

REQUEST FOR PROPOSALS AND STATEMENT OF QUALIFICATIONS

FOR THE PURCHASE OF

UV DISINFECTION SYSTEM PN 03-14



**City of Kodiak
Kodiak, Alaska**

Prepared By:



Anchorage, Alaska

October 2009

For Information Regarding This Project, Contact:

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City of Kodiak

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Email: hweston@city.kodiak.ak.us

CITY OF KODIAK

KODIAK, ALASKA

REQUEST FOR PROPOSALS
AND
STATEMENT OF QUALIFICATIONS

for the purchase of
UV DISINFECTION SYSTEM

PN 03-14



CH2M HILL

Anchorage, AK

October 2009

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Project No. 362059.B1.11.EP

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**ADVERTISEMENT FOR PROPOSALS AND STATEMENTS OF
QUALIFICATIONS**

City of Kodiak

**UV Disinfection System
PN 03-14**

The City of Kodiak is advertising this Request for Proposals and Statements of Qualifications (RFP) for qualified ultraviolet (UV) disinfection equipment suppliers (Supplier) to furnish and deliver the following equipment: UV Disinfection System suitable for potable water disinfection for installation at the planned City of Kodiak Water Treatment Plant.

Unless otherwise specified, the Supplier shall be responsible for the provision of all engineering, labor, equipment, and materials as required for the manufacture, provision and delivery of a fully functional Ultraviolet Disinfection System as described in these specifications. In addition, the Supplier shall provide the following services and items as described in the General Requirements and General Conditions:

- Submittal information and shop drawings
- Operations and Maintenance (O&M) Manuals
- Manufacturer's services during construction
- Engineering support, startup and training services
- Equipment warranty assurances

Three (3) copies of the sealed proposal must be received by **2:00 p.m., Monday, November 12, 2009**, at the office of the City Manager, 710 Mill Bay Road, Room 220, Kodiak, AK 99615. RFPs are available for download from the City's website at <http://www.city.kodiak.ak.us/ENG/Pages/BidProjects.aspx>, or by e-mail to gdiniega@city.kodiak.ak.us. Inquiries about this proposal should be made to Howard Weston, City Engineer, at phone no. 907-486-8065 or by e-mail to hweston@city.kodiak.ak.us.

The City of Kodiak reserves the right to reject any or all proposals and to waive any informality or technicality in the interest of the City. Disadvantaged, minority and women's business enterprises are encouraged to respond.

City of Kodiak

Aimee Kniazowski, City Manager
710 Mill Bay Road
Kodiak, Alaska 99615

Certified a true and correct copy of the within and foregoing faxed or mailed to the Kodiak
Daily Mirror this _____ day of _____, 2009, for publication of a legal ad
on the following dates:

By _____
City of Kodiak

END OF SECTION

REQUEST FOR PROPOSALS AND STATEMENTS OF QUALIFICATIONS

City of Kodiak

**UV Disinfection System
PN 03-14**

1. INTRODUCTION

The City of Kodiak (City) requests proposals and statement of qualifications from qualified ultraviolet (UV) disinfection equipment suppliers (Supplier) to furnish and deliver the following equipment: UV Disinfection System suitable for potable water disinfection for installation at the planned City of Kodiak Water Treatment Facility.

Unless otherwise specified, the Supplier shall be responsible for the provision of all engineering, labor, equipment and materials as required for the manufacture, provision and delivery of a fully functional Ultraviolet Disinfection System as described in these specifications. In addition, the UV supplier shall provide the following services and items as described in the General Requirements:

- Submittal information and shop drawings
- Operations and Maintenance (O&M) Manuals
- Manufacturer's services during construction
- Engineering support, startup and training services
- Equipment warranty assurances

2. PRIMARY PROJECT CONTACT

Howard Weston, City Engineer

Phone: 907-486-8065

Fax: 907-486-8066

E-mail: hweston@city.kodiak.ak.us

3. SELECTION PROCESS

Selection and execution of any agreement for equipment and services will be accomplished in accordance with the City policies and procedures. The proposed system that meets all the specifications, has a good record of operation, maintenance, and supporting services, and has the overall lowest (best) life cycle cost to total benefit score ratio will be recommended for award of the UV Disinfection Contract.

3.1. Instruction for Responding Suppliers

1. Review the RFP in its entirety and become familiar with its contents. Incomplete or incorrect responses or proposals may be discounted or disqualified.
2. Specifications are attached hereto. All responses must be specific and directly related to the project's Specifications.
3. Bidders must respond to all items and include any additional material required by this RFP.
4. Additional information may be requested from the Suppliers during the Bid Evaluation period.
5. The City shall not be liable for any cost incurred by any Supplier in response to this solicitation or any requests for information from the City or Engineer.
6. The City expressly reserves the right to reject any and all proposals and to not award a contract, if the City Council determines, in its sole judgment that such action is in the City's best interest.
7. For the purposes of this RFP, Supplier, Manufacturer, and Bidder all have the same meaning.
8. For the purposes of the RFP, Bid, Proposal, and Statement of Qualifications have the same meaning.

3.2. Submittals

To be considered, respondents must deliver submittals to the address stated herein on or before the deadline, and in the number of copies indicated below.

1. **SUBMITTAL DEADLINE:** As shown in the Advertisement. Proposing Suppliers should be aware that express carriers consider Alaska a "remote location". Delivery by FedEx, UPS and similar carriers **does not** guarantee overnight delivery. All proposals should be sent **at least two (2) full business days** before the due date if sent via the above referenced carriers. Delivery can be delayed by weather conditions that can restrict air traffic to Kodiak for several days.

Proposals not received by the deadline, regardless of cause, will not be considered.

2. SUBMIT RESPONSES TO:
City Manager
City of Kodiak
710 Mill Bay Road, Room 220
Kodiak, Alaska 99901.
3. MARK SUBMITTALS AS FOLLOWS: "Proposal and Statement of Qualifications – UV Disinfection System, PN 03-14"
4. REQUIRED COPIES OF SUBMITTALS: Three (3) copies.

3.3. Requests for Information

Any Supplier with questions, exceptions, objections, qualifications or clarifications on the technical requirements and content of this RFP must submit them in writing to the primary project contact. Acceptable formats for question submission shall include Fax, E-mail and Letter. E-mail with return confirmation is the preferred method. The project contact will compile these questions and periodically distribute summaries of the submitted questions and responses by Addendum to all Suppliers under consideration for this project. The Addenda distributed to the Suppliers will be done via email. The final date for submitted questions shall be seven (7) working days before the proposal due date. All addenda will be incorporated into the final RFP.

3.4. Bid Security

Proposals must be accompanied by Bid Bond in an amount of 10 percent of the bid amount payable to the City of Kodiak. The Bid amount shall be the maximum Initial Cost of the UV Disinfection System as shown in the Bid Schedule (Line A1). This bid security shall be given as a guarantee that the Supplier will not withdraw the Proposal for a period of 90 days after bid opening.

3.5. Selection of Supplier

Within 120 calendar days after the opening of Proposals, the City will select one of the Proposals in accordance with Section 5.7 – Proposal Evaluation. The selection of the Proposal will be by written notice of selection, mailed or delivered to the office designated in the Proposal. In the event of failure of the selected Supplier to sign a contract with the City, the City may select the second ranked responsible Supplier. Selection of the Proposal does not guarantee a contract with the City.

3.6. Return of Bid Security

Within 60 days after selection of Supplier, the City will return the bid securities to all Suppliers whose Proposals are not to be further considered in selecting the Supplier. All other retained bid securities will be held until the Contract has been finally executed, after

which all bid securities, other than Suppliers' bonds and any guarantees which have been forfeited, will be returned to the respective Suppliers whose Proposals they accompanied.

3.7. Failure to Execute Contract

The selected Supplier who fails to properly execute a contract with the Owner shall forfeit the bid security that accompanied his bid, and the bid security shall be retained as liquidated damages by the City, and it is agreed that this said sum is a fair estimate of the amount of damages the City will sustain in case the Supplier fails to enter into a contract.

4. SCOPE OF SERVICES

The City is seeking proposals from qualified ultraviolet (UV) disinfection equipment suppliers (Supplier) to furnish and deliver the following: UV Disinfection System suitable for potable water disinfection for installation at the planned Water Treatment Facility. Services of the Supplier shall include, but not necessarily be limited to, those described in Part 4 – Specifications. The drawings presented in Part 5 – Drawings are supplemental and represent the preliminary drawings of the design as developed by the Engineer. The drawings show a medium pressure system option and a low pressure high output system option. Only one option will be included in the final design drawings, which will be revised to reflect the selected UV System. For preparation of all pricing, the requirements in this RFP shall be considered complete and accurate. The supplemental drawings shall be considered as reference only to solely depict the design intent. To date, preliminary design of the UV Facility has been completed. The effort will move to final design after selection of the Supplier. The major components and requirements of the system are well defined at this time and reflected in the attached specifications. In order to finalize the design and the preparation of the final Contract Documents for the UV Disinfection Facility, the Supplier will provide the following engineering consultation and support services. Cost of these services shall be included in the capital cost of the Bid Form in Item A1.1.

1. Provide one (1) engineering consultation office visit by Supplier's Project Manager to the Engineer's Bellevue, Washington office for a period of one 8-hour working day (travel time excluded) to attend a workshop. The purpose of the workshop will be to provide Supplier-provided engineering support, especially in instrumentation and control and system layout, to the Engineer. All decisions of whether to accept or reject Supplier recommendations shall reside entirely with the City and Engineer. This is anticipated to occur no later than May 2010.
2. In addition to the engineering consultation office visit, the Supplier shall include all costs for 40 hours of remote engineering support to the City and Engineer up through issuance of the final Contract Documents for the UV Disinfection Facility. This shall also include documentation including equipment drawings noting connections and space requirements and

specification of Supplier-designed components. This is anticipated to occur no later than May 2010.

3. Supplier shall include all costs for 60 hours of remote engineering support to the City and Engineer to receive Certificate to Construct prior to installation of UV System and Certificate to Operate after UV System is installed. Certificates are issued by the State of Alaska Department of Environmental Conservation. This is anticipated to occur in 2010 or 2011 and no later than 2012.
4. Supplier shall provide all costs for and attend a two-day coordination meeting at the City's Water Treatment Facilities prior to the start of UV System or Facility programming. Supplier shall also provide other services as identified in the other sections included in this RFP, including those required per Section 44 44 73. The two-day coordination meeting is anticipated to occur in 2010 or 2011 and no later than 2012.

5. PROPOSAL CONTENT

Interested Suppliers wishing to offer their equipment and services must submit Proposals and Statements of Qualifications to the City to be considered. The proposal must contain the following information:

5.1. Acknowledgment of Terms and Conditions

The Proposing Supplier shall acknowledge and accept all terms and conditions contained in the RFP and its attachments. Any exceptions or qualifications must be submitted in writing prior to Proposal submission, as described in Section 3.3 – Requests for Information. Any exceptions of the bid not addressed by Addenda could result in disqualification of the proposal if, in the judgment of the City or its Engineer, the exception does meet the intent of the terms and conditions contained in the RFP and its attachments. .

Complete the Acknowledgement Form and Non-Collusion Affidavit provided in Attachment A.

5.2. Compliance with General Criteria

General criteria regarding proposal content is defined below:

1. Refer to Specification, 44 44 73 UV System, for the required UV Disinfection System to be provided by the Supplier. Supplier Proposals shall address the items listed in all specification sections. Suppliers should note that it is suggested that the Proposals be presented in such a manner as to allow the reviewer to expeditiously learn the key features of the Supplier's system. Concise answers to all questions are desired.

2. Suppliers may submit multiple proposals with different UV systems. Each proposal shall be a stand-alone document meeting all the requirements of this RFP.
3. Proposals without sufficient submittal data to provide a complete evaluation will not be considered.
4. Use of Information Provided: The Supplier shall agree that any and all information provided in the Proposal shall serve as the basis for evaluation of Proposals and all or portions of the proposal can be shared with any approving agency.
5. Selection of Supplier does not constitute approval of any materials or deviations from the Specifications.
6. Each Supplier is required to describe and provide details on their proposed product and services for the City.
7. The Supplier shall present any objections or exceptions to any provision of this RFP and its attachments not addressed by Addenda.
8. UV equipment must fully meet all State of Alaska code requirements and also meet all state and federal regulatory requirements for the disinfection of unfiltered surface water for a municipal potable water supply.
9. Any deviation from Specification, 44 44 73 UV System, MUST be noted in detail, and submitted in writing and attached to the Bid Form. Completed specifications should be attached for any substitutions offered, or when amplifications are desirable or necessary. The absence of the specification deviation statement and accompanying specifications will hold the Supplier strictly accountable to the specifications as written herein. Failure to submit this document of specification deviation, if applicable, shall be grounds for rejection of the item when offered for delivery. If specifications or descriptive papers are submitted with Proposals, the Supplier's name should be clearly shown on each document.

5.3. Compliance with Technical Specifications

The following table summarizes the technical information to be provided in the Proposal to indicate compliance with the Specifications, 44 44 73 UV System. Failure to provide technical information regarding the proposed UV System may result in rejection of the Submittal from further consideration and evaluation.

Specification Reference	Description
1.08	Provide list of spare parts. Include cost of spare parts in Item A.1 of Bid Form.
2.02.A.3 - 7	Provide the Validation Factor (VF) and Reduction Equivalent Dose (RED) for the equipment provided and all of the design conditions indicated in the RFP as assembled herein. Include summary of applicability of the Validation Testing results for this project including identification of the operating window and the controlling setpoints for operation within that window of validated conditions. Provide supporting documentation showing range of flows, UVT, power settings, piping configuration, and lamp on/off operating scenarios for each reactor that has been validated per the 2006 UVDGM.
2.02.A.3.d-e	Provide 3 rd -party end of lamp life certification to support values used in Bid Form calculations (if applicable).
2.02.A.3.d-e	Provide 3 rd -party sleeve fouling factor certification to support values used in Bid Form calculations (if applicable).
2.02.A.8	Provide graph of headloss over full range of operating flowrates (gpm or mgd) per reactor.
2.03.A - F	Provide list of equipment and instrumentation components provided including quantities, manufacturer, and materials of construction.
2.02.B.4.a, c	What type and quantity of UV intensity sensors are provided? Provide submittal for intensity sensors shall include details of sensor calibration and traceability, as well as information on uncertainty from linearity, temperature response, spectral response, angular response, and long-term drift, in compliance with the 2006 UVDGM.
2.03.B.4.b	Provide methods for compliance with the Chapter 6 requirements of the 2006 UVDGM, specifically the lamp intensity checks for LPHO lamps, if applicable.
2.03.B.4.d	Describe how sensor calibration is checked at the WTP. Can a sensor calibration check be conducted with reactor in service? Describe the factory calibration requirements for the reference UV intensity sensors and duty UV intensity sensors (e.g., calibration interval at factory), and anticipated factory calibration frequency based on requirements of the 2006 UVDGM.
2.03.B.5	Describe automated and/or manual cleaning procedures and estimated time to clean sleeves and sensors. Describe type/quantity of cleaning chemical and ancillary equipment required. Provide status of NSF

Specification Reference	Description
	certification for cleaning chemicals.
2.03.C.1.e	Provide input power requirements; clearly specify whether 480V, 3-wire or 480/277V, 4-wire is required as well as capacity.
2.03.C.1.g	Describe external cooling and ventilating requirements of control panels.

5.4. Compliance with Non-Monetary and Monetary Evaluation Criteria

Mandatory Criteria:

Failure to comply with any of these mandatory criteria may result in rejection of the Submittal from further consideration and evaluation.

1. System proposed meets UV Disinfection System performance criteria of the Technical Specifications and all federal and State of Alaska code and regulatory requirements.
2. Experience of Supplier. The Supplier shall have a minimum of 5 years experience in the design, fabrication, assembly, and operation of equipment similar to that specified. **The Supplier must have a minimum of 3 similar operating public utility drinking water systems in North America or 5 worldwide.** Similar systems shall use the same model equipment (may be a different size) with a minimum of two reactors for UV disinfection of drinking water. Minimum facility treatment capacity experience is 5 mgd.
3. References. Provide reference letters from 3 similar operating public utility drinking water systems in North America, including the contact's name, company, title, address, telephone number, and email address.
4. System proposed shall be completely functional and operable within specified design conditions, as identified in RFP Part 4 - Specifications.
5. System proposed shall be fully compliant with the requirements of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2) and the 2006 Ultraviolet Disinfection Guidance Manual (UVDGM).

