OFFICE OF WASTEWATER MANAGEMENT

WASHINGTON, D.C. 20460

SOLICITATION OF PUBLIC COMMENT FOR PROJECT-SPECIFIC BUILD AMERICA, BUY AMERICA NONAVAILABILITY WAIVER PROPOSAL

SUBJECT: UNDER EVALUATION: Project-Specific Nonavailability Waiver of Build America, Buy America Act Manufactured Products Requirements to the Danville Sanitary District in Illinois, for Vertical Inclined Ultraviolet Disinfection Equipment

Intro: This solicitation of public comment by the U.S. Environmental Protection Agency (EPA) is to evaluate a Build America, Buy America Act (BABA) waiver request submitted by an assistance recipient based on nonavailability of a product for a single project.

This solicitation of public comment does not represent a final agency decision. The purpose of this proposal is to inquire whether potential alternative domestic products may be available that were not identified by the assistance recipient or through the EPA's domestic product research efforts, and whether other factors should be considered in the evaluation of a waiver.

The EPA has completed its market research efforts and was unable to identify an alternative domestic product meeting the performance-based specifications in sufficient and reasonably available quantities and of a satisfactory quality. The EPA makes every effort to locate domestic alternative products through its waiver process and the public comment period provides a meaningful opportunity to vet the Agency's interim research. In the EPA's experience, a viable domestic product is identified through public comment in many cases. Through this public comment period, commenters may provide information that indicates a waiver may not be needed. For example, if the specified item is found to be domestically available, EPA would not issue a final waiver.

Public comments are requested for 15 days (specific dates noted on the EPA's website). Please submit comments to BABA-OW@epa.gov. Please include information in the subject of the email identifying it as a public comment on this waiver request, such as "Waiver Comment: Danville UV Equipment" or similar. The proposed waiver will also be posted to the Made in America website.

Background

The Buy America Preference set forth in section 70914 of the BABA included in the Infrastructure Investment and Jobs Act (Pub. L. No. 117-58), requires all iron, steel, manufactured products, and construction materials used for infrastructure projects under Federal financial assistance awards be produced in the US.

Under section 70914(b), the EPA may waive the application of the Buy America Preference, in any case in which it finds that: applying the domestic content procurement preference would be inconsistent with the public interest; types of iron, steel, manufactured products, or construction materials are not produced in the US in sufficient and reasonably available quantities or of a satisfactory quality; or the inclusion of iron, steel, manufactured products, or construction materials produced in the U.S. will increase the cost of the overall project by more than 25 percent. All waivers must have a written explanation for the proposed determination; provide a period of not less than fifteen (15) calendar days for public comment on the proposed waiver; and submit the proposed waiver to the Office of Management and Budget's (OMB) Made in America Office for review to determine if the waiver is consistent with policy.

Summary

Proposed Waiver: The Environmental Protection Agency is soliciting comments regarding whether to issue a project waiver of the manufactured product requirements of section 70914 of the BABA included in the Infrastructure Investment and Jobs Act (Pub. L. No. 117-58), for vertical inclined ultraviolet (UV) disinfection equipment used in an infrastructure project funded through the Clean Water State Revolving Fund.

Waiver Type: Nonavailability of a domestic product in sufficient and reasonably available quantities or of a satisfactory quality.

Waiver Level and Scope: Project level waiver for a single product for a single project. No other project will utilize the waiver.

Proposed Waiver Description: Project-specific nonavailability waiver of BABA manufactured product requirements to the Danville Sanitary District in Illinois (Applicant), for vertical inclined UV disinfection equipment for the Central and West 2025 Improvements Project (project).

Project Summary: The project will include facilities improvements at the Danville Wastewater Treatment Facility, owned and operated by the Applicant. Improvements will include upgrades to the secondary clarifiers, replacement of effluent and backwash pumps, and conversion from sodium hypochlorite disinfection to UV disinfection.

