface.
5. The system shall be provided with the cleaning reagents and solutions required for initial equipment testing and equipment start-up.
6. Cleaning reagents and solutions used shall be NSF™ 60 approved.

Spare Parts:

The following spare parts and safety equipment shall be supplied:

1. 4 UV Lamps
2. 4 sleeves
3. 1 set of seals and o-rings per reactor
4. 1 set of replacement wiper seals per reactor
5. 1 Face Shield, able to block UV light wavelengths between 200 and 400nm
6. Cleaning solution for 1 year of operation

PART 3-EXECUTION

INSTALLATION

In accordance with the contract drawings, manufacturer's engineering drawings and instructions.

MANUFACTURER'S SERVICES

A.	Installation Supervision:	As required by phone or fax.
B.	Start-up and Operator training:	2-3 full days on site, per reactor.
C.	Service scheduling:	As required during the warranty period.

END OF SECTION 11700