Operational Criteria:

1. Complete the following summary table for each proposed UV system:

Operating Characteristics Summary	
1. Manufacturer:	
2. UV Reactor Model:	
3. Total Number of UV Reactors (duty plus one standby):	
4. No. of lamps supplied in each reactor to treat 18 mgd at 86.5% UVT, resulting in achieving 3-log <i>Cryptosporidium</i> inactivation at Design Fouling-Aging Factor:	
5. UV Reactor maximum flow rate at UVT of 95%, achieving 3-log <i>Cryptosporidium</i> inactivation at Design Fouling-Aging Factor:	_____ million gallons per day (mgd)
6. UV Reactor maximum flow rate at UVT of 86.5%, achieving 3-log <i>Cryptosporidium</i> inactivation at Design Fouling-Aging Factor:	_____ mgd,
7. UV Reactor minimum validated UVT:	_____ %
8. UV Reactor maximum flow rate at minimum validated UVT:	_____ mgd
9. Guaranteed maximum headloss at maximum UV System design flow of 18 mgd with 1 reactor out of service:	_____ inches

2. What UVDGM-defined control strategy will be used? Describe how equipment incorporates flow, UVT, and intensity sensor readings into dose calculations.

3. Describe control strategy of operation (i.e., calculated dose or sensor set point). Are dose calculations validated for full operating range as described in the Specification, 44 44 73 UV System, as assembled herein?
4. What is the required time for lamp cool-off and restart?
5. Is cooling water required during reactor startup? If so, state flowrate and duration.
6. Describe turndown capacity including minimum setting and available increments. To support the turndown capacity, describe the options, demonstrated through Validation Testing, available to modify number of lamps in operation, lamp power setting, and validated operating regime.
7. Describe the approach of meeting the potential expansion requirement and future expansion requirement. Specifically, what model of reactors will be provided with space for additional lamps to be installed if the extra 15% UV dose is required? How many additional lamps are required to meet the extra 15% UV dose requirement? Will the same reactors be expandable to treat 22 mgd of flow with 15% additional UV dose? If so, how many additional lamps are required in the future?

Maintenance Criteria:

1. Provide the estimated delivery time from time of ordering replacement lamps or ballasts to receiving item in Kodiak.
2. Provide the expected response time to Kodiak for onsite assistance.
3. List suppliers, including contact name, address, and telephone number for all major components (lamps, ballasts, sensors, reactors, switchgear, etc.).
4. What city/state will the technician originate from?

Equipment Validation Criteria:

1. Has the proposed system been validated according to a method that meets the requirements of 2006 UVDGM?
2. Complete 2006 UVDGM checklists (Attachment A).

Equipment Characteristics Criteria:

1. State the maximum distance the power supply units can be separated from the UV reactors.

2. Provide the maximum total connected power load for all the reactors, including redundant (standby) reactor.
3. Define power quality thresholds for continuous operation including power sag and cycle limits. Also state the maximum time duration of AC power loss that the local control panel (LCP) can tolerate before functional shutdown.

Manufacturer's Experience:

1. Provide company contact information including address, telephone number, facsimile number, and email address.
2. Provide location and description of manufacturing facilities.
3. Provide three (3) reference letters from public water utilities, including the contact's name, company, title, address, telephone number, and email address, with similar UV reactors to those proposed.
4. Provide 5-year experience list for same model reactors. Include facility location, installation date, treated flow rate, validation approach, and number of reactors provided at each facility
5. Provide the number of years the Supplier has been in the potable water UV disinfection market.

Building Layout Requirements:

1. Provide preliminary drawings showing the UV system layout, piping, valve, flow meter and all the other accessories within the UV building basement. The footprint of the UV system will be used as the basis to calculate the cost of the UV building in the Bid Form.
2. In the preliminary drawings, provide the dimensions of each reactor including power distribution panels or ballasts. List the flange diameters for connection to piping by others. Provide recommended spacing between reactors for proper maintenance. Provide dimensional drawings for the power supply and control panels. Identify separately-mounted components, connections to other work, critical clearance requirements, interconnections and interface requirements.
3. The system layout shall follow the following guidelines:
 - a. Provide space for all duty and standby reactor trains as well as space required for future expansion to 22 mgd plus 15% added dose. If extra identical train is required for future expansion, the space shall be included in the layout drawing. If the existing duty and standby trains

are able to provide future expansion capacity, the additional cost for reactors, wired power panels, etc. associated with the larger reactors (not including the additional lamps and ballasts for future expansion) needs to be included in the system initial cost in Item A1 of the Bid Form.

- b. The header pipes shall be 30 inches in diameter.
- c. The inlet and outlet configuration of the UV reactors shall meet the 2006 UVDGM validation requirement for minimum upstream and downstream conditions. At a minimum, five pipe diameters of straight run piping are required upstream of each UV reactor.
- d. Maintain minimum recommended clearances (for operations and maintenance activities) around the reactors for lamp, sleeve, power and controls access recommended by the UV System Supplier and as required to meet all OSHA regulations.
- e. All frequently accessed equipment shall be located at a readily accessible elevation (3-4 ft above finished floor elevation). All parts of the system that are frequently accessed for routine maintenance that are not readily accessible from the floor shall be clearly noted so that other access requirements may be considered.
- f. Maintain a minimum clear distance of 2 feet between the reactors when access is not required for routine maintenance.
- g. Maintain a minimum clear distance of 5 feet between the outside train and wall.
- h. Maintain a minimum clear distance of 6 feet between the header pipes and wall if the header pipes and their connecting pipes will obstruct the walkway access.
- i. Maintain minimum of 7'-6" from floor to bottom of inlet or outlet header if access between trains is required for routine maintenance.
- j. Include space for one flow meter for each UV train. Flow meters shall be insertion magnetic meters, layouts shall assume Marsh-McBirney meters. Maintain a minimum straight pipe length of 5 pipe diameters upstream and 3 pipe diameters downstream of the flow meter.
- k. Pipe diameters shall be in accordance with UV System validation conditions. Abnormal or impractical piping configurations may be revised during proposal review at the Owner's discretion.

- l. Include space for one isolation valve and one flow control valve for each UV train. Isolation and flow control valves shall be standard size butterfly valves with diameters matching the upstream and downstream piping.
- m. No space considerations are needed for stairs, doors and storage room.
- n. Example drawings from the pre-design of the UV systems are provided to give a general idea on pipe orientation and space requirement. AutoCAD drawings will be provided on request. In the areas where the drawings are not consistent with the guidelines above, the guidelines above govern.

5.5. Project Cost

For purposes of consistent evaluation, the City requires that all Suppliers present their costs in the same format. **Project Costs shall be submitted in the Bid Form included in Part 1 of this RFP, Section 00 41 13.** If Supplier is selected for further negotiation with the City, this Bid Form will be used as the basis for negotiations.

1. The contract for services requested by this RFP shall be administered using procurement regulations of the City of Kodiak.
2. Sign and submit **00 41 13 Supplement 2** certifying that if selected Supplier will sign the standard City Contract Agreement.

5.6. Supportive Information (as Appendix to Proposal Submittal)

Submittal of this information is optional and may include graphs, charts, photos, resumes, firm profiles, etc. Information included in the supportive information section will be considered in the evaluation of the submittals. The City requests that respondents keep this section brief and relevant.

5.7. Proposal Evaluation

Proposals meeting the mandatory criteria requirements defined herein will be evaluated using a benefit to cost approach. Benefits evaluation consists of four non-monetary criteria which are weighted for importance and will be used to evaluate the UV systems, as presented in the attached Bidder Scoring Sheet:

1. Operation.
2. Maintenance.
3. Equipment Validation.

4. Equipment Characteristics.

There are several sub-criteria under each of these four categories. Each is weighted as well. Each sub-criterion has a maximum score of 10. For each proposed system, scores will be assigned according to the information provided by the Supplier in the proposal and the calculation method described in the Bidder Scoring Sheet. Comments from the three provided public water utility references will also be incorporated into the scoring procedures where appropriate. The sum of the weighted scores for all the sub-criteria under each category will be multiplied by the weight of that main category to obtain the weighted score of that category. The sum of the weighted score of the four categories is the final score of the system.

Monetary criteria included in the bid form will also be considered, including:

1. Capital cost of the UV System equipment, as defined on the Bid Form.
2. Capital cost of connecting piping, tees, valves, and flow meters, as defined on the Bid Form.
3. Capital cost of building space required by the UV system (based on Supplier supplied layout), as defined on the Bid Form.
4. Present worth operating and maintenance costs, as defined on the Bid Form.

6. PROPOSAL EVALUATION CRITERIA

It is the intention of the City that the UV System selection will be based on the ratio of cost (as shown on the Bid Form) divided by the total benefit score. The proposed UV system that best and most fully complies with the requirements of this RFP and has the lowest (best) cost to benefit ratio will be selected to provide the UV System for the City of Kodiak UV Disinfection Facility.

City reserves its right to reject any and all Proposals, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Proposals. City further reserves the right to reject the Proposal of any Supplier whom it finds, after reasonable inquiry and evaluation, to be nonresponsive. City may also reject the Proposal of any Supplier if City believes that it would not be in the best interest of City to make an award to that Supplier. City also reserves the right to waive informalities not involving price, time or changes in Goods and Special Services, and to negotiate contract terms with Successful Supplier.

In evaluating Proposals, City will consider whether or not Proposals comply with prescribed requirements, and such alternatives, unit prices and other data, as may be requested in Proposal Form or may be requested from Suppliers prior to a Notice of Award.

In evaluating Proposals, City will consider the qualifications of the Suppliers and their proposed UV reactor models.

City may conduct such investigations it deems necessary to establish responsibility, qualifications, and financial ability of Supplier's proposed subcontractors, suppliers, individuals, or entities to furnish parts of Goods and Special Services in accordance with the RFP. Supplier references will be contacted and poor performance on Operation, Maintenance and Support Services can disqualify a proposer from award in accordance with Kodiak City Code (KCC) 3.12.080:

KCC, Title 3, Revenue and Finance, 3.12, Contract, Procurement, and Sales Procedures: Article 3.12.080. Lowest responsible bidder. In determining the lowest responsible bidder factors to be considered shall include, but not necessarily be limited to, the following criteria:

- (a) The ability, capacity, and skill of the bidder to perform the contract;
- (b) Whether the bidder can perform the contract within the time specified, without delay or interference;
- (c) The character, integrity, reputation, judgment, experience, and efficiency of the bidder;
- (d) The quality of performance of previous contracts;
- (e) The previous and existing compliance by the bidder with laws and ordinances related to the contract;
- (f) The sufficiency of the financial resources and ability of the bidder to perform the contract;
- (g) Litigation by the bidder on previous orders or contracts with the city; and
- (h) Attendance at and compliance with any requirements associated with or arising out of mandatory pre-bid or pre-award meetings or conferences. (Ord. 1029 §2, 1996: Ord. 745 §1, 1985: Ord. 479 §1 (part), 1976)

If Contract is to be awarded, City will award Contract to Supplier whose Proposal is in the best interest of City.

7. PROPOSED PROJECT SCHEDULE

The UV System to be purchased is being selected in advance of final design of the proposed water treatment facility. The water treatment facility will be designed to accommodate the selected equipment. The schedule below provides a general guideline for the project but does not constitute contractually binding dates.

Proposal Due Date:	November 12, 2009
Final Question Submittal:	7 working days prior to Proposal Due Date
Estimated date of Proposal Selection	December 6, 2009
Estimated date of UV System Notice to Proceed	February 26, 2010
UV System Shop Drawing Submittal:	May 2010
Construction Contract Award:	June 2010
Delivery of Proposed Equipment:	October 2010

Substantial Completion:	August, 2012
Final Completion:	December 2012

8. CONTRACT

After Selection of the Proposal, the Supplier and the City will enter into negotiations for an agreement on award amount and scope of work. The City Engineer will then recommend the selected Supplier, contract terms and conditions, and budget award to the City Manager/City Council based on the evaluation process described in Article 6 and subsequent negotiations. Any changes to the scope of work or award amount will be made before executing the contract and will become part of the final contract. All contracts and amendments must be reviewed and approved by the City and their Legal Office before a signed Contract and Performance Bond are received by the Supplier. Final Supplier selection is dependent on approval of the Supplier, contract terms and conditions, and budget by the City Council. The City Council has the right to terminate the project, or change the contract or budget, subject to subsequent agreement with the Supplier. The submittal and final scope of work will become part of the final contract.

The agreement between the City and the successful Supplier resulting from this RFP will stipulate that the components, equipment, and accessories for the UV system shall be installed by a City-selected construction contractor (Installing Contractor).

Milestone and equipment delivery dates will be negotiated with the selected Supplier. The dates included in the schedule above should be used as a basis for the purposes of preparing the bid.

END OF SECTION

Bidder Scoring Criteria	Score Calculation	Weight	Max. Score	Max Weighted Score
Operation		30%	10	3
Fully automated based on flow and UVT?	Y = 10 N = 0	25%	10	2.5
Is dose measurement based on UV intensity required by UVDGM?	Y = 10 N = 0	15%	10	1.5
Require cooling water during startup/operation?	Y = 0 N = 10	10%	10	1
Downtime between shutdown and startup (cool down + warm up time)	$1/(\text{downtime in minutes}) \times 10$	5%	10	0.5
Minimum validation UVT (Umin) of the proposed system lower than the minimum UVT specified (85%)	1 point per 1% UVT below 85% (e.g., Min. UVT of 80% = 5 points). Max of 10 points.	15%	10	1.5
Validated max. flow at 86.5% (QUVT=86.5%) with all duty reactors higher than the peak flow specified (18 mgd)	1 point per 1 mgd of flow above 18 mgd (e.g., Max. 23 mgd = 5 points). Max of 10 points.	15%	10	1.5
UV System turndown ratio including active reactors on/off, lamps on/off, and lamp intensity (TR = min. system power level / max system power level)	TR <= 5%: 10 5% < TR <= 10%: 6 10% < TR <= 15%: 3 TR > 15%: 0	15%	10	1.5
Maintenance		15.0%	10	1.5
The estimated delivery time from time of ordering replacement lamps or ballasts to receiving item in Kodiak (assume order placed during normal working hours).	Next day = 10 points, 2 days = 6 points 3 days = 3 points, and 4+ days = 0 points.	50%	10	5
The expected response time to Kodiak for onsite assistance (assume order placed during normal working hours).	Next day = 10 points, 2 days = 6 points 3 days = 3 points, and 4+ days = 0 points.	50%	10	5
Validation		40%	10	4
Has the proposed system been validated according to a method that meets the requirements of 2006 UVDGM.	Y = 10 N = 0	75%	10	7.5
Does the validation of the proposed system meet all the requirement from the provided checklists (5.1-5.5)?	Y = 10 N = 0	25%	10	2.5
Characteristics		15.0%	10	1.5
Total Connected Power Load	The lowest connected load (L1) from all the proposals: 10 The highest connected load (L2) from all the proposals : 0 The other connected load (L) in between: Score = $(L2-L) / (L2-L1) \times 10$	25%	10	2.5
Maximum distance between control panel and reactors, L in ft	L >= 70 ft: 10 50 ft <= L < 70 ft : 5 L < 50 ft: 0	25%	10	2.5
Power quality thresholds for continuous operation (voltage swing range)	The voltage swing range >= 50%: 10 20% <= The voltage swing range <50%: 5 The voltage swing range < 20%: 0	50%	10	5
Total		100%		10

BIDDER'S CHECKLIST

I. GENERAL:

Bidders are advised that notwithstanding any instructions or implications elsewhere in this Request for Proposals and Statements of Qualifications the documents shown and detailed on this sheet need be submitted with and made part of their bid. Other documents may be required to be submitted after bid time, but prior to award. Bidders are hereby advised that failure to submit the documents shown and detailed on this sheet may be justification for rendering the bid nonresponsive.