To implement this conversion, new UV disinfection equipment will be installed in the existing chlorine contact tank structure for upgrading the disinfection system. The design will utilize the existing hydraulic profile which will avoid additional pumping requirements. The proposed vertical inclined system has significantly less head loss and lower energy requirements when compared to horizontal style equipment. Additionally, the vertical inclined system can be maintained in place while horizontal style equipment requires additional lifting equipment.

Length of the waiver: From the effective date of the final waiver until August 31, 2029.

Summary of Items Covered in the Proposed Waiver (including NAICS): The Applicant is seeking a waiver for vertical inclined UV disinfection equipment (NAICS code 335139; PSC 4230), which is a BABA manufactured product, consisting of the following components: UV module with UV lamps, quartz sleeves and automatic chemical and/or mechanical cleaning system; electronic controls; UV bank

lifting mechanism; power distribution center; hydraulic system center; system control center; UV intensity sensors; dose pacing system, and UV transmittance monitor. The Applicant proposes to procure the vertical inclined UV disinfection equipment that is manufactured outside of the United States.

For additional information on the project and waiver request, see the attached original waiver request from the Applicant and supporting documents.

Description of Efforts Made to Avoid the Need for a Waiver

No domestic alternative products were identified by the Applicant, or through the EPA's market research completed in January 2025. The market research process included thorough review of the waiver request submission, examination of domestic manufacturer catalogs and other technical data and marketing materials, personal communication with domestic manufacturers, inquiries of regional project officers, and outreach to contractors and engineers with expertise and familiarity with the project. During market research, the EPA contacted ten (10) manufacturers and suppliers. No (zero) manufacturers indicated they could produce BABA-compliant UV disinfection equipment that meets the technical specifications of the project. Based on the technical evaluation conducted, the claim that BABA-compliant vertical inclined UV disinfection equipment that meets the project's specifications is not available is supported.

Anticipated Impact if No Waiver is Issued

Absent a waiver, the recipient would be unable to upgrade its disinfection process to utilize UV disinfection, and by extension, would be required to redesign and expand the project to accommodate a different disinfection technology. This change would delay the project and would likely require additional ancillary equipment and a new structure.

Description of Award

Recipient Name and/or Unique Entity Identifier (UEI): MJM6KGNDMPG8

Federal Financial Assistance Identification Number (FAIN): N/A

Federal Financial Assistance Listing Name: 66.458 Clean Water State Revolving Fund

Federal Financial Assistance Listing Number: 66.458

Common Government-wide Accounting Classification Agency Code: 068

Federal Financial Assistance Funding Amount: $2.45M

Total Cost of Infrastructure Expenditures: $2.45M

[redacted]

[redacted]

NOTE: Information in this waiver may have been redacted or removed due to issues of proprietary business information or incompatibility with Federal accessibility requirements. To request the information redacted for purposes of accessibility requirements, please email BABA-OW@epa.gov.

December 5, 2024

Jasmine Mallory
Illinois Environmental Protection Agency
Bureau of Water - Infrastructure Financial Assistance Section
1021 North Grand Ave. East
Springfield IL 62794

Re: Non Availability Waiver Application for Danville Sanitary District Wastewater Treatment Facility Central and West Plants 2025 Improvements

Dear Ms. Mallory:

[redacted] retained by Danville Sanitary District (DSD) for the design of the Central and West 2025 Improvements Project. We are requesting the following:

Waiver Type: Non availability

Waiver Description: Project specific nonavailability waiver of BABA requirements for DSD Wastewater Treatment Facility Central and West Plants 2025 Improvements for the following:

- 46 66 56 – UV Disinfection Equipment

Specification section is attached.

Project Summary:
The Project includes facilities improvements at the Danville Wastewater Treatment Facility owned and operated by the Danville Sanitary District.

Improvements at the WWTF include, but are not necessarily limited to, improvements to the secondary clarifiers, replacement of effluent and backwash pumps, and conversion from sodium hypochlorite disinfection to UV disinfection. As part of the improvements, new UV disinfection equipment will be installed in the existing chlorine contact tank structure.