II. REQUIRED DOCUMENTS FOR BID:

The checklist provided below is for assistance in compiling the bid proposal. A detailed description of all items required in the bid package is provided in the Request for Proposals and Statements of Qualifications (Section 00 11 57).

- _____ Completed Bid Form (Section 00 41 13).
- _____ Erasures or other changes made to the Bid Form must be initialed by the person signing the bid.
- _____ Non-collusion Affidavit.
- _____ Acknowledgement Form.
- _____ All addenda issued shall be acknowledged in the space provided on the Bid Form.
- _____ Bid Bond, certified check, cashier's check, money order or cash shall be submitted with the bid in the amount indicated.
- _____ Manufacturer's Experience and 3 Reference Letters.
- _____ UV System Technical Information Required with Proposal.
- _____ 3rd Party Certification for end of lamp life aging and quartz sleeve fouling factors (if used).
- _____ Completed UVDGM Checklists (Attachment A).
- _____ Manufacturer's UV System Layout Drawing(s).
- _____ Supporting Information (Optional).

END OF SECTION

NOTE TO BIDDER: Use typewriter or BLACK ink for completing this Bid Form.

BID FORM

To: City of Kodiak (City)

Mailing Address: City Manager
City of Kodiak
710 Mill Bay Road, Room 220
Kodiak, AK 99615

Project Identification: UV Disinfection System, PN 03-14

1. BIDDER'S DECLARATION AND UNDERSTANDING

1.1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm, or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over the City.

1.2. In submitting this Bid, Bidder certifies Bidder is qualified to do business in the State of Alaska as required by laws, rules, and regulations at the time the Bid Form is submitted to the City.

1.3. In this section, the Bidder shall provide values for specific performance parameters for the Ultraviolet Disinfection System (UV System). The Bidder understands and agrees that the values stated in this section for the associated performance parameters will be compared to the performance standards required in the Technical Specifications. Bidders understand and agree to guarantee the performance values stated herein for the UV System in accordance with the guidelines specified in the Technical Specifications. The definition of each performance parameter used in the life-cycle cost comparison is as defined herein.

1.4. The undersigned Bidder understands and agrees that this Proposal shall form the basis for a contract with the City. Therefore, the undersigned agrees to enter into an agreement to perform and furnish all Work as specified or indicated in these Specifications for the amount indicated in this Bid Form and in accordance with the other terms and conditions of this Request for Proposal (RFP).

1.5. The undersigned accepts all of the terms and conditions of this RFP including, without limitation, those dealing with the disposition of Bid security, and the penalties that may be imposed based on results from the Performance Testing.

1.6. This Proposal shall remain subject to acceptance for a period of 120 days after the day of Bid opening.

2. CONTRACT EXECUTION

2.1. The undersigned Bidder agrees, if this Bid is accepted, to enter into an Agreement with the City to perform and furnish Work as specified or indicated in the Bidding Documents for the Contract Price derived from the Bid, and in accordance with the other terms and conditions of the Bidding Documents.

2.2. Bidder accepts the terms and conditions of the Bidding Documents.

3. INSURANCE

3.1. Bidder further agrees that the Bid amount(s) stated herein includes specific consideration for the specified insurance coverages.

4. ADDENDA

4.1. Bidder hereby acknowledges that it has received Addenda

Nos. _____, _____, _____, _____,

(Bidder shall insert number of each Addendum received) and agrees that Addenda issued are hereby made part of the Bidding Documents, and Bidder further agrees that this Bid includes impacts resulting from said Addenda.

5. STATE AND LOCAL SALES AND USE TAXES

5.1. State and local sales taxes shall not be included in this Bid Form.

5.2. All other applicable taxes shall be included in all costs provided by supplier.

BIDDER'S NAME _____

BID FORM

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6. BID SCHEDULE

6.1. Bidder shall provide required information by filling in all blanks following the Bid Schedule (begins next page).

6.1.1. The life cycle period for the purposes of the cost evaluation of the UV System is defined as 20 years.

6.1.2. The interest rate for purposes of the cost evaluation of the UV System is defined as 5 percent (based on an 8 percent rate of return and 3 percent inflation rate).

6.1.3. The present worth of recurring annual costs over a 20 year life cycle is defined as the annual cost multiplied by 12.46.

6.1.4. The guarantees for component lifetimes shall be in terms of calendar time based on the average usage conditions identified herein.

BID SCHEDULE	
1. Manufacturer:	_____
2. UV Reactor Model:	_____
3. Total Number of UV Reactors (duty plus one standby):	_____

A1. <u>Cost of the UV System</u>	
<i>Report all costs in terms of US Dollars.</i>	
<p>A1.1 <u>Initial Cost of the UV System in Whole Dollar Amount</u></p> <p>Initial Cost of the UV System including type and quantity of UV reactors provided in lines 1 through 3 above designed to meet all requirements of the RFP to provide UV disinfection under the specified conditions with one unit out of service. Cost shall include time for required manufacturer support services as stated in RFP documents herein (e.g., design support, performance testing, training, etc.). Initial Costs only include the cost that is necessary to accommodate the potential and future expansion (if accommodated). Costs for the additional lamps and accessories that could be installed later to meet the potential and future expansion requirements are NOT included. Potential and future expansion requirements are described in Section 44 44 73, Article 2.02 A.5 and A.6.</p>	\$
<p>A1.2 <u>Additional Cost for Potential Expansion in Whole Dollar Amount</u></p> <p>Cost of adding lamps, ballasts and other components to provide potential 15% higher UV dose, as specified in Section 44 44 73, Article 2.02 A.5.</p>	\$
<p><u>A1. Total Initial Cost of the UV System</u> [A1.1 + A1.2]</p>	\$

BIDDER'S NAME _____

BID FORM _____

00 41 13 - 4 _____

A2. Cost of the Connecting Piping, Valves and Flow Meters

The quantity and sizes of all components described in A2.1 through A2.6 shall be as shown on the UV system layout drawing prepared by the Bidder in accordance with the requirements of Section 00 11 57, Article 5, "Building Layout Requirements".

A2.1 Connecting Piping within the Building

\$

Determine cost for this item by summing extended costs detailed in Item A2.1.a, below.

A2.1.a For the proposed system, indicate total length and diameter of header and UV train piping required in table below.

Cost basis:

Pipe Diameter	Cost per LF	LF required	Extended Cost (\$)
18 inches	\$435		
20 inches	\$540		
24 inches	\$640		
30 inches	\$800		
36 inches	\$963		
48 inches	\$1,285		

<p>A2.2 Tees</p> <p>Determine cost for this item by summing extended costs detailed in Item A2.2.a, below.</p>	<p>\$</p>																								
<p>A2.2.a For the proposed system, indicate quantity and size of tees required. The header pipes will be 30 inches. Size of the tees shall match header and UV train pipe sizes. Include upstream tees for connection to influent header and downstream tees for connection to effluent header.</p> <p>Cost basis:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Tee size</th> <th style="text-align: left;">Cost per each</th> <th style="text-align: left;">No. required</th> <th style="text-align: left;">Extended Cost (\$)</th> </tr> </thead> <tbody> <tr> <td>30x30x18 tee</td> <td>\$4,000</td> <td></td> <td></td> </tr> <tr> <td>30x30x20 tee</td> <td>\$5,000</td> <td></td> <td></td> </tr> <tr> <td>30x30x24 tee</td> <td>\$6,100</td> <td></td> <td></td> </tr> <tr> <td>30x30x30 tee</td> <td>\$11,200</td> <td></td> <td></td> </tr> <tr> <td>30x30x36 tee</td> <td>\$17,500</td> <td></td> <td></td> </tr> </tbody> </table>		Tee size	Cost per each	No. required	Extended Cost (\$)	30x30x18 tee	\$4,000			30x30x20 tee	\$5,000			30x30x24 tee	\$6,100			30x30x30 tee	\$11,200			30x30x36 tee	\$17,500		
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BIDDER'S NAME _____

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<u>A2.3 Isolation Valves</u> Determine cost for this item by summing extended costs detailed in Item A2.3.a, below.	\$																												
<p>A2.3.a. For the proposed system, indicate quantity and size of isolation valves required. Size shall match UV train pipe size.</p> <p>Cost basis:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 25%;">Valve size</th> <th style="width: 25%;">Cost per each</th> <th style="width: 25%;">No. required</th> <th style="width: 25%;">Extended Cost (\$)</th> </tr> </thead> <tbody> <tr> <td>18 inches</td> <td style="text-align: center;">\$7,800</td> <td></td> <td></td> </tr> <tr> <td>20 inches</td> <td style="text-align: center;">\$8,900</td> <td></td> <td></td> </tr> <tr> <td>24 inches</td> <td style="text-align: center;">\$9,900</td> <td></td> <td></td> </tr> <tr> <td>30 inches</td> <td style="text-align: center;">\$13,100</td> <td></td> <td></td> </tr> <tr> <td>36 inches</td> <td style="text-align: center;">\$15,300</td> <td></td> <td></td> </tr> <tr> <td>48 inches</td> <td style="text-align: center;">\$21,200</td> <td></td> <td></td> </tr> </tbody> </table>		Valve size	Cost per each	No. required	Extended Cost (\$)	18 inches	\$7,800			20 inches	\$8,900			24 inches	\$9,900			30 inches	\$13,100			36 inches	\$15,300			48 inches	\$21,200		
Valve size	Cost per each	No. required	Extended Cost (\$)																										
18 inches	\$7,800																												
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36 inches	\$15,300																												
48 inches	\$21,200																												

<p><u>A2.4 Flow Control Valves</u></p> <p>Determine cost for this item by summing extended costs detailed in Item A2.4.a, below.</p>	<p>\$</p>																												
<p>A2.4.a. For the proposed system, indicate size and quantity of flow control valves required. Size shall match UV train pipe size.</p> <p>Cost basis:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Valve size</th> <th style="width: 25%;">Cost per each</th> <th style="width: 25%;">No. required</th> <th style="width: 25%;">Extended Cost (\$)</th> </tr> </thead> <tbody> <tr> <td>18 inches</td> <td>\$8,570</td> <td></td> <td></td> </tr> <tr> <td>20 inches</td> <td>\$9,650</td> <td></td> <td></td> </tr> <tr> <td>24 inches</td> <td>\$10,700</td> <td></td> <td></td> </tr> <tr> <td>30 inches</td> <td>\$13,900</td> <td></td> <td></td> </tr> <tr> <td>36 inches</td> <td>\$16,100</td> <td></td> <td></td> </tr> <tr> <td>48 inches</td> <td>\$22,100</td> <td></td> <td></td> </tr> </tbody> </table>		Valve size	Cost per each	No. required	Extended Cost (\$)	18 inches	\$8,570			20 inches	\$9,650			24 inches	\$10,700			30 inches	\$13,900			36 inches	\$16,100			48 inches	\$22,100		
Valve size	Cost per each	No. required	Extended Cost (\$)																										
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30 inches	\$13,900																												
36 inches	\$16,100																												
48 inches	\$22,100																												

BIDDER'S NAME _____

<u>A2.5 Flow Meters</u> Determine cost for this item by summing extended costs detailed in Item A2.5.a, below.	\$																												
<p>A2.5.a For the proposed system, indicate size and quantity of flow meters required (minimum one per reactor). Size shall match UV train pipe size.</p> <p>Cost basis:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 25%;">Flow Meter Size</th> <th style="width: 25%;">Cost per each</th> <th style="width: 25%;">No. required</th> <th style="width: 25%;">Extended Cost (\$)</th> </tr> </thead> <tbody> <tr> <td>18 inches</td> <td>\$21,600</td> <td></td> <td></td> </tr> <tr> <td>20 inches</td> <td>\$23,800</td> <td></td> <td></td> </tr> <tr> <td>24 inches</td> <td>\$26,500,</td> <td></td> <td></td> </tr> <tr> <td>30 inches</td> <td>\$32,000</td> <td></td> <td></td> </tr> <tr> <td>36 inches</td> <td>\$37,400</td> <td></td> <td></td> </tr> <tr> <td>48 inches</td> <td>\$48,300</td> <td></td> <td></td> </tr> </tbody> </table>		Flow Meter Size	Cost per each	No. required	Extended Cost (\$)	18 inches	\$21,600			20 inches	\$23,800			24 inches	\$26,500,			30 inches	\$32,000			36 inches	\$37,400			48 inches	\$48,300		
Flow Meter Size	Cost per each	No. required	Extended Cost (\$)																										
18 inches	\$21,600																												
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30 inches	\$32,000																												
36 inches	\$37,400																												
48 inches	\$48,300																												

<p><u>A2.6 Pipe Reducers</u></p> <p>Determine cost for this item by summing extended costs detailed in Item A2.6.a, below.</p>	\$												
<p>A2.6.a For the proposed system, indicate size and quantity of pipe reducers/enlargers required. Size shall be for conversion from 30" header to required UV train size (if necessary).</p> <p>Cost basis:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="width: 30%;">Reducer Size</th> <th style="width: 20%;">Cost per each</th> <th style="width: 20%;">No. required</th> <th style="width: 30%;">Extended Cost (\$)</th> </tr> </thead> <tbody> <tr> <td>30 inch x 36 inch</td> <td>\$15,000</td> <td></td> <td></td> </tr> <tr> <td>30 inch x 48 inch</td> <td>\$20,000</td> <td></td> <td></td> </tr> </tbody> </table>		Reducer Size	Cost per each	No. required	Extended Cost (\$)	30 inch x 36 inch	\$15,000			30 inch x 48 inch	\$20,000		
Reducer Size	Cost per each	No. required	Extended Cost (\$)										
30 inch x 36 inch	\$15,000												
30 inch x 48 inch	\$20,000												
<p><u>A2. Total Cost of the Connecting Piping, Valves and Flow Meters</u></p> <p style="text-align: center;">[A2.1 + A2.2 + A2.3 + A2.4 + A2.5 + A2.6]</p>	\$												

A3. Cost of the Building Space Required by UV System

The minimal building footprint will be provided by the Bidder as shown on the UV System layout drawing according to the requirements of Section 00 11 57, Article 5, "Building Layout Requirements".

A3.1 Building Space Required by UV Systems

The cost of the building space required by UV system will be calculated based on the unit cost of \$600/sq. ft (SF) of building footprint.

Cost basis:

Cost per SF of Building Footprint	Minimal Building Footprint (SF)
\$600	

A3. Total Cost of the Building Space

[\$600 x A3.1]

\$

A4. Annual Electric Power Cost in Whole Dollar Amount

The Average Power Consumption calculation shall assume that the system will operate at a validated dose (Dval) greater than 12 mJ/cm² to achieve a minimum of 3.0 log Cryptosporidium inactivation. Power requirements of all equipment supplied under this RFP, including the UV disinfection system and all associated equipment will be included in the electric power cost calculation. The operating conditions identified in A4.1 shall serve as the basis for calculation of the Average Power Consumption on an annual basis. The calculated Average Power Consumption will be validated based on readings taken during the Performance Testing. **Assume an average unit power cost of \$0.14/kWh.**

A4.1 Average Power Consumption**A4.1.a Design Factors**

Indicate values for the items requested in the following table that should be used to calculate the reactor power setting and power consumption:

Item	Description	Value
End of Lamp Life Aging factor (ELAF)	Bidder provided third-party certified ELAF for the proposed UV System. Max=0.90, if no data 3rd-party certification is submitted, assume 0.80. If data supports a value less than 0.80, substitute the more conservative value.	
Quartz Sleeve Fouling Factor (QSFF)	Bidder provided third-party certified QSFF for the proposed UV System. For systems with automatic cleaning mechanism, Max=0.95, if no data is available assume 0.90. For systems without automatic cleaning system, Max=0.85, if no data is available assume 0.80.	
Design Fouling-Aging Factor (DFAF)	This factor is used to determine design UV dose Multiply ELAF x QSFF	
Average Fouling-Aging Factor (AFAF)	This factor is used to determine average power consumption Average of 1.0 and DFAF	

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A4.1.b. The proposed system will operate at a validated dose (Dval) greater than 12 mJ/cm² to achieve a minimum of 3.0 log Cryptosporidium inactivation.