Installing the UV disinfection equipment in an existing structure is cost effective when compared to building new tankage. Additionally, the design will utilize the existing hydraulic profile to save operating costs on additional pumping requirements. The selected UV equipment, vertical inclined system has significantly less headloss (25%-50% reduction) and lower energy requirements (25% reduction) when compared to horizontal style equipment. The vertical inclined system can also be maintained in place while the horizontal style equipment requires additional lifting equipment. Overall the vertical inclined style UV system was selected for capital costs, operating and maintenance cost as well as headloss requirements.

Description of Efforts Made to BABA compliance:
Specification 46 66 56 – We contacted [redacted], the two manufacturers who supply vertical inclined, high efficiency, low headloss UV systems which will fit in the existing channel space. While both manufacturers are investigating solutions to meet BABA compliance they are not currently BABA

compliant and there is no firm timeline to be able to provide BABA compliance on the specified equipment.

Summary of Equipment Quantities and Costs:
46 66 56 – UV Disinfection Equipment

- Estimated Equipment Cost = [redacted]

Project Schedule
The Central and West 2025 Improvements Project is currently in design and expected to advertise for bids in August 2025, with bid opening in October 2025 and anticipated construction begins in February 2026. Substantial completion has been estimated for June 2027, and final completion in August 2027.

We appreciate your consideration of a Non-Availability Waiver for the equipment noted above. Please contact me at [redacted] should you have any questions.

Sincerely,

[redacted]

Enclosures:
Spec Section 46 66 56

SECTION 46 66 56
UV DISINFECTION EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Provide UV Disinfection System complete with the following:

1. Interconnecting power and data cables to module.
2. UV intensity monitoring system.
3. UV eye shields.
4. Automatic cleaning system.
5. Personnel safety equipment.
6. Automatic flow pacing system.
7. Level Floats.
8. Module lifting mechanism.
9. Spare parts.

1.02 SYSTEM DESCRIPTION

A. Low pressure, high output lamp UV Disinfection System for disinfection of tertiary effluent.

B. Design Criteria:

1. Design Flow:

   a. Current Average Flow: 8.13 MGD
   b. Peak Hourly Flow: 9 MGD
   c. Max Month Flow: 14.64 MGD
   d. Design Average Flow: 16 MGD
   e. Design Maximum Flow: 24 MGD

2. System to be sized for the design average and maximum flows, with the ability to add additional modules and associated equipment for treating future flows exceeding 24 MGD.
3. Maximum Suspended Solids: 24 mg/L.
4. Effluent Standards: Fecal coliform count shall not exceed a geometric mean of 200/100mL, nor shall any sample during the month exceed 400/100mL in May through October.
5. The system design shall be based on third-party bioassay dose calculations taking into consideration the following criteria:

   a. Minimum UV transmittance: 65% @ 253.7 nm
   b. UV lamp end of life derating factor = 0.86 for 15,000 hours
   c. Sleeve fouling derating factor = 0.9 unless third party validation is provided.

6. Effluent Temperature Range: 33 to 85 °F (1 to 30 °C)

C. Performance Requirements:

1. Provide a UV disinfection system complete with UV Banks and lifting mechanism, System Control Center, Power Distribution Centers, and Water Level Control device as herein specified.
2. The ultraviolet disinfection system will produce an effluent conforming to the microbiological discharge limit as specified herein. Grab samples will be taken in

accordance with the Microbiology Sampling Techniques found in Standard Methods for the Examination of Water and Wastewater, 19th Ed.