For each of the following conditions, indicate how many reactors and lamps will be used, and at what power setting. The Average Fouling-Aging Factor (AFAF) calculated in A4.1.a should be used to calculate the power setting.

	UVT	MGD	No. of Reactors	No. of Lamps	Power Setting (kWh)	Power Consumption (kWh/day)
(1)	88%	8.1				
(2)	91%	8.1				
(3)	88%	5.1				
(4)	91%	5.1				

A4.1.c. The power consumption conditions (1) through (4) listed in A4.1.b (above) are expected to be encountered in the following proportions:

- (1) 12.5% of year @ 88.0% UVT and 8.1 MGD
- (2) 37.5% of year @ 91.0% UVT and 8.1 MGD
- (3) 12.5% of year @ 88.0% UVT and 5.1 MGD
- (4) 37.5% of year @ 91.0% UVT and 5.1 MGD

Calculate Average Power Consumption by multiplying the power consumption for each condition shown in the table above by its expected condition.

$$[\text{Power Consumption (1)} \times 0.125] + [\text{Power Consumption (2)} \times 0.375] + [\text{Power Consumption (3)} \times 0.125] + [\text{Power Consumption (4)} \times 0.375]$$

A4.1.c Calculated Average Power Consumption (kWh/day)

<p><u>A4. Average Annual Power Cost</u> [A4.1.c x (\$0.14/kWh) x (365 days per year)]</p>	<p>\$</p>
---	-----------

A5. Annual Maintenance Costs

Annual maintenance costs will be calculated based on guaranteed life and cost data provided by the supplier for lamps, ballasts/transformers, quartz sleeves, UV intensity sensors and cleaning method. UV equipment operating conditions shall be based on design UV dose for minimum of 3.0 log Cryptosporidium inactivation at average flow rate of 6.6 mgd, average UVT of 90 percent, and average fouling-aging factor.

A5.1 Annual Lamp Cost

\$

Determine cost by [LMC x LPY] from Item A5.1.a, below.

A5.1.a. Lamp information.

Item	Description	Value
Number of Lamps in Service (LS)	Number of Lamps in Service (LS) in operating reactor(s).	
Guaranteed Lamp Life (GLL)	Expressed in hours, for the given conditions and reactor in service.	
Lamp Material Cost (LMC):	Guaranteed not-to-exceed replacement cost for one UV lamp including return of spent lamp, expressed in dollars.	\$
Number of Lamps Replaced Per Year (LPY):	Number of Lamps in Service divided by Guaranteed Lamp Life multiplied by 24 hours per day multiplied by 365 days per year. [(LS / GLL) x 24 x 365]	

A5.2 Annual Ballast/Transformer Replacement Cost		\$		
Determine cost by [BRC x BRY] from Items A5.2.a and A5.2.b, below.				
A5.2.a. Ballast/transformer information.				
Item	Description	Value		
Ballasts/transformers in Service (BS)	Total number of ballasts/transformers (BS) in operating reactor(s)			
Guaranteed Ballast/transformer Life (GBL)	Guaranteed Ballast/Transformer Life (GBL), expressed in years.			
Ballast/transformer replacement cost (BRC)	Guaranteed not-to-exceed replacement cost per ballast/transformer expressed in dollars (BRC).	\$		
A5.2.b Ballast/transformer replacement calculations				
The number of ballast/transformer replacements is annualized by dividing the total number of ballasts/transformers in operating reactor(s) by the guaranteed ballast/transformer life. It is assumed that 15% of ballasts in service will fail prematurely during their life.				
[1.15 x BS / GBL]				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Calculated Ballast/Transformer Replacements per Year (BRY)</td> </tr> <tr> <td style="height: 40px;"></td> </tr> </table>			Calculated Ballast/Transformer Replacements per Year (BRY)	
Calculated Ballast/Transformer Replacements per Year (BRY)				

<u>A5.3 Annual Quartz Sleeve Replacement Cost</u>		\$
Determine cost by [QRC x QRY] from Items A5.3.a and A5.3.b, below.		
A5.3.a Quartz sleeve information.		
Item	Description	Value
Total number of quartz sleeves (QS)	Total number of quartz sleeves (QS) in operating reactor(s)	
Guaranteed Quartz sleeve Life (GQL)	Guaranteed Quartz Sleeve Life (GQL), expressed in years.	
Quartz sleeve replacement cost (QRC)	Guaranteed not-to-exceed replacement cost per quartz sleeve expressed in dollars (QRC).	\$
<p>A5.3.b Quartz sleeve replacement calculations.</p> <p>The number of quartz sleeve replacements is annualized by dividing the total number of quartz sleeves in operating reactor(s) by the guaranteed quartz sleeve life. It is assumed that 15% of quartz sleeves in service will be replaced prematurely during their life.</p> <p>[1.15 x QS / GQL]</p>		
Calculated Sleeve Replacements per Year (QRY)		

<p><u>A5.4 Annual Duty and Reference Sensor Replacement Cost</u></p> <p>Determine cost by [SRC x SRY] from Items A5.4.a and A5.4.b, below.</p>	<p>\$</p>														
<p><u>A5.4.a Duty and reference UV intensity sensor information.</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Item</th> <th style="width: 55%;">Description</th> <th style="width: 30%;">Value</th> </tr> </thead> <tbody> <tr> <td>Total number of UV intensity sensors (SS)</td> <td>Total number of duty and reference UV intensity sensors (SS) in the operating reactor(s)</td> <td></td> </tr> <tr> <td>Guaranteed UV Sensor Life (GSL)</td> <td>Guaranteed Sensor Life (GSL), expressed in years.</td> <td></td> </tr> <tr> <td>UV Sensor replacement cost (SRC)</td> <td>Guaranteed replacement cost per UV intensity sensor expressed in dollars (SRC).</td> <td>\$</td> </tr> </tbody> </table> <p><u>A5.4.b Duty and reference UV intensity sensor replacement calculations.</u></p> <p>The number of UV intensity sensor replacements is annualized by dividing the total number of UV intensity sensors in operating reactor(s) by the guaranteed sensor life.</p> <p>[SS / GSL]</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 20px;"> <tr> <td style="text-align: center; padding: 5px;"> <p>Calculated Sensor Replacements per Year (SRY)</p> </td> </tr> <tr> <td style="height: 40px;"></td> </tr> </table>		Item	Description	Value	Total number of UV intensity sensors (SS)	Total number of duty and reference UV intensity sensors (SS) in the operating reactor(s)		Guaranteed UV Sensor Life (GSL)	Guaranteed Sensor Life (GSL), expressed in years.		UV Sensor replacement cost (SRC)	Guaranteed replacement cost per UV intensity sensor expressed in dollars (SRC).	\$	<p>Calculated Sensor Replacements per Year (SRY)</p>	
Item	Description	Value													
Total number of UV intensity sensors (SS)	Total number of duty and reference UV intensity sensors (SS) in the operating reactor(s)														
Guaranteed UV Sensor Life (GSL)	Guaranteed Sensor Life (GSL), expressed in years.														
UV Sensor replacement cost (SRC)	Guaranteed replacement cost per UV intensity sensor expressed in dollars (SRC).	\$													
<p>Calculated Sensor Replacements per Year (SRY)</p>															

<p><u>A5.5 Annual Sensor Calibration Cost</u></p> <p>Annual cost for reference and duty sensors calibration per the November 2006 UVDGM. (Assume re-calibration of all reference sensors each year.)</p>	<p>\$</p>
<p><u>A5.6 Annual Automatic Cleaning System Replacement Cost</u></p> <p>Annual cost for automatic cleaning system replaceable components (Assume replacement of all replaceable cleaning system components at least once each year)</p>	<p>\$</p>
<p style="text-align: center;"><u>A5. Total Operating Cost of the UV System</u></p> <p style="text-align: center;">[A5.1 + A5.2 + A5.3 + A5.4 + A5.5 + A5.6]</p>	<p>\$</p>

<u>A6. Present Value of Initial and Annual Costs in Whole Dollar Amounts</u>	
The present value of initial and annual costs is calculated based on a 20-year design life and a 5 percent interest rate.	
<u>A6.1 Total Initial Costs:</u> [A1 + A2 + A3]	\$
<u>A6.2 Total Annual Costs (TAC):</u> [A4 + A5]	\$
<u>A6.3 Present Value of Total Annual Costs:</u> [A6.2 x 12.46]	\$
<u>A6. Present Value System Cost:</u> [A6.1 + A6.3]	\$

BIDDER'S NAME _____
 BID FORM _____
 00 41 13 - 20 _____

<u>A7. Benefit to Cost Ratio (For use by the City/Engineer Only)</u>	
The benefit to present worth cost ratio of the UV system.	
<u>A7.1 Benefit Score (For use by the City/Engineer)</u>	
Benefit Score (from Benefit Score Sheet)	
<u>A7. Benefit to Cost Ratio:</u> [A7.1 / A6]	
Award will be based on A7 and Mandatory Criteria requirements.	

<u>A8. Guaranteed Daily Billing Rate (For Reference Only; Do not include in cost calculations)</u>	
Supplier shall guarantee that they will provide up to 60 hours of additional technical services, including additional programming, training, or regulatory assistance. This billing rate shall be guaranteed for a minimum of 2 years following Final Payment of the UV Disinfection System Contract.	
<u>A8. Guaranteed Daily Billing Rate (US dollars per 8-hr Workday)</u>	\$

7. GUARANTEES

7.1. Performance: Supplier shall guarantee that the system will perform, providing the design dose to the design flowrate as stated in Section 44 44 73, UV System. After installation, the Supplier will conduct Performance Testing to confirm performance as described in Section 44 44 73, UV System.

7.2. Power Consumption: Supplier shall guarantee that the system's power utilization and total connected load will not exceed the amounts specified in the Bid Schedule as guaranteed by Supplier. After installation and Performance Testing, the total connected load and system power consumption will be measured under a number of conditions. If either or both of these quantities exceed the guaranteed amounts for any of the tested conditions, Supplier shall pay City a Power Penalty. The amount of the Power Penalty shall be equal to the present worth value of the calculated difference in actual and guaranteed electricity costs for the 20-year design life (based on a 5 percent discount rate, flow frequency, and the power costs listed in the Bid Form).

7.3. The costs of potential expansion, as specified in the Bid Schedule, shall be guaranteed by the Supplier for a period of 5 years from system acceptance date. The guaranteed costs shall be the lower of either the costs listed in this Bid Form or future market prices.

7.4. The costs of replacements for all system components shall be guaranteed by the Supplier for a period of 5 years from system acceptance date. The guaranteed replacement costs shall be the lower of either the costs listed in the Bid Schedule or future market prices.

7.5. Lamps, Ballasts, Quartz Sleeves and UV Intensity Sensors: Supplier shall guarantee average life as listed in the Bid Schedule. If these Replacement Parts do not last for the guaranteed life, Supplier shall pay City for the cost of replacement, adjusted proportional to the actual life. For example, if the lamps last 4,000 hours but are guaranteed for 5,000 hours (or their intensity declines below the guaranteed end of lamp life output), one penalty shall be $(5,000 - 4,000)/5,000$ times the initial cost. This guarantee shall apply for a period of 20 years, or until parts that meet guaranteed life are provided by Supplier. Supplier's not-to-exceed cost shall include receiving and disposing of spent lamps. The proposer-nominated guaranteed life and replacement cost for each replaceable component will be used to estimate life-cycle costs for the system.

7.6. Billing Rate for Allowance for Additional Technical Services: Supplier shall guarantee that they will provide up to 60 hours of additional technical services, including additional programming, training, or regulatory assistance, as listed in Bid Schedule. This billing rate shall be guaranteed for a minimum of 2 years following Final Payment of the UV Disinfection System Contract.

BIDDER'S NAME _____
 BID FORM
 00 41 13 - 22

8. SURETY

8.1. If Bidder is awarded the Work from this Bid, the surety providing the Performance Bond is:

_____ whose address is

Street City State Zip

9. BIDDER

SUBMITTED on _____, 2009.

State Contractor License No. _____. (If applicable)

If Bidder is:

An Individual

Name (*typed or printed*): _____

By (*signature*): _____

Doing business as: _____

Business address: _____

Phone No.: _____ FAX No.: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(*Signature of general partner – attach evidence of authority to sign*)

Name (*typed or printed*): _____

Business address: _____

Phone No.: _____ FAX No.: _____

A Corporation

Corporation Name: _____(SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By: _____
(Signature – attach evidence of authority to sign)

Name *(typed or printed)*: _____

Title: _____ (CORPORATE SEAL)

Attest: _____
(Signature of Corporate Secretary)

Business address: _____

Phone No.: _____ FAX No.: _____

Date of Qualification to do business is: _____

A Joint Venture

Joint Venturer Name: _____(SEAL)

By: _____
(Signature of joint venture partner – attach evidence of authority to sign)

Name *(typed or printed)*: _____

Title: _____

Business address: _____

Phone No.: _____ FAX No.: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

BIDDER'S NAME _____

Phone and FAX Number, and Address for receipt of official
communications:

END OF SECTION

NON-COLLUSION AFFIDAVIT

**CITY OF KODIAK
KODIAK, ALASKA**

_____ (Bidder), first being duly sworn, on his oath says that the bid above submitted is a genuine and not a sham or collusive bid, or made in the interest or behalf of any person not herein named, and he further says that the said bidder has not directly or indirectly induced or solicited any bidder on the above work or supplies to put in a sham bid, or any other person or corporation to refrain from bidding; and that said bidder has not in any manner sought by collusion to secure to _____ self an advantage over any other bidder or bidders.

BIDDER

Subscribed and sworn to before me this _____ day of _____, 2009

NOTARY PUBLIC

My Commission Expires: _____

ACKNOWLEDGEMENT FORM

1. BIDDER'S DECLARATION AND UNDERSTANDING

In submitting this Proposal, Bidder acknowledges and accepts all terms and conditions contained in the Request for Proposal and Statement of Qualifications, including the Agreement. If there are objections, clearly define the elements and reasons for the objections:

2. BIDDER'S COMPLIANCE WITH MANDATORY CRITERIA

In submitting this Proposal, Bidder acknowledges compliance with the mandatory criteria stated below:

1. System proposed meets UV Disinfection system performance criteria of the Technical Specifications.
2. Experience of Supplier. The Supplier shall have the minimum experience and provide reference letters as described in the Request for Proposals and Statement of Qualifications.
3. System proposed is completely functional and operable within specified supply limits, as identified in the Technical Specifications.
4. System proposed shall be fully acceptable to the State of Alaska for drinking water disinfection.
5. Supplier certifies that, if selected to provide a UV Disinfection Equipment System pursuant to this proposal, it will sign the Agreement included herein.

3. BIDDER'S REPRESENTATIVE

_____ is (are) authorized to represent
_____ (UV System Supplier) during the evaluation
process, any negotiations, and signing the contract that may result. The representative is authorized
to bind the firm in contractual matters.

Dated: _____

BIDDER:

By: _____
(Print Name)

By: _____
(Signature)

Title: _____

BID BOND

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

City of Kodiak
710 Mill Bay Road, Room 220
Kodiak, Alaska 99901

BID

Bid Due Date:
Project (Brief Description Including Location):

BOND

Bond Number:
Date (Not later than Bid due date):

Penal sum (Ten percent _____
of initial system cost _____
shown on Bid Form) (Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

SURETY

_____(Seal)
Bidder's Name and Corporate Seal

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title

Attest: _____
Signature and Title

Note: Above addresses are to be used for giving required notice.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Surety's liability.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Request for Proposals and Statement of Qualifications (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Request for Proposals and Statement of Qualifications and any performance and payment bonds required by the Request for Proposals and Statement of Qualifications.
3. This obligation shall be null and void if:
 - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Request for Proposals and Statement of Qualifications (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Request for Proposals and Statement of Qualifications and any performance and payment bonds required by the Request for Proposals and Statement of Qualifications, or
 - 3.2. All Bids are rejected by Owner, or
 - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Request for Proposals and Statement of Qualifications (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

END OF SECTION

**SECTION 00 52 63
AGREEMENT FORM**

THIS AGREEMENT is between _____ (“Owner”)
and _____ (“Supplier”).