3. The basis for evaluating the UV dose delivered by the UV system will be the manufacturer's biodosimetric performance validation testing conducted by a recognized independent 3rd party expert according to the procedures described in the US EPA UV Disinfection Guidance Manual (2006) and IUVA Uniform Protocol.
4. To ensure thorough characterization and disinfection performance of the UV reactor, two challenge organisms will be used in the validation testing. One challenge organism with low UV resistance (e.g. T1 with resistance of ~5 mJ/cm2 per log inactivation) and a second challenge organism with higher UV resistance (e.g. MS2 with resistance of ~20 mJ/cm2 per log inactivation). The use of at least two organisms will allow a "bracketing" methodology (as described in the USEPA UVDGM) to be used for accurate sizing.
5. At a minimum the following parameters shall have been considered during validation testing:

    a. UVT
    b. Measured UV intensity
    c. Flow rate per lamp
    d. Power consumption
    e. UV sensitivity of challenge organism
    f. Head loss across UV banks
    g. Total Suspended Solids concentration

6. Validation testing that does not utilize all of the above parameters is considered inadequate as it does not allow for appropriate system sizing. Bids based on inadequate validation testing will not be considered. To be acceptable, UV sensor data must be collected during the biodosimetry validation testing.
7. Lamp aging and sleeve fouling factors will not be allowed in lieu of UV sensor signals for determination of UV dose during operation.
8. The end of lamp life third-party bioassay UV dose produced by the system shall not be less than 30,000 microwatt-secs/cm^2 (MS2) and not less than 20,000 microwatt-secs/cm2 (T1) with all UV modules in service, in an effluent with 65% UV transmission at 253.7 nm. Lamp output must be at least 86% of initial level after 15,000 hours of operation, with no fouling on the lamp sleeves.
9. The UV dose will be adjusted using an end of lamp life factor of 0.86 to compensate for lamp output reduction over the time period corresponding to the manufacturer's lamp warranty. The use of a higher lamp aging factor will be considered only upon review and approval of independent third party verified data that has been collected and analyzed in accordance with protocols described in the NWRI Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse (May 2003, 2012).
10. The Reduction Equivalent Dose (RED) will be adjusted using a quartz sleeve fouling factor of 0.9 to compensate for quartz sleeve transmission reduction due to wastewater effluent fouling. The use of a higher quartz sleeve fouling factor will be considered only upon review and approval of independently verified data that has been collected and analyzed. The data recorded for the determination of the validated fouling factor must be obtained by testing in secondary wastewater effluent utilizing the same lamp, quartz sleeve and cleaning system proposed by the UV manufacturer.
11. Independent validation for use of higher factors (lamp aging and sleeve fouling) must be submitted to the Engineer for consideration a minimum of fifteen (15) days prior to proposal submittal. The independent validation shall have oversight by a qualified registered professional engineer with knowledge and experience in testing and evaluation of UV systems as defined in the EPA UVDGM (Appendix C, Section C.3.3)
12. The system will be designed for complete outdoor installation.
13. The actual retention time of the effluent within the system determined by hydraulic analysis shall be less than 1.0 times the theoretical retention time but no less than 0.9 times the theoretical retention time.

14. Total headloss for each channel shall not exceed 8 inches (not including level control device), this being confirmed by measurements in the field after start-up.
15. Provide a fixed weir for water level control.
16. The UV system must be equipped with its own integral lifting system to eliminate the need for an external lifting unit.
17. The UV system must be equipped with a motor or hydraulic driven automatic wiping system.
18. The UV system must control based on the following dose parameters: sensor intensity, flow rate, and UV transmittance. Based on these parameters, the system shall automatically vary the UV lamp power.
19. Provide UPS – 24 VDS with 15 minutes backup time.

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Catalog cuts and product specifications for equipment specified.
2. Motor and/or hydraulic drive data.
3. Coating systems.
4. Hydraulic calculations demonstrating compliance with the required hydraulic characteristics.
5. Independent bioassay validation and dosage calculations demonstrating compliance with the specified RED requirements.
6. Lifetime disinfection performance guarantee.

C. Shop Drawings:

1. Installation and assembly drawings and specifically prepared technical data for equipment.
2. Wiring Diagrams: Show power and control connections and distinguish between factory-installed and field-installed wiring.

D. Certificate of compliance with the drawings and specifications, noting all deviations from the drawings and specifications.

E. Submittals shall be in accordance with Section 01 33 00.

F. Operation and Maintenance (O&M) Data:

1. Operating instructions and maintenance data for materials and products for inclusion in O&M Manual.
2. Manufacturer's written instructions for periodic tests of equipment in service.
3. Submit in accordance with Section 01 78 23.

G. Submit Instructional Services information in accordance with Section 01 79 30.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: The manufacturer will be regularly engaged in the design, manufacture, and servicing of UV systems for municipal wastewater disinfection. Manufacturer

to submit evidence of a proven track record with at least one-hundred (100) permanent installations of open channel low pressure, high output systems in similar applications.

B. Submittal including UV system details, control panel, lamp and ballast descriptions, and engineering reports stating headloss. calculation or validation of the delivered dose will also be submitted for consideration. These calculations shall be able to demonstrate that the proposed UV system design and number of lamps will deliver the specified RED based on the water quality and operating conditions specified herein.

C. The manufacturer will provide documentation of previous experience with municipal UV disinfection systems in wastewater applications with variable output electronic drivers and automatic cleaning systems.

D. Description of UV System Supplier's service capabilities including local support offered for technical service and spare part availability.

E. Single-Source Responsibility: Components from this specification shall be supplied from Manufacturer and Manufacturer shall be responsible for entire system. System shall be representative product built from components that have proven compatibility and reliability and are coordinated to operate as unit as evidenced by records of prototype testing.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment and system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is made safe from such hazards.

B. Store equipment in clean, dry location in accordance with Manufacturer's recommendations.

C. Manufacturer shall define the requirements to properly protect the equipment and parts shipped to the job site.

1.06 SPARE PARTS

A. Provide spare parts necessary to maintain the equipment in service for a period of two years, including but not limited to the parts listed below.

1. 36 UV lamps
2. 5 quartz sleeves
3. 2 lamp drivers
4. 5 lamp wiper seals
5. 1 UV intensity sensor
6. 1 Operators Kit that includes 2 UV-resistant face shield, gloves, and cleaning solution.

B. Provide special tools required for checking, testing, parts replacement, and maintenance.

C. Spare parts shall be suitably packaged and clearly labeled and identified with the name and number of the equipment to which they belong.

1.07 WARRANTY

A. The equipment furnished under this section will be free of defects in material and workmanship, including damages that may be incurred during shipping for a period of 12 months from the anticipated substantial completion date.

B. Lamps shall be warranted for a minimum of 15,000, prorated after 9,000 hours, for each lamp under normal operation conditions. Normal operation conditions include an average of four on/off cycles per 24 operating hours.

C. Lamp drivers will be warranted for 10 years, prorated after 1 year.

D. UV Intensity Sensors will be warranted for 5 years, prorated after 1 year.

PART 2 – PRODUCTS

2.01 MANFACTURER

A. [redacted]

B. [redacted]

2.02 UV DISINFECTION SYSTEM CONSTRUCTION

A. Materials:

1. Metal components in contact with effluent shall be Type 316L stainless steel.
2. Material exposed to UV light shall be Type 304L or Type 316L stainless steel, Type 214 quartz, or other suitably UV resistant material.

B. Lamp Array Configuration:

1. The system shall be designed for complete submersion of the UV lamps in the effluent within their protective quartz sleeve under all flow conditions including both electrodes and the full length of the lamp arc.
2. The UV lamps shall be arranged in an angle of 45° in staggered rows to assure best mixing and minimal channel depth.
3. The UV lamps and sleeves shall be removable while the module is in the disinfection channel.

C. UV Modules:

1. Each UV module will consist of UV lamps, quartz sleeves and an automatic chemical and/or mechanical cleaning system.
2. The UV lamps are to be protected from contact with the effluent by a 99.9% silicon dioxide quartz jacket with a minimum of 90% transmission of UV radiation at the 254 nanometer wave length and have a nominal wall thickness of 2.5 mm.
3. Each lamp will be enclosed in its individual quartz sleeve, one end of which will be closed and the other end sealed by a lamp end seal.
4. The closed end of the quartz sleeve will be held in place by a retaining O-ring. The quartz sleeve will not come in contact with any steel in the frame.
5. The UV lamp sleeve shall be a single piece of clear circular tubing, which shall not be subject to degradation over the life of the system.
6. Each UV module shall be precision fabricated in type 316L stainless steel to meet the NEMA-4X standards.
7. Each module shall be completely field serviceable while located in the channel and shall be fitted with water resistant UL rated multi-pin connectors for power and data.
8. The UV modules shall be designed for submergence without causing failures or damage to the system or components. Ballasts for powering UV lamps shall be located in electrical enclosures located away from the channel.
9. All electrical connections shall be above maximum operating water elevations to protect

against electrical hazard. All electrical connectors and motors located on the module and above nominal channel water level shall either be rated at IP67 or located within IP67 enclosures suitable for temporary submersion.

10. Ultraviolet lamps, electronic controls and individual electronic lamp controllers shall be arranged so that they may be easily tested in place. When necessary, any malfunctioning device or unit shall be capable of being replaced without removal of the entire module from the channel.
11. Each UV module shall be equipped with an interlock switch, which will automatically disconnect power to its associated UV bank if the module is raised from the UV channel or the quick disconnect plug is removed.
12. The UV module design and mounting shall provide plug and socket quick disconnect facilities enabling non-technical personnel to carry out lamp replacement, wiper insert replacement, etc. without the need for any tools or specialist isolation procedures.
13. Lamps shall be removable with the quartz sleeve and wiper system remaining in place.
14. Each module shall be designed to allow lifting from the operating position in the channel to a maintenance / storage position above the channel using an integral lifting mechanism.
15. Provide low level sensor and associated level sensor control box.
16. To minimize cleaning frequency of the UV system each high output module must be equipped with mechanical wipers. The mechanical wipers must be motor or hydraulically driven and can be operated in either manual or automatic mode. The cleaning wipers shall be automatically initiated and controlled from the operator interface. Cleaning cycle intervals shall be field adjustable. Each module shall be provided with an independent cleaning system which is actuated by an AC motor housed in the module, along with all required monitoring and control components so that each module's cleaning system is independent, only requiring an initiate cycle command from the main controller.

17. Mechanical Wipers and/or Chemical Sleeve Cleaning:

    a. Each UV module shall be equipped with an automatic wiping system with selectable and field adjustable wiping frequency and number of strokes.
    b. Wiping sequence will be automatically initiated with capability for manual override.
    c. Wipers shall be fabricated of UV resistant material and installed in a manner which accommodates any irregularities associated with the quartz sleeves and precludes any binding during operation.
    d. The wipers shall be replaceable without having to dismantle the wiper drive system, complete removal of the quartz sleeves, or disassembly of the module structure.
    e. When in the raised position, all module wetted components shall be accessible.
    f. The cleaning system will be fully operational while UV lamps and modules are submerged in the effluent channel and energized.
    g. The wiper system shall be mechanically driven with a single drive assembly. The drive shall incorporate a centrally located means of supporting and aligning the wipers properly throughout the travel.
    h. To minimize maintenance, UV System will be designed such that cleaning solution replacement and can be performed while the UV Bank and lamps are in place and operational in the channel.
    i. The cleaning system will be provided with the required solutions necessary for initial equipment testing and for equipment start-up.
    j. The wipers shall travel the full length of the UV lamp arc. Designs in which the wipers only travel part way along the sleeves will not be acceptable.
    k. The number of wiping strokes per interval shall be factory preset for optimum effect and shall be easily reset by the owner from 1 to 5 strokes per time interval, with time intervals being user adjustable.

D. Ultraviolet Lamps:

1. Low pressure, high output UV lamps. Each lamp shall produce UV light with at least 90%

of the UV emission at 254 nanometer wave length.

2. Lamps shall be low-pressure mercury amalgam “doped”, high intensity type. Lamps containing liquid mercury will not be allowed.
3. The filament of the lamps shall be the clamped design, significantly rugged to withstand shock and vibration.
4. Electrical connections for the lamp will consist of four (4) pins at one end of the lamp only. Lamp wiring shall be Teflon insulated stranded wire.
5. Lamps without maintenance coating or that do not have four (4) pins are considered instant-start and are not acceptable due to reduced reliability and increased maintenance and operating costs.
6. The lamp shall withstand a maximum of four (4) on/off cycles per day without reducing lamp life, warranty or causing any damage to the lamp.
7. UV Output Energy: Lamps will be operated by electronic lamp drivers with variable output capabilities ranging from 30% to 100% of nominal power.
8. The lamp assembly shall incorporate active filament heating to maintain a minimum lamp efficiency of 35% across varying water temperatures and between the minimum and maximum stated lamp power levels.
9. Lamps shall not produce any ozone.
10. The lamp bases shall be of a durable construction resistant to UV.
11. The lamp design shall prevent electrical arcing between electrical connections in moist conditions.
12. Each lamp shall be tested in UV-output, lamp current and lamp voltage from supplier. All results shall be stored in a database referencing to the individual batch number. The lamp batch number shall be printed on the lamp surface.
13. The UV manufacturer shall ensure disposal of returned lamps (old/used) at no costs to the owner upon receipt of the returned lamps at the manufacturing headquarters.

E. UV Bank Lifting Mechanism:

1. The lifting device for UV Banks will be supplied by the UV Manufacturer.
2. An automatic raising mechanism will be designed and supplied to facilitate lifting a UV bank from the channel without use of ancillary equipment.
3. The automatic raising mechanism will be integrated into the UV Bank for simple and seamless operation.
4. The UV Bank will be raised from the channel for easier access and maintenance.
5. The automatic raising mechanism design will provide access to components without having to break electrical connections thus reducing wear on connectors.

F. Electrical:

1. Power distribution center power requirement of 480 volt, 3-phase, 4-wire + ground, 60 hertz
2. Each module shall be completely field serviceable while located in the channel and shall be fitted with water resistant UL rated multi-pin connectors for power and data. Combined power and data shall not be acceptable.
3. Provide sufficient length of power interconnect cables and data cables between the modules and the Power Distribution Center. Connection shall be made by the Contractor.
4. Cable organizer shall be provided by Manufacturer. Power and data cable interconnecting conduit shall be provided by the Contractor.

G. Power Distribution Center

1. The configuration of Power Distribution Centers shall be lamps per PDC.
2. PDC enclosure material will be 316 Stainless Steel.
3. All internal components will be sealed from the environment.
4. All Power Distribution Centers to be UL approved or equivalent.
5. An internal heater will be provided in the PDC to prevent condensation when the external

temperature drops below the dew point.

6. Each PDC shall be able to electrically isolate each bank of lamp drivers and safely replace a lamp driver without de-energizing any other operating banks.

H. Hydraulic System Center

1. The Hydraulic System Center (HSC) houses the components required to operate the automatic cleaning system and bank Automatic Raising Mechanism (ARM).
2. HSC enclosure material will be 304 Stainless Steel (Type 4X, IP 66) (Type 4X).
3. The HSC will contain hydraulic power unit complete with pump, fluid reservoir, manifolds, valves and filter.