Owner and Supplier, in consideration of the mutual covenants set forth herein, agree as follows:

1. WORK.

1.1. Supplier shall complete the Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Manufacture, provision, delivery, and support of a fully functional Ultraviolet Disinfection Equipment System as described in these Contract Documents

2. ENGINEER.

2.1. CH2M HILL, Inc is hereinafter called Engineer and is to act as Owners representative, assume duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

3. POINT OF DESTINATION.

3.1. The place where the Goods are to be delivered is defined in the General Conditions as the Point of Destination and is designated as:

UV Facility Project Site, Kodiak, AK

4. CONTRACT TIMES.

4.1. Time of the Essence: All time limits for Milestones, if any, and delivery of Goods and furnishing of Special Services as stated in the Contract Documents are the essence of the Contract.

4.2. Date for Submittal of Shop Drawings: Shop Drawings and Samples required by the Contract Documents shall be submitted to Owner for Engineer’s review and approval within 60 days after the date of Execution of Contract as provided in the General Conditions.

4.3. Date for Delivery: Deliver Work to the Point of Destination and ready for Owner’s receipt of delivery on (or within a period of 15 days prior to) the date

established by the Installing Contractor at Notice to Proceed of the Construction Contract. This date will be a minimum of 120 days after the date is established or 120 days after final approval of Shop Drawings, whichever comes later.

4.4. Liquidated Damages:

4.4.1. Owner and Supplier recognize time is of the essence of this Agreement and that Owner will suffer financial loss if Work is not completed and ready for receipt of delivery by Owner within times specified in Paragraph Date for Delivery herein, plus any extensions thereof allowed in accordance the General Conditions. The parties also recognize timely performance of services by others involved in the Project are materially dependent upon Supplier’s specific compliance with requirements specified in Date for Delivery. Further, they recognize the delays, expense, and difficulties involved in proving actual loss suffered by Owner if Work is not completed on time. Accordingly, instead of requiring such proof, Owner and Supplier agree that as liquidated damages for delay (but not as a penalty) Supplier shall pay Owner \$1,000.00 for each day that expires after the time specified in Paragraph Date for Delivery.

4.4.2. Owner shall recover such liquidated damages by deducting the amount owed from the final payment or any retainage held by Owner.

5. CONTRACT PRICE.

Owner shall pay Supplier for completion of the Work in accordance with the Contract Documents in current funds as follows:

5.1.1. A Lump Sum of _____ Dollars

and _____ Cents \$ _____
(Amount written in words has precedence)

5.1.2. The City of Kodiak is exempt from sales tax and certain other use taxes. Any charges for taxes from which the City is exempt will be deducted from invoices before payment is made.

6. PAYMENT PROCEDURES.

6.1. Payment shall be in accordance with Article 13 of the General Conditions.

7. INTEREST.

7.1. All monies not paid when due as provided in Article 13 of the General Conditions shall bear interest at the rate 1/2 percent per month.

8. SUPPLIER’S REPRESENTATIONS.

8.1. In order to induce Owner to enter into this Agreement, Supplier makes the following representations:

8.1.1. Supplier has examined and carefully studied the Contract Documents and other related data identified in the Request for Proposals and Statement of Qualifications.

8.1.2. If specified, or if in Supplier's judgment, any local condition may affect cost, progress or completion of Work, Supplier has visited the Point of Destination and become familiar with and is satisfied as to local conditions that may affect cost, progress, or completion of Work.

8.1.3. Supplier is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, and completion of Work.

8.1.4. Supplier has carefully studied and correlated information known to Supplier, and information and observations obtained from Supplier's visits, if any, to the Point of Destination, with the Contract Documents.

8.1.5. Supplier has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Supplier has discovered in the Contract Documents, and written resolution thereof by Engineer is acceptable to Supplier.

8.1.6. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for completion of Work.

9. CONTRACT DOCUMENTS.

9.1. Contents: The following Contract Documents are attached to this Agreement (except as expressly noted otherwise herein) in order of precedence:

9.1.1. This Agreement (pages 1 to ____, inclusive);

9.1.2. Advertisement for Proposals (pages 1 to ____, inclusive);

9.1.3. Request for Proposals and Statement of Qualifications (pages 1 to ____, inclusive);

9.1.4. Bid Form as accepted;

9.1.5. Non-Collusion Affidavit (pages 1 to ____, inclusive);

9.1.6. Acknowledgment Form (pages 1 to ____, inclusive);

9.1.7. Bid Bond (pages 1 to ____, inclusive);

9.1.8. Supply Contract Bond (pages 1 to ____, inclusive);

- 9.1.9. Warranty Bond (pages 1 to ____, inclusive);
- 9.1.10. General Conditions (pages 1 to ____, inclusive);
- 9.1.11. General Requirements (pages 1 to ____, inclusive);
- 9.1.12. UV System Technical Specification (pages 1 to ____, inclusive);
- 9.1.13. UV System Example Layout Drawings (pages 1 to ____, inclusive);
- 9.1.14. Addenda (Numbers ____ to ____, inclusive);
- 9.1.15. Notice of Award;
- 9.1.16. Exhibits to this Agreement (enumerated as follows):
 - 9.1.16.1. Supplier's Proposal as accepted (pages ____ to ____, inclusive);
 - 9.1.16.2. Certificate of Insurance;
- 9.1.17. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - 9.1.17.1. Notice to Proceed (pages ____ to ____, inclusive);]
 - 9.1.17.2. Written Amendment(s);
 - 9.1.17.3. Change Order(s);
 - 9.1.17.4. Field Order(s);
 - 9.1.17.5. Engineer's Written Interpretation(s).

9.2. There are no Contract Documents other than those listed above in this Article.

9.3. The Contract Documents may only be amended, or supplemented as provided in the General Conditions.

10. MISCELLANEOUS.

10.1. Defined Terms: Terms used in this Agreement will have the meanings indicated in the General Conditions.

10.2. No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound. Specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent

(except to the extent that the effect of this restriction may be limited by law). Unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge assignor from any duty or responsibility under the Contract Documents.

10.3. Successors and Assigns: Owner and Supplier each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

IN WITNESS WHEREOF, Owner and Supplier have signed this Agreement in duplicate. One counterpart each has been delivered to Owner and Supplier. All portions of the Contract Documents have been signed or identified by Owner and Supplier or on their behalf.

This Agreement will be effective on _____.
(date)

Owner: _____

Supplier: _____

By: _____
(Corporate Seal)

By: _____
(Corporate Seal)

Attest: _____

Attest: _____

Address for giving notice:

Address for giving notice:

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Owner-Supplier Agreement.)

Agent for service of process:

Designated Representative:

(If Supplier is a corporation or a partnership, attach evidence of authority to sign.)

Name: _____

Designated Representative:

Title: _____

Name: _____

Address: _____

Title: _____

Phone: _____

Address: _____

Facsimile: _____

Phone: _____

Facsimile: _____

END OF SECTION

SUPPLY CONTRACT BOND

Any singular reference to Supplier, surety, Owner or other party shall be considered plural where applicable.

SUPPLIER
(Name and Address):

SURETY
(Name and Address of Principal Place of Business):

OWNER (Name and Address):

BOND

Amount: _____

Date: _____

CONTRACT

Date: _____

Amount: _____

Description (Name and Location): _____

Modifications to this Bond Form:

Surety and Supplier, intending to be legally bound hereby, subject to the terms printed on the last page hereof, do each cause this Supply Contract Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

SUPPLIER AS PRINCIPAL

SURETY

Company Name and Corporate Seal

Company Name and Corporate Seal

Signature

Signature

Name and Title

Name and Title (Attach Power of Attorney)

Address

Telephone

(Space is provided below for signatures of additional parties, if required.)

SUPPLIER AS PRINCIPAL

SURETY

Company Name and Corporate Seal

Company Name and Corporate Seal

Signature

Signature

Name and Title

Name and Title (Attach Power of Attorney)

Address

Telephone

1. Supplier and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to Owner for the performance of the Contract, which is incorporated herein by reference. For purposes of this bond, Owner means Owner's assigns if, and when Owner has assigned the Contract.
2. If Supplier performs the Contract, Surety and Supplier have no obligation under this Bond, except to participate in conferences as provided in paragraph 3.1.
3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
 - 3.1. Owner has notified Supplier and Surety pursuant to paragraph 10 that Owner is considering declaring a Supplier Default and has requested and attempted to arrange a conference with Supplier and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. (If Owner, Supplier and Surety agree, Supplier shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, to subsequently declare a Supplier Default); and
 - 3.2. Owner has declared a Supplier Default and formally terminated Supplier's right to complete the Contract. Such Supplier Default shall not be declared earlier than 20 days after Supplier and Surety have received notice as provided in paragraph 3.1; and
 - 3.3. Owner has agreed to pay the Balance of the Contract Price to:
 1. Surety in accordance with the terms of the Contract;
 2. Another Supplier selected pursuant to paragraph 4.3 to perform the Contract.
4. When Owner has satisfied the conditions of paragraph 3, Surety shall promptly, and at Surety's expense, take one of the following actions:
 - 4.1. Arrange for Supplier, with consent of Owner, to perform and complete the Contract; or
 - 4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 4.3. Obtain bids or negotiated proposals from qualified Suppliers acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Supplier selected with Owner's concurrence, to be secured with a supply bond executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to Owner the amount of damages as described in paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Supplier Default; or
 - 4.4. Waive its right to perform and complete, arrange for completion, or obtain a new Supplier, and with reasonable promptness under the circumstances, either:
 1. determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
 2. deny liability in whole or in part and notify Owner citing reasons therefor.
5. If Surety does not proceed as provided in paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in paragraph 4.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
6. After Owner has terminated Supplier's right to complete the Contract, and if Surety elects to act under paragraph 4.1, 4.2, or 4.3, then the responsibilities of Surety to Owner shall not be greater than those of Supplier under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:
 - 6.1. The responsibilities of Supplier for correction or replacement of defective Work and completion of the Contract;
 - 6.2. Additional legal, design professional and delay costs resulting from Supplier's Default, and resulting from the actions or failure to act of Surety under paragraph 4; and
 - 6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Supplier.
7. Surety shall not be liable to Owner or others for obligations of Supplier that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, successors, or assigns.
8. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders and other obligations.
9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work is located and shall be instituted within two years after Supplier Default or within two years after Supplier ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
10. Notice to Surety, Owner or Supplier shall be mailed or delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Work was to be delivered, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
12. Definitions.
 - 12.1. Balance of the Contract Price: The total amount payable by Owner to Supplier under the Contract after all proper adjustments have been made, including allowance to Supplier of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Supplier is entitled, reduced by all valid and proper payments made to or on behalf of Supplier under the Contract.
 - 12.2. Contract: The agreement between Owner and Supplier identified on the signature page, including all Contract Documents and changes thereto.
 - 12.3. Supplier Default: Failure of Supplier, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
 - 12.4. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Supplier as required by the Contract or to perform and complete or comply with the other terms thereof.

WARRANTY BOND
CONTRACT NO. _____

KNOW ALL MEN BY THESE PRESENTS, that we, _____

("Principal") and _____
("Surety"), hereby jointly and severally bind ourselves, our respective heirs, executors,
administrators, successors and assigns, to pay the City of Kodiak, State of Alaska (Owner), the
sum of _____ DOLLARS
(\$_____), in United States currency.

WHEREAS, the Principal has, by means of a written agreement dated _____, 2009,
entered into contract with the Owner for furnishing and delivering the Ultraviolet Disinfection
Equipment System, which contract is by reference made a part hereof the same as though fully
set forth herein (the "Contract");

NOW, THEREFORE, the conditions of this obligation are as follows:

FIRST. Principal shall (1) honor all claims for defective workmanship and materials on
the UV lamps, intensity sensors, quartz sleeves, and ballasts/transformers made within the
warranty period after acceptance of the foregoing Contract, and (2) pay over, make good and
reimburse to the Owner, all loss or damage which the Owner may sustain by reason of failure or
default on the part of the Principal.

SECOND. Principal shall (1) honor all claims for defective workmanship and materials
on all items other than the UV lamps, ballasts/transformers, quartz sleeves, and intensity sensors
made within one (1) year after acceptance of the foregoing Contract, and (2) pay over, make
good and reimburse to the Owner, all loss or damage which the Owner may sustain by reason of
failure or default on the part of the Principal.

THIRD. Principal shall honor all Guarantees listed in Article 7 of the Bid Form including
costs for additional services and equipment, and replacement parts and consumables for the UV
Disinfection System.

If all the above conditions are fully satisfied, this obligation shall be null and void;
otherwise it shall remain in full force and effect.

For value received, Surety further agrees that, any Contract provision to the contrary
notwithstanding, Surety's obligations hereunder shall not be affected in any way by any of the
following and expressly waives notice of the same:

1. Any extension of time granted to Principal in which to perform the Contract.

- 2. Andy change in the Plans, Drawings, Specifications, Contract or other Contract Documents.

An action on the maintenance and warranty provisions of this bond may be brought by the Owner or any person entitled to the benefits of this bond at any time within 20 years from the date of final settlement of the Contract.

Principal and Surety are jointly and severally liable under the provisions hereof and actions against either or both may proceed without prior action against the other, and both may be joined in one action.

SIGNED AND SEALED THIS _____ day of _____, 20_____.

IN THE PRESENCE OF:

WITNESS: (as to Individual)

Principal

Attest: (as to Corporation)

By:

Name

Secretary

Title

(CORPORATE SEAL)

Surety

By: _____

Attorney-in-Fact

Give local address and phone number.

(SEAL OF SURETY)

NOTE: The Surety named on this bond shall be one who is licensed to conduct business in the Sate of Alaska. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act for the Surety at the time of signing of this Bond.

END OF SECTION

GENERAL CONDITIONS

1. DEFINITIONS

1.1. Bidder: The person or persons, partnership, firm, or corporation submitting a Proposal for the Work specified in these Contract Documents.

1.2. Contract Documents: "Contract" or "Contract Documents" shall include the BIDDING REQUIREMENTS, CONTRACT FORMS, CONDITIONS OF THE CONTRACT, SPECIFICATIONS, and DRAWINGS, including all modifications and Addenda thereof incorporated into the Documents before execution of the Contract, and including subsequent Change Orders issued by the Owner, and all other requirements incorporated in these Documents by specific reference thereto. These form the Contract.

1.3. Supplier: Shall be synonymous with UV Supplier and Manufacturer. Supplier shall be the Bidder as defined in these General Conditions.

1.4. Days: Unless otherwise specifically stated, the term "days" shall be understood to mean calendar days.

1.5. Engineer: CH2M HILL, INC., located at 301 West Northern Lights Blvd, Suite 601, Anchorage, AK 99503, Attention: Floyd Damron, P.E.

1.6. Execution of Contract: Shall mean the signing of the Contract by the authorized representatives of both Owner and Supplier (Owner's signature date is the Notice to Proceed date).

1.7. Installing Contractor (Contractor): The party under separate contract with Owner who installs, tests, and starts up the product(s) furnished under this Contract.

1.8. Manufacturer: Shall be synonymous with Supplier. Manufacturer shall be the Bidder as defined in these General Conditions.

1.9. Or Equal: The term "or equal" shall be understood to indicate that the "equal" product is the same or better than the products named in function, performance, reliability, quality, and general configuration. Determination of equality in reference to the project design requirements will be made by Engineer.

1.10. Owner: City of Kodiak (City), Kodiak, AK, its agents, officers, and employees.

1.11. Person-day: Person-day shall be 8 working hours (8 a.m. to 5 p.m.) in a 24-hour period.

1.12. Proposal: Shall be synonymous with the Bid.

1.13. UV System: Shall be synonymous with UV Disinfection Equipment or UV Disinfection System, which includes all related equipment, materials, and appurtenances.

1.14. Work: Shall include all equipment, materials and appurtenances, manufacturing of equipment, delivery of equipment, and specified services necessary for the Supplier to perform and complete the Contract, including items not specifically indicated or described which are reasonably considered in good practice as belonging to the equipment specified.