I. System Control Center:

1. The monitoring, operation and control of the UV disinfection equipment is managed at the System Control Center (SCC) by a [redacted] with a [redacted] 15" A15 (Outdoor 4X Rated) HMI screen.
2. If the SCC is installed outdoors, the operator interface shall be positioned out of or away from direct sunlight and shall include a sunshade and shall be protected by a UL listed Type 4X hinged viewing window.
3. Alarms will be provided to indicate to plant operators that maintenance attention is required or to indicate an extreme alarm condition in which the disinfection performance may be jeopardized. The alarms will include, but not be limited to:

    a. Individual Lamp Failure
    b. Multiple Lamp Failure
    c. Low UV Intensity
    d. Bank Communication Alarm

4. The 100 most recent alarms will be recorded in an alarm history register and will be displayed when prompted.
5. Mode of operation for UV Banks can be manual, automatic or remote.
6. Elapsed time of each bank will be recorded and displayed on the display screen when prompted.

J. UV Intensity Sensors:

1. A submersible UV sensor shall continuously sense the UV intensity produced in each bank of UV lamp modules.
2. The UV sensor shall be factory-calibrated to US National Institute for Standards and Technology (NIST). Sensors requiring field-calibration are not acceptable. The sensor shall be digitally calibrated to ensure calibration accuracy.
3. Sensors will be designed to provide UV intensity data for dose monitoring and control functions. Dose pacing program will enable use of measured UV intensity along with flow rate and UVT to determine the delivered dose during operation.
4. Systems that use theoretical data or data from laboratories to determine lamp aging or fouling in the control logic should not be allowed. Only measured intensity and flow rate should be used to determine the actual disinfection performance / dose applied acc. to the validation protocol or design calculation method.
5. To ensure continuous disinfection, sensors will be designed such that reference sensor readings can be taken without interrupting disinfection and without removing UV lamps, banks/modules or sleeves.
6. There shall be no fewer than (1) UV sensor for every bank of UV lamps.

K. Dose Pacing:

1. A dose-pacing system will be supplied to modulate the lamp UV output in relationship to a 4-20 mA DC signal from an effluent flow meter, UV intensity sensor(s), and the measured, real-time UV transmittance.
2. The system to be dose-paced such that as the flow and effluent quality change, the design UV dose is delivered while conserving power.
3. The dose-pacing system will allow the operator to vary the design dose setting. Logic and time delays will be provided to regulate UV Bank ON/OFF cycling.
4. To avoid misrepresentation and possible over-reporting of UV dose during operation, equipment that does not utilize the UV sensor signal in determination of operational dose will not be allowed.

L. UV Transmittance Monitor:

1. An on-line UVT monitor will be provided to automatically and continuously track the UV transmission of the effluent at the 254 nm wavelength.
2. The measurement device shall consist of a stainless steel housing designed to be installed in the UV channel for monitoring of the effluent transmittance in the channel.
3. A shielded twisted pair cable to be provided by the Contractor for connecting the UVT monitor (4-20 mA signal) to the System Control Center. The SCC will modulate the lamp intensity in response to the effluent UV Transmission.
4. Transmittance monitors requiring pumping (and straining) of the effluent out of the channel to the monitor will not be allowed due to their fouling tendency and maintenance requirement.
5. Manual systems, which require the operator to take samples or perform lab work, are not acceptable.

2.03 COATINGS

A. Manufacturer is responsible for surface preparation, priming, and finish coating of equipment prior to shipment.

B. Stainless steel, bronze, and nonmetallic surfaces shall not be coated.

C. Coat machined or bearing surfaces and holes with protective grease.

PART 3 – EXECUTION

3.01 FACTORY ACCEPTANCE TESTING

A. Perform factory testing of UV system to demonstrate its successful operation. The Owner shall, at their discretion, be able to participate in/witness testing activities.

3.02 INSTALLATION

A. Install equipment in accordance with manufacturer's written instructions and approved submittals.

3.03 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:

1. Representative for equipment specified herein shall be present at the job site or classroom designated by Owner a minimum of three separate occasions for the minimum workdays specified below, travel time excluded.

a. 5 workdays for Installation and Startup Services (minimum two trips)
b. 1 workday for Instructional Services
c. 1 workday for Post-Startup Services

2. In addition to the services specified above, provide manufacturer's services as required to successfully complete systems demonstration as specified in Section 01 79 10.

END OF SECTION