1.15. UVDGM: USEPA's November 2006 Ultraviolet Disinfection Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule (EPA-815-R-06-007).

2. CONTRACT DOCUMENTS

2.1. Contract Documents include the BIDDING REQUIREMENTS, CONTRACT FORMS, CONDITIONS OF THE CONTRACT, SPECIFICATIONS, and DRAWINGS, including all modifications and Addenda thereof incorporated into the Documents before execution of the Contract, and including subsequent Change Orders issued by the Owner, and all other requirements incorporated in these Documents by specific reference thereto.

2.2. The Drawings are supplemental and represent the preliminary drawings of the design as developed by the Engineer. The final design drawings will be revised to reflect the selected UV System. The requirements in the Specifications shall be considered complete and accurate and shall take precedent over the supplemental drawings, which depict the project scope and design intent. The supplemental drawings shall be considered as reference only.

2.3. Discrepancies and Omissions:

2.3.1. Should anything which is necessary for a clear understanding of the Work be omitted from the Specifications and Drawings, or should it appear that various instructions are in conflict, the Supplier or Contractor shall secure written instructions from Engineer before proceeding with the Work affected by such omissions or discrepancies. It is understood and agreed that the Work shall be performed according to the true intent of the Contract Documents.

2.3.2. It is understood and agreed that the written terms and provisions of the Contract Documents shall supersede all verbal statements of representatives of Owner, and verbal statements shall not be effective or be construed as being a part of this Contract.

3. INSPECTION/ACCEPTANCE

3.1. All material and equipment shall be subject to inspection and test by Owner or its designee at Supplier's plant, shipping way points, and at the project site. Notwithstanding any inspection at Supplier's plant, final inspection and acceptance of the material and equipment shall be at Owner's project site.

3.2. If inspection and tests, whether preliminary or final, are made on Supplier's premises, Supplier shall furnish all reasonable facilities and assistance for safe and convenient inspection and tests required by Owner. Inspection by Owner or failure to inspect by Owner shall not relieve Supplier of any responsibility or liability with respect to such material and equipment and shall not be interpreted in any way to imply acceptance by Owner.

3.3. Owner reserves the right to reject nonconforming material and equipment. Owner shall have the option either to require Supplier to promptly remove and replace rejected material and equipment at Supplier's expense; or to cancel this order pursuant to Article Termination/Cancellation and require Supplier to promptly remove rejected material and equipment at Supplier's expense.

3.4. Owner reserves the right to revoke acceptance of material and equipment if Owner accepted same on the reasonable assumption that the nonconformity would be cured by Supplier and has not been reasonably cured, or without discovery of such nonconformity if acceptance was reasonably induced either by the difficulty of discovery before acceptance or by Supplier's assurances.

4. CHANGES

4.1. Owner shall have the right (by written supplement hereto, including revised drawings, specifications, and other transmittals), to make changes in the specifications of material and equipment ordered.

4.2. If any change affects the price or delivery date of such material and equipment, Supplier shall forthwith so notify Owner in writing; and shall, within 30 days of the date such supplement is mailed or otherwise delivered to Supplier, submit a written claim for adjustment of price and/or delivery date. If Supplier fails to do so, Supplier waives any claim for such adjustment.

4.3. Supplier shall not suspend performance while Owner and Supplier are in the process of making such changes and any related adjustments.

4.4. Payment or credit for any changes shall be determined by lump sum agreement, in writing, between Supplier and Owner before starting extra work.

5. SUPPLIER

5.1. The relationship of Supplier to Owner shall be that of an independent contractor. Supplier shall have no contractual relationship with the Engineer as a result of its contract with Owner. Nothing contained in this Contract shall create any contractual relation between any subcontractor of Supplier and Owner or Engineer.

6. MATERIALS AND EQUIPMENT

6.1. General: All materials and equipment furnished shall conform to applicable Specifications and shall be new, unused, and undamaged when installed or otherwise incorporated in Owner's project. No such material or equipment shall be used by Supplier for any purpose other than that intended or specified, unless such use is specifically authorized by Owner in each case.

6.2. Codes, Laws, and Regulations: All material, equipment, and services provided hereunder shall comply with all applicable codes, laws, regulations, standards, and ordinances, including potable water NSF requirements, National Electrical Code, and UL listing mark or label requirements. Supplier shall not be liable for factors over which it has no control; e.g., installation, operation, and maintenance when performed by others unless supplier has provided erroneous installation or operational instructions or guidance.

7. FIELD PERFORMANCE TESTING

7.1. Operating equipment and systems will be performance tested by the Supplier in the presence of Engineer to demonstrate compliance with the specified requirements. Performance testing will be conducted under the specified design operating conditions or under such simulated operating conditions as recommended or approved by Engineer.

7.2. In the event of malfunction or failure to perform as specified, and it is determined by Engineer that the equipment or system furnished under this Contract is in nonconformance with the Contract Documents, Supplier shall bear all cost for repair, replacement, retesting, and other damages resulting from noncompliance with these Contract Documents. If the failure of the Supplier's equipment results in any fines, penalties by the Federal Government or State of Alaska, or corrective actions by the Owner, Supplier shall reimburse the Owner for the amount of those fines, penalties, or corrective actions.

8. WARRANTY

8.1. Except as stated in the BID FORM, all material and equipment supplied shall be warranted by Supplier to Owner as follows:

8.1.1. All Work, including mechanical and electrical components of material and equipment, and/or packaged control systems which are furnished as

components of the materials and equipment specified hereinafter, shall be warranted against defects in materials and workmanship for a period of five years following acceptance of performance testing by Owner and Engineer.

8.1.2. All material and equipment shall be guaranteed as merchantable and suitable for the purpose intended and shall provide the results required by the Drawings and Specifications.

8.1.3. Supplier shall make all repairs or replacements necessitated by defects in materials or workmanship that become evident within the warranty period.

8.1.4. Supplier also agrees to hold Owner harmless from liability of any kind arising from damage due to said defects. Supplier shall make all repairs and replacements promptly upon receipt of written orders for same from Owner. If within 10 days after Owner has notified Supplier of a defect, Supplier has not started to make the necessary corrections, Owner is hereby authorized to make the corrections or to order the Work to be done by a third party, and the cost of the corrections shall be paid by Supplier.

9. RELATED SERVICES

9.1. Whenever Supplier furnishes personnel for installation supervision, startup, testing, inspection, related services, or maintenance (the Work), the following provisions shall apply, in addition to other applicable provisions of this order including compensation:

9.1.1. Representation by Supplier: Supplier represents that Supplier, its agents, and employees, are qualified and competent to perform the Work and that all tools and equipment furnished by Supplier in its performance of the Work are, and shall be, kept in good working order.

9.1.2. Supplier's Responsibility: Supplier asserts that the Work shall be performed in accordance with accepted standards and shall conform to the requirements of this Contract. Any Work not so performed or not in conformity herewith shall be corrected by Supplier. If such deficiencies are not immediately corrected, Owner may cause the same to be corrected for the account of Supplier. The above-described remedy is in addition to any other remedies, in law or equity, available to Owner.

9.1.3. Completion and Acceptance: When Supplier deems the Work completed, Supplier shall give Owner notice thereof in writing. Within a reasonable time after receipt of such notice, Owner will determine if the Work has been completed to its satisfaction; if so, Owner will advise Supplier, in writing, of its final acceptance thereof; if not, Owner will notify Supplier of its lack or failure of performance and Supplier will take remedial action as

described in this Article and will repeat the procedure stated herein until the Work has been satisfactorily completed and accepted.

10. DELIVERY/DELAYS

10.1. Delivery milestones will be established and incorporated into the agreement between the Owner and Supplier.

10.2. Since material and equipment covered hereby may be incorporated into a construction project, the submittal and delivery dates must be met by Supplier, and be subject to liquidated damages, as defined in the GENERAL REQUIREMENTS, if dates are not met.

10.3. Supplier shall not be responsible for delays resulting from occurrences beyond its control which it could not have reasonably anticipated and provided for. In such event, Supplier shall give Owner written notice within 5 days of such occurrence. Owner shall determine an equitable extension of time for delivery. Supplier's failure to so notify Owner of such delay shall constitute a waiver of Supplier's right to a time extension. There shall be no price adjustment by virtue of any such time extension.

11. TERMINATION/CANCELLATION

11.1. Owner shall have the right to terminate all or any part of this Contract for its convenience. Upon termination, Supplier shall be reimbursed for its reasonable and necessary costs resulting therefrom which are substantiated by evidence satisfactory to Owner. Supplier shall receive no profit on unperformed Work. Owner shall be entitled to immediate possession of plans and Work for which it has paid.

11.2. Any failure by Supplier to perform its obligations under this order which is deemed substantial by Owner, shall be a grounds for Owner to cancel this order or the affected portion hereof. Supplier shall not be entitled to any compensation pursuant to such cancellation, except for the reasonable value of material and equipment delivered by Supplier and accepted by Owner prior to cancellation, which amount shall not exceed the Contract Price. Owner reserves all rights it may have against Supplier as a result of Supplier's failure to so perform.

11.3. Owner's obligations under Article Warranty shall survive termination or cancellation.

12. SUSPENSION OF WORK

12.1. Owner reserves the right to suspend and reinstate execution of the whole or any part of the Work without invalidating the provisions of the Contract. Orders for suspension or reinstatement of the Work will be issued by Owner to Supplier in writing. The time for completion of the Work will be extended for a period equal to

the time lost by reason of the suspension. Supplier may request a cost escalation to be reviewed by Owner for suspensions of work extending beyond 6 months.

13. PAYMENT

13.1. Supplier shall invoice Owner on a complete and accurate Owner supplied payment request form in the percent complete amounts as described below. Owner will make payment within 30 days of Engineer's approval of the Supplier's payment request:

13.1.1. Ten (10) percent of the contracted price will be paid after the complete set of submittals, including shop drawings, acceptable to Engineer have been returned to Supplier.

13.1.2. Five (5) percent of the contracted price will be paid after the complete set of O&M Manuals acceptable to Engineer have been returned to Supplier.

13.1.3. Fifty (50) percent of the contracted price will be paid after receipt of the complete order in Kodiak indicated by a bill of lading, provided requirements of 13.1.1 and 13.1.2 have been fully met.

13.1.4. Fifteen (15) percent of the contracted price will be paid after Functional Testing is complete.

13.1.5. Fifteen (15) percent of the Contract amount shall be paid by Owner upon successful completion of startup and training, and fulfillment of all contractual obligations concerning installation, startup services and training of Owner's personnel. During this time, Owner may make payments based upon satisfactory progress of this Work.

13.1.6. The remaining five (5) percent will be paid upon final acceptance of the Work.

13.1.7. Acceptance by Supplier of the final payment shall be a release to Owner from all claims and liability hereunder for anything done or furnished in connection with the Work, or for any act or neglect of Owner or of any person relating to or affecting the Work.

14. INSURANCE REQUIREMENTS

14.1. For PRODUCTS or SERVICES requiring Supplier's presence on any Owner property, the Supplier shall, during the term of this Agreement and until completion thereof, provide and maintain the coverages set forth in this INSURANCE SECTION.

14.1.1. Workers Compensation Insurance: The successful Bidder shall carry and maintain during the term of this contract, workers compensation and employers liability insurance meeting the requirements of the State of Alaska on all the successful Bidder's employees carrying out the work involved in this contract.

14.1.2. General Liability Insurance: The successful Bidder shall carry and maintain during the term of this contract, general liability insurance on a per occurrence basis with limits of liability not less than \$1,000,000 per occurrence for Bodily Injury and Property Damage. As a minimum, coverage for Premises, Operations, Products and Completed Operations shall be included. This coverage shall protect the public or any person from injury or property damages sustained by reason of the successful Bidder or its employees carrying out the work involved in this contract.

14.1.3. Automobile Liability Insurance: The successful Bidder shall carry and maintain during the term of this contract, automobile liability insurance with either a combined limit of at least \$1,000,000 per occurrence for bodily injury and property damage. Coverage shall include all owned, hired, and non-owned motor vehicles used in the performance of this contract by the successful Bidder or its employees.

14.2. Subcontractors: In the case of any work sublet, the Supplier shall require subcontractors and independent contractors working under the direction of either the Supplier or a subcontractor to carry and maintain the same workers compensation and liability insurance required of the Supplier.

14.3. Qualifying Insurance: The insurance required by this contract shall be written by non-assessable insurance companies licensed to do business in the State of Alaska and currently rated "B" or better by the A.M. Best Company. All policies shall be written on a per occurrence basis and not a claims made form.

14.4. Additional Insured: The City of Kodiak and CH2M HILL, their officers and employees shall be named as additional insureds without restrictions (i.e., with waiver of subrogation) on the Supplier's, subcontractor's, and independent contractor's liability insurance policies and certificates of insurance.

14.5. Supplier shall deliver to Owner, with copies to each additional insured identified in these General Conditions, certificates of insurance (and other evidence of insurance requested by the Owner or any other additional insured) which Supplier is required to purchase and maintain. Failure to deliver certificates or list the City of Kodiak and CH2M HILL as additional insured does not relieve Supplier of the responsibilities of this insurance requirement.

15. HOLD HARMLESS AGREEMENT

15.1. The Supplier agrees to protect, defend, indemnify and hold harmless the City of Kodiak and CH2M HILL, and their officers and employees (subject to any customary exclusion regarding professional liability) from any and all claims and damages of every kind and nature made, rendered or incurred by or in behalf of every person or corporation whatsoever, including the parties hereto and their employees that may arise, occur, or grow out of any acts, actions, work or other activity done by the Supplier, its employees, subcontractors or any independent contractors working under the direction of either the Supplier or subcontractor in the performance of this contract.

16. LAWS AND REGULATIONS

16.1. All applicable State of Alaska and federal laws, ordinances, licenses and regulations of a governmental body having jurisdiction shall apply to the award throughout as the case may be, and are incorporated here by reference.

17. FORCE MAJEURE

17.1. For the purpose hereof, force majeure shall be any of the following events: acts of God or the public enemy; compliance with any order, rule, regulation, decree, or request of any governmental authority or agency or person purporting to act therefore; acts of war, public disorder, rebellion, terrorism, or sabotage; floods, hurricanes, or other similar unusual storms; strikes or labor disputes; or any other cause, whether or not of the class or kind specifically named or referred to herein, not within the reasonable control of the party affected.

17.2. A delay in or failure of performance of either party shall not constitute a default hereunder nor be the basis for, or give rise to, any claim for damages, if and to the extent such delay or failure is caused by force majeure.

17.3. The party who is prevented from performing by force majeure (i) shall be obligated, within a period not to exceed fourteen (14) days after the occurrence or detection of any such event, to give notice to the other party setting forth in reasonable detail the nature thereof and the anticipated extent of the delay, and (ii) shall remedy such cause as soon as reasonably possible.

END OF SECTION

SECTION 01 04 00
GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SUBMITTALS - GENERAL

- A. Complete Supplier's specifications, including material description.
- B. Recommended spare parts and spare parts cost information.
- C. List of special tools/instruments furnished with the equipment.
- D. List of materials and supplies furnished with the equipment.
- E. Approximate shipping weight of the equipment and, if shipped unassembled, the number of components and approximate weight of each.
- F. Shipping method(s) to Kodiak from point of manufacture.
- G. Recommended handling method.
- H. Requirements for storage and protection prior to installation.
- I. Requirements for storage and protection following installation, but prior to startup.
- J. List of requested exceptions to the Contract Documents.
- K. Submittals as required by the specific Specification Section.

1.02 SHOP DRAWINGS

- A. Supplier shall submit such shop drawings and/or catalog cuts required for the fabrication and installation of the equipment. These drawings shall be accurate in every detail, and shall contain all information necessary to relate the equipment to the Drawings and Specifications.
- B. Where the installation of the equipment requires coordination with work performed by others, such as installation of required embedded items furnished either by Supplier or by others, such coordination shall be clearly identified and indicated on the shop drawings.
- C. Each shop drawing and/or catalog cut shall have been thoroughly checked by Supplier for compliance with the Drawings and Specifications. Supplier shall

submit at least four sets of shop drawings to Engineer. Two sets will be returned to Supplier after review by Engineer within 30 days of receipt.

- D. No work shall be performed in connection with the fabrication or manufacture of materials and equipment, nor shall any accessory or appurtenance be purchased until the shop drawings and data have been reviewed and returned to Supplier as being approved or otherwise accepted, except at Supplier's own risk and responsibility.
- E. Should Supplier propose any item on his shop drawings, or incorporate an item into the work, and that item should subsequently prove to be defective or otherwise unsatisfactory, (regardless of Engineer's review), Supplier shall, at his own expense, replace the item with another item that will perform satisfactorily.

1.03 SAMPLES AND TEST SPECIMENS

- A. Where required in the Specifications, and as determined necessary by Engineer, test specimens or samples of materials, and fittings to be used or offered for use in connection with the work shall be submitted to Engineer at Supplier's expense, with information as to their sources, with all cartage charges prepaid, and in such quantities and sizes as may be required for proper examination and tests to establish the quality or equality thereof, as applicable.

1.04 OPERATION AND MAINTENANCE (O&M) MANUALS

- A. Definitions:
 - 1. Preliminary Data: Initial and subsequent submissions for Engineer's review.
 - 2. Final Data: Engineer-accepted data, submitted as specified herein, within 30 days of receipt.
- B. Sequencing and Scheduling:
 - 1. Preliminary Data:
 - a. Do not submit O&M Manual until Shop Drawings for equipment or system have been reviewed and approved by Engineer. Review to be within 30 days of receipt.
 - b. Submit three (3) copies not less than 90 days prior to equipment shipment date.
 - 2. Final Data: Submit Instructional Manual Formatted data not less than 60 days prior to installation of equipment or system. Submit six (6)

copies of compilation formatted and electronic media formatted data at least 90 days prior to substantial completion of project.

C. Data Format:

1. Prepare preliminary data in data compilation format.
2. Prepare final data in data compilation format and on electronic media.

D. Data Compilation Format:

1. Compile all Engineer-accepted preliminary O&M data into a hard-copy, hard-bound set.
2. Each set shall consist of the following:
 - a. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - b. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO. ___ OF ___", and list:
 - 1) Project title.
 - 2) Owner's and Engineer's name.
 - 3) Contractor's name, address, and telephone number.
 - 4) If entire volume covers equipment or system provided by one Supplier include the following:
 - a) Identity of general subject matter covered in manual.
 - b) Identity of equipment number and Specification section.
 - c. Provide each volume with title page and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
 - d. Table of contents neatly typewritten, arranged in a systematic order:
 - 1) Include list of each product, indexed to content of each volume.
 - 2) Designate system or equipment for which it is intended.
 - 3) Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 - e. Section Dividers:
 - 1) Heavy, 80 pound cover weight, tabbed with numbered plastic index tabs.
 - 2) Fly-Leaf:
 - a) For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.

- b) List with Each Product:
 - (1) Name, address, and telephone number of subcontractor, supplier, installer, and maintenance contractor, as appropriate.
 - (2) Identify area of responsibility of each.
 - (3) Provide local source of supply for parts and replacement.
 - c) Identity of separate structure as applicable.
 - f. Assemble and bind material, as much as possible, in same order as specified in the Contract Documents.
- E. Electronic Media Format:
- 1. Portable Document Format (PDF):
 - a. After all preliminary data has been found to be acceptable to Engineer, submit Operation and Maintenance data in PDF format on CD media.
 - b. Files to be exact duplicates of Engineer-accepted preliminary data. Arrange by specification number and name.
 - c. Files to be fully functional and viewable in most recent version of Adobe Acrobat.
 - 2. Word and Excel Documents
 - a. All O&M documents and data files shall also be submitted in Word or Excel format on CD media.
- F. Each instruction manual shall include, but not be limited to, the following:
- 1. Diagrams and illustrations.
 - 2. Detailed description of the function of each principal component of the system.
 - 3. Performance and nameplate data.
 - 4. Installation instructions.
 - 5. Procedure for starting.
 - 6. Proper adjustment.
 - 7. Test procedures.
 - 8. Procedure for operating.
 - 9. Shutdown instructions.
 - 10. Emergency operating instructions and troubleshooting guide.
 - 11. Safety precautions.
 - 12. Maintenance and overhaul instructions which shall include detailed assembly drawings with part numbers, parts list, instructions for ordering spare parts, and complete preventive maintenance instructions required to ensure satisfactory performance and longevity of the equipment.
 - 13. Procedures for calibrating equipment as appropriate.
 - 14. MSDS for each item as appropriate.

15. Contact information for requesting assistance from Supplier.
 16. Contact information for ordering spare parts.
- G. The manual shall be complete in all respects for all equipment, accessories, and associated appurtenances. Incomplete manuals will be returned to Supplier within 30 days of receipt for corrections and resubmittal. If more than two resubmittals are required Supplier shall reimburse Owner for the additional Engineer's review time at a rate of \$150/hour.

1.05 SUPPLIER'S SERVICES DURING CONSTRUCTION

- A. Competent and experienced technical representatives shall represent the Suppliers of all equipment and systems as may be necessary to resolve assembly or installation problems at the worksite which are attributable to, or associated with, the equipment furnished.
- B. A Supplier's representative shall certify in writing stating that the system has been installed in accordance with the Supplier's recommendation and has been inspected by a Supplier's authorized representative, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed and that the proper electrical and mechanical connections have been made.
- C. Where functional testing is called for in the Technical Specifications, the Supplier's representative shall assist with the initial test. Initial equipment and system adjustment and calibrations shall be performed in the presence of, and with the assistance of, the Supplier's representative. The above-mentioned Supplier's certification shall include the statement that proper adjustments have been made, and that the equipment or system is ready for plant startup and operation.
- D. Where plant startup services are called for in the Technical Specifications, or when technical assistance is necessary due to any malfunction of the system furnished, the Supplier's representative shall furnish such services. The Supplier's representative shall also conduct and/or assist with final performance and demonstration testing, as required by the Specifications. These services shall continue until such times as the applicable system has been successfully performance tested and has been accepted by Owner for full-time operation.
- E. Where training is called for in the Technical Specifications, the Supplier's representative shall furnish detailed instructions to Owner's personnel for operation of the specified equipment. These training services shall include pre-startup classroom and onsite equipment instruction and/or post-startup

classroom and onsite equipment instruction, as stated in the Technical Specifications.

1.06 SCHEDULE REQUIREMENTS

- A. Within 14 days of Execution of Contract, provide Engineer with bar chart graphic schedule showing expected start date, duration, and completion date for the following:
1. Shop drawing submittal
 2. O&M manual submittal
 3. Meetings with Engineer
 4. Start of manufacture
 5. Factory testing
 6. Shipment
 7. Field services
- B. The following forms, bound at the end of this section, shall be used to report progress relative to schedule:
1. Notice of Start of Manufacturing.
 2. Shipment of Equipment (enclose bill of lading).
 3. Schedule Impact.
- C. Supplier shall assist Engineer in determining the latest available schedule information on the Contract items, including whether Supplier is on schedule or delayed. These requirements apply fully to telephone inquiries, personal visits, letters, or other communications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION FOR SHIPMENT

- A. Insofar as is practical, equipment shall be factory assembled. The equipment parts and assemblies that are, of necessity, shipped unassembled shall be furnished with an assembly plan and instructions. The separate parts and assemblies shall be match-marked or tagged in a manner to facilitate field assembly of the equipment.

- B. Generally, machined and unpainted parts subject to damage by the elements shall be protected with an application of a strippable protective coating.
- C. Equipment shall be packaged or crated in a manner that will protect equipment from damage during shipping, handling, and storage.
- D. The outside of the package or crate shall be adequately marked or tagged to indicate its contents by equipment name, Contract number, and equipment number if applicable; approximate weight; state any special precautions for handling; and indicate the recommended requirements for storage prior to installation.

3.02 PACKAGING AND DELIVERY OF SPARE PARTS AND SPECIAL TOOLS

- A. Spare parts and special tools shall be properly marked to identify the associated equipment by name, equipment, and part number. Parts shall be packaged in a manner for protection against damage from the elements during shipping, handling, and storage. Spare parts and special tools shall be shipped in appropriately sized, hinged-cover, wood or metal boxes. The boxes shall be marked to indicate the contents and use. Delivery of special tools shall be made prior to the time the associated equipment is scheduled for the initial test run.

3.03 UNLOADING EQUIPMENT AT POINT OF RECEIPT

- A. Unloading equipment at the jobsite shall be by the Owner or Installing Contractor(s). Installing Contractor(s), Owner and Engineer will require a 15-day advance notice of delivery day followed by a 48-hour notice prior to the expected delivery time at the designated location. The 48-hour notice must include the approximate hour of delivery which shall be during regular daytime working hours at the WTP site, Monday through Friday, 7:30 am to 3:00 pm.

END OF SECTION

NOTICE OF START OF MANUFACTURING

DATE: _____

TO: City of Kodiak
2410 Mill Bay Road
Kodiak, AK 99615

ATTENTION: Howard Weston

RE: Equipment Contract No.: _____

Name of Contract: _____

Type of Equipment: _____

Quantity: _____

Scheduled Completion of Assembly: _____

Scheduled Date of Shipment: _____

NOTE: Delay to the above schedule which will affect shipment date by 5 days or more must be reported on the SCHEDULE IMPACT form.

By: _____ Date: _____

Title: _____

ACTUAL MANUFACTURING AGENT:

Name: _____

Address: _____

City: _____ State: _____ Zip: _____ Telephone: _____

NOTICE OF SHIPMENT OF EQUIPMENT

DATE: _____

TO: City of Kodiak
2410 Mill Bay Road
Kodiak, AK 99615

ATTENTION: Howard Weston

RE: Equipment Contract No.: _____

Name of Contract: _____

Type of Equipment: _____

QTY, DESCRIPTION (Include Equipment Numbers) SERIALS (If Applicable):

ATTACH BILL(S) OF LADING FOR ALL SHIPMENTS TO THIS FORM:

Date of Shipment: _____

By: _____

Title: _____

ACTUAL MANUFACTURING AGENT:

Name: _____

Address: _____

City: _____ State: _____ Zip: _____ Telephone: _____

NOTICE OF SCHEDULE IMPACT

(Send this form to Owner and Engineer if delay is over 5 days)

DATE: _____

TO: City of Kodiak
 2410 Mill Bay Road
 Kodiak, AK 99615

ATTENTION: Howard Weston

RE: Equipment Contract No.: _____

Name of Contract: _____

Type of Equipment Affected: _____

Nature of Delay Description: _____

New Estimated Date for Final Shop Drawings: _____

New Estimated Date for Start of Manufacture: _____

New Estimated Date for Finish Manufacture: _____

New Estimated Date for Shipment: _____

New Estimated Date for Arrival at Jobsite: _____

By: _____

Title: _____

ACTUAL MANUFACTURING:

Name: _____

Address: _____

City: _____ State: _____ Zip: _____ Telephone: _____

**SECTION 44 44 73
UV SYSTEM**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of references which may be found in this section:
1. American National Standards Institute (ANSI).
 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
 3. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 4. U.S. Environmental Protection Agency (USEPA):
 - a. Final UV Disinfection Guidance Manual (UVDGM) - 2006 UVDGM.

1.02 DEFINITIONS

- A. UV Dose (Fluence): Shall indicate the UV power incident onto an infinitesimally small sphere of cross-sectional area dA , divided by dA , for a given contact time in seconds. The units of UV dose are millijoules per square centimeter (mJ/cm^2). The term "UV dose" shall only include the UV energy with germicidal properties, and the contributions shall be weighted according to the relative spectrum of germicidal effectiveness for the challenge organism utilized by the Supplier in Validation Testing.
- B. UV Transmittance (UVT): Shall indicate the transmittance of ultraviolet light at a wavelength of 254 nanometers through the water across a path length of 1 centimeter. UVT shall be expressed as a percentage.
- C. Intensity: Shall indicate the intensity of UV energy and shall be defined as the UV power incident onto an infinitesimally small sphere of cross-sectional area dA , divided by dA . The units of intensity are milliwatts per square centimeter (mW/cm^2).
- D. Reduction Equivalent Dose (RED): Shall indicate the dose necessary, with the full-scale UV System to provide a level of inactivation of a specific organism (e.g. MS-2 bacteriophage) equivalent to the level of inactivation for the same organism achieved in a laboratory, using a collimated beam apparatus with a low-pressure lamp producing UV energy at a wavelength of 254 nanometers, on a water sample collected at the same time.

- E. Validation Factor (VF): As defined by the UVDGM, an uncertainty term that accounts for the uncertainty and bias associated with validation testing.
- F. Validated Dose (Dval): RED divided by VF as described in the UVDGM.
- G. As defined in Section 00 72 10, General Conditions.

1.03 SYSTEM DESCRIPTION

- A. The existing water treatment system includes pressure control, chlorination and pH control (soda ash addition). The raw water from the Upper Reservoir is regulated in the pressure reducing valve (PRV) building. The chlorine is injected downstream of the PRV building. The chlorination CT is then accomplished in two 2-million-gallon CT reservoirs. The soda ash is injected downstream of the CT reservoirs.
- B. The UV System will be installed downstream of the chlorination injection and upstream of soda ash injection and CT reservoirs.
- C. The UV System will be installed inside a new UV Facility Building. The Control Panels will be installed on the main floor, and the UV Reactors and piping will be installed in the basement. The temperature inside the building is expected to be maintained between 50 and 78 degrees F.
- D. The maximum, minimum, and average flow rates are as follows:
 - 1. Maximum: 18.0 million gallons per day (mgd).
 - 2. Minimum: 1.0 mgd.
 - 3. Annual Average: 6.6 mgd.
- E. Characteristics of the chlorinated water:
 - 1. Turbidity less than 5 nephelometric turbidity units (NTU).
 - 2. Water temperatures from 0.7 to 20 degrees C.
 - 3. UV Transmittance:
 - a. Average UV transmittance (UVT): 90 percent.
 - b. Range of UVT: 85 to 96 percent.
 - 4. Hardness less than 5 mg/L as CaCO₃.
 - 5. pH of 6.5 to 8.7.
 - 6. Free chlorine residual of <3.5 mg/L.
 - 7. Iron concentration of <0.1 mg/L.
 - 8. Static pressure of 55 psig.

1.04 SUBMITTALS

- A. The following specific information shall be provided in accordance with the General Requirements:
1. Shop Drawings:
 - a. Catalog information and cuts for all system components, including the control system components and control panels.
 - b. Detailed shop drawings of all system components and all interconnections and interface requirements (piping, power, control, instrumentation, data), dimensions of all major elements of the UV System, critical clearance requirements, and weight of equipment.
 - c. Input power requirements; clearly specify whether 480V, 3-wire or 480/277V, 4-wire is required as well as ampacity. Also state the maximum time duration of AC power loss that the local control panel (LCP) can ride through before functional shutdown as well as equipment power operating range, voltage and frequency.
 - d. Information on the details of sensor calibration and traceability, sensor uncertainty (including uncertainty from linearity, temperature response, spectral response, angular response, and long-term drift), polychromatic bias, working range, detection limit, sensor life and sensor calibration interval showing compliance with the 2006 UVDGM. Also provide expected variations among online sensors readings.
 - e. Complete description of sensor locations within reactor and accessibility for calibration and routine maintenance.
 - f. A list of all system components along with their expected replacement frequencies, and duration of life warranties. Include a list of special tools required for checking, testing, parts replacement, and maintenance.
 - g. Lamp data, including, watt rating, initial lumen output, lamp loss factors, average lumens and life expectancy (in hours).
 - h. Complete description of the manual or automatic lamp cleaning process and its maintenance requirements. The level of details should be sufficient for Owner to evaluate lamp cleaning mechanism reliability and its maintenance requirements.
 - i. Operator Interface Units (OIU) example screens and Programmable Logic Controller (PLC) programs on CD in Rockwell Automation and pdf formats.
 - 1) Fully documented ladder logic listings, function listings for function blocks not fully documented by ladder logic listings, cross-reference listings and operator interface configuration documentation.

- j. Complete description of UVT monitor. Include operation and maintenance requirements necessary for compliance with the 2006 UVDGM requirements.
- k. Validation Testing: Detailed report with third party signature, raw data, and documentation of all reactor performance validation testing per the 2006 UVDGM. Include dose equations, target organism, validation factor, including all applicable components, and RED at operating conditions as described in the Contract Documents as assembled herein. If reactor was validated to a previous version of the UVDGM, provide summary of deviations from the 2006 UVDGM and indicate if additional validation testing per the 2006 UVDGM is required and/or planned. Describe control approach. Provide inlet and outlet piping configurations from validation testing.
- l. Headloss information on proposed reactor at maximum and average flow rates. Headloss shall be calculated from the inlet flange to the outlet flange of the reactor, including any baffling.
- m. Third-party certification of lamp aging and quartz sleeve fouling factors.
- n. Harmonic distortion data, up to the 35th harmonic, and power factors at ballast's minimum, medium, and maximum power settings. Include test data showing that the available short circuit current at the Main LCP input power terminals to be 30,000 amps symmetrical at 480 volts and include distortion by harmonic table. 3rd party off-site test results are acceptable.
- o. Data on harmonic filters, or active filters, used to mitigate harmonics to IEEE 519 levels.
- p. Detailed engineering calculations showing efficiencies of electrical components and power requirements per each Local Control Panel (LCP) provided.
- q. Wireway, conduit and grounding layout Drawings, wiring and control diagrams, and the overall electrical design of the UV System (both control and power).
- r. Specifications for all interconnecting cables between the UV equipment, including voltage ratings, insulation type, conductor material and cable/conductor outside diameter.
- s. Interconnecting cable termination data, including termination type and quantity.
- t. Control panel construction and panel layout Drawings.
- u. Control panel interconnection wiring diagrams that include numbered wire and terminal designations showing all external interfaces.
- v. Special shipping, storage and protection, and handling instructions.

- w. Provide structural calculations for the UV System and the UV System supports and anchoring, designed for Seismic Zone 4 and provided by the Supplier. Supplier shall design and provide all supports directly supporting the UV Reactors (does not include supports for upstream and downstream piping). All structural calculations shall meet the requirements of the local building code and be signed by a registered Professional Engineer in the Structural or Civil discipline.
 - x. Manufacturer's printed installation instructions.
 - y. List special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
2. Quality Control Submittals:
- a. Documentation of lamp outputs prior to shipment of equipment. Supplier will verify the output of up to four (4) lamps for MP systems and ten (10) lamps for LPHO systems.
 - b. Factory test procedures and data sheets.
 - c. Factory Witness Test Report: Provide report as indicated; UV equipment may not be shipped until the report is approved by the Engineer.
 - d. Detailed proposed procedure for conducting the functional and performance field tests.
 - e. Functional Testing Report: Provide a narrative of the Functional Testing discussing each element requiring testing, the tests performed, and the results. Functional Testing is not complete until this report is submitted and approved by the Engineer.
 - f. Performance Testing Report: Provide a narrative of the Performance Testing discussing each element requiring testing, the tests performed, and the results. This test shall be performed when the plant systems are operational and there is water available for testing. Performance Testing is not complete until this report is submitted and approved by the Engineer. As part of the UV Performance Testing, power monitoring shall be conducted by the UV Equipment Supplier to indicate total power consumptions in kW-hr, power factors, and harmonic distortions at ballast's minimum, medium and maximum power settings.
 - g. Harmonic testing results showing UV system performance measured at 50 percent, 75 percent and 100 percent of rated load with harmonics (Voltage and Current) measured to the 35th harmonic. Results shall show that the harmonics are below IEEE 519 standards with a Point of Common Coupling (PCC) at the input terminals of the UV Local Control Panel.

- h. Power Factor tests results showing that the UV reactor maintain a 0.95 power factor throughout the full operating range.
- 3. Contract Closeout Submittals:
 - a. Provide PLC and Operator Interface programs on CD in both Rockwell Automation software and PDF format.
 - 1) Fully documented ladder logic listings, function listing for function blocks not fully documented by ladder logic listings, cross-reference listings and operator interface configuration documentation.
 - b. Service records for maintenance performed during construction.

1.05 AUTHORITY HAVING JURISDICTION APPROVAL

- A. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to State of Alaska, in order to provide a basis for approval under the NEC.
- B. Materials and equipment manufactured within the scope of standards published by Underwriters Laboratories (UL), Inc. shall conform to those standards and shall have an applied UL listing mark or label. Control panels shall also be UL 508 Labeled.

1.06 OPERATION AND MAINTENANCE DATA

- A. Complete set of user manuals for all equipment, instruments and devices provided, including the programmable controllers.
- B. List of spares and test equipment for the programmable controllers.
- C. O&M Manuals: Content, format, and schedule for providing as specified in Section 01 04 00, General Requirements.

1.07 WARRANTY

- A. Provide as specified in the General Conditions and Bid Documents. Provide a fully executed Performance Bond for UV System, attached hereto, to the benefit of the Owner upon the acceptance of the UV System Performance Test. The sum of the Performance Bond shall be for the full value of all equipment, materials, testing, incidentals, and labor associated with the supply of the UV System by the Supplier. The Performance Bond shall meet all the requirements of the Contract.

1.08 EXTRA MATERIALS

A. Spare Parts: Provide the following for the UV System:

1. UV Lamps: 25 percent of total of all lamps in all reactors, with minimum of four lamps.
2. Sleeves: 10 percent with minimum of two sleeves.
3. Ballasts: 5 percent with minimum of one unit.
4. Ballast Cooling Fan: One unit.
5. Duty UV Sensor: Two (2) per reactor.
6. Reference UV Sensor: Three (3) Sensors.
7. Cable/Conductor terminations 10 percent spare, of each type used with a minimum of 4, of each type used, of sufficient length to provide for four more cable runs.
8. Complete set of cleaning system wiper rings for one reactor.
9. Complete set of special tools to disassemble or adjust the UV System.
10. Complete set of O-rings seals for one reactor.
11. One year's supply of cleaning chemicals, (if applicable).
12. Spare parts for 1 year's operation of the UVT analyzer.
13. Spare parts for programmable controllers:
 - a. One of each type rack power supply used.
 - b. One of each type PLC processor used.
 - c. One of each type of I/O module used.
 - d. One of each type of mounting rack used
14. Three (3) pairs of eye protective goggles.

PART 2 PRODUCTS

2.01 UV SYSTEM MANUFACTURER (SUPPLIER)

A. The UV System Supplier shall be:

1. Trojan Technologies.
2. Calgon Carbon Corporation.
3. Wedeco UV Technologies.
4. Aquionics.
5. Ozonia UV Products.
6. Or Approved Equal.

2.02 EQUIPMENT

A. Design Conditions:

1. The UV System shall be designed to provide a minimum of 3.0-log inactivation of Giardia and Cryptosporidium at the full range of flows and water characteristics as described below.
2. UV System Design Flow and UVT:
 - a. Flow:
 - 1) Max Flow: 18.0 mgd.
 - 2) Min Flow: 1.0 mgd.
 - b. UVT:
 - 1) Design UVT: 86.5 percent.
3. UV Dose:
 - a. Reactors must produce a Validated Dose (Dval) equal to or greater than 12 mJ/cm^2 . The calculated RED (RED) at the design conditions, with one reactor out of service, obtained using MS-2 bacteriophage must be greater than the product of 12 mJ/cm^2 and the validation factor (VF) calculated per the 2006 UVDGM.
 - b. Reactors shall be sized with space for additional lamps and ballasts to increase the Validated Dose (Dval) to 13.8 mJ/cm^2 (15% above LT2 required validated dose).
 - c. Minimum value instead of average value of S/S_0 shall be utilized when determining the Validated Dose.
 - d. The UV design dose shall be based on end of lamp life aging factor (ELAF) as provided by the UV Supplier based on the 3rd party verified lamp output as a fraction of specified new lamp output. The maximum ELAF shall be 0.90 and if no 3rd party certification is submitted the ELAF shall be 0.80. The quartz sleeve fouling factor (QSFF) for use in calculating the design dose shall be 0.90 for system with automatic cleaning and 0.80 for systems without automatic cleaning (even if a different value is used in O&M calculations as described in Paragraph c below). Therefore, the fouling-aging factor equal to the product of the ELAF multiplied by 0.90 shall be used for system design to account for sleeve fouling, lamp aging and wear. If an alternate end of lamp aging factor is used, third-party certification (signed by a registered professional engineer) of the factor and the conditions under which it was determined shall be provided in the proposal.
 - e. For O&M calculations, UV Suppliers may use an alternate, third-party certified ELAF and QSFF, if available for the proposed system. ELAF shall be in accordance with the guidelines described in paragraph b above. The maximum value for a 3rd party certified QSFF shall be 0.95 for systems with automatic cleaning and 0.85 for systems without automatic cleaning. If no 3rd party certification is submitted for QSFF, 0.90 shall be used for

- systems with automatic cleaning and 0.80 shall be used for systems without automatic cleaning. If third party certified fouling or aging factors are used, the fouling-aging factor shall be the product of the UV System's third party certified end of lamp life factor and quartz sleeve fouling factor as shown on the Bid Form. If an alternate end of lamp aging factor or quartz sleeve fouling factor is used, third-party certification (signed by a registered professional engineer) of these factors and the conditions under which they were determined shall be provided in the proposal.
- f. The UV Reactor validation shall confirm that the UV system, with one reactor out of service, is validated for all flow and UVT combinations within the following ranges:
 - 1) Flow: 1.0 to 18.0 mgd.
 - 2) UVT: 86.5 percent to 95 percent.
 - g. In addition, the UV Reactors shall be validated for a range of UVT that includes 85 percent UVT (Validated flow at 85 percent UVT may be less than 18 mgd, and may be interpolated from validation greater than and less than 85 percent but not extrapolated).
4. UV System Redundancy: The UV system equipment shall be capable of 3-log *Cryptosporidium* disinfection at the design flow at the design dose with one UV reactor out of service.
 5. Capability of Potential Expansion: The UV system proposed must have the capability of providing 15% more validated dose (total of 13.8 mJ/cm²) than what is required in Section 2.02. A.3 above by adding lamps and ballasts in the existing reactors. Adding reactors for this potential expansion requirement is not acceptable. The cost of extra lamps, ballasts and other accessories to provide this additional 15% validated dose is required in the Bid Form. The system proposed shall include space in reactors and control panels for additional lamps and ballasts and be completely wired for potential expansion. The potential expansion should only require addition of lamps and ballasts and modification of dose calculation.
 6. Capability of Future Capacity Expansion: The UV system proposed may provide additional reactor shell space and provision for other accessories to treat up to 22 mgd flow at 86.5% UVT with validated dose of 13.8 mJ/cm² (15% additional dose) in the future. This is not required, however if extra reactor is proposed to meet this future expansion requirement, the space for the extra reactor needs to be included in the UV building layout as described in Item 16 of Paragraph "Equipment Characteristics" under Article 5.2 *Technical Information Required with the Proposal* in the RFP. The additional cost of extra lamps, ballasts and

- other accessories to provide this capability shall be provided on the Bid Form.
7. The initial design flow for each UV reactor shall be no less than 6 mgd @ 86.5 percent UVT, dose for 3-log *Cryptosporidium* inactivation, and with fouled sleeves and at end of lamp life.
 8. UV Reactor Headloss: Maximum of 36 inches measured from inlet to outlet flange.
 9. Input Voltage: 480Vac plus or minus 10 percent.
- B. All reactor components shall be designed to handle pressures of up to 150 psig and shall be fully assembled and hydrotested at 1.5 times the design pressure at the factory prior to shipment.
- C. The UV System shall be comprised of the following components:
1. UV Reactors: Two (1 online + 1 redundant), three (2 online + 1 redundant), or four (3 online + 1 redundant) total. The number of reactors shall be proposed by the Supplier based on the specifics of the proposed UV equipment, the performance criteria listed above, and optimization of capital and operating costs.
 2. Local Control Panel(s) with an OIU: One per UV reactor.
 3. UV System Master Control Panel with an OIU.
 4. Number of UV Intensity sensor(s):
 - a. Per 2006 UVDGM requirements.
 - b. The system shall be able to continue providing disinfection while the UV intensity sensor is being calibrated or checked for calibration.
 5. Automatic Cleaning System, if available: 1 per reactor.
 - a. The system shall be able to continue providing disinfection while the automatic cleaning system is in operation.
 6. UV Transmittance Monitor, capable of meeting performance requirements of UVDGM.
- D. General:
1. Products that will be in contact with potable water shall have NSF 61 certification.
 2. Equipment shall fully comply with OSHA standards.
 3. Electrical material and equipment shall have UL listing or be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to State of Alaska. Complete electrical assembly shall meet requirements of National Electrical Code (NEC), National Electrical Manufacturers Association (NEMA), and National Fire Protection Association (NFPA) as well as having a UL 508 label.

4. Components, including equipment, coatings and other parts of system, shall comply with AWWA standards.

E. Terminal point connections for piping shall be ANSI standard flanges.

2.03 UV SYSTEM SUPPLIER SCOPE OF SUPPLY

A. The UV System shall be furnished by the Supplier, complete with all validated UV reactors, power supplies, line filters, transient voltage surge suppressors, ballasts/transformers, lamps, quartz sleeves, calibrated duty and reference UV sensors (validated per the 2006 UVDGM), automatic cleaning system (if applicable), cleaning chemicals, electrical interconnect wiring and control systems, UV transmittance monitor, water level and temperature sensors, air release valves, for a complete and operable system.

B. UV Reactor:

1. General Requirements:

- a. **Materials of Construction:** The UV reactor shall be welded Type 316L stainless steel, pickled, passivated, and bead blasted for uniform external finish. Each reactor shall be supplied with 150-pound ANSI flanged inlet/outlet connections. All metal parts in the reactor shall be constructed of Type 316L, pickled and passivated stainless steel. All nonmetallic materials in the reactor shall be suitable for continuous exposure to UV light.
- b. Quartz sleeves shall be high purity, rated for maximum possible UV transmittance.
- c. Each lamp shall be enclosed in an individual quartz sleeve, sealed with compressed O-rings.
- d. Each quartz sleeve shall be independently sealed within the reactor.
- e. The UV reactor shall be designed such that operating personnel at the plant can change the lamps without draining the reactor.
- f. The UV reactor shall be provided with access ports for easy maintenance of the quartz sleeves, cleaning system, and sensor calibration and maintenance.

2. UV Lamps:

- a. The UV lamps shall be medium pressure (MP) or low-pressure high-output (LPHO).
- b. The filament shall be rugged to withstand shock and vibration.
- c. The lamp bases shall be resistant to UV.
- d. The lamps shall be operated by electronic or electromagnetic ballasts with multiple power settings ranging from at least 50

- percent to 100 percent maximum power using at least 5 power steps as validated conditions.
- e. The UV lamps shall be guaranteed for a minimum number of operation hours. The guarantee shall be included on the Bid Form. At the end of guaranteed lamp life, lamp output weighted for the germicidal emission spectrum (using a weighting equivalent to that used by the Supplier's intensity sensor), shall be greater than or equal to 80 percent of new lamp output, as measured in the field by the Owner using the system's UV intensity sensors. Thus, lamp life shall be determined by field tests based on intensity sensor readings. At the highest power setting, if the intensity reference sensor reading (or average of all reference sensors) for a clean lamp is less than or equal to 80 percent of the intensity sensor reading(s) for a new lamp, then the end of lamp life shall be considered to have been achieved. If the Supplier submits an alternative ELAF, then the submitted value shall replace "80 percent" in the previous text.
3. UV Lamp Sleeves:
 - a. The UV lamp sleeves shall be manufactured from General Electric Type 214, fully annealed clear fused quartz tubing, or equal.
 - b. The open end(s) of the lamp sleeve shall be sealed by means of an O-ring and Type 316 stainless steel compression plate.
 - c. The UV lamp sleeves shall be guaranteed for a number of operation hours. The guarantee shall be included on the Bid Form. At the end of guaranteed sleeve life, sleeve output shall be greater than or equal to 90 percent of new sleeve output.
 4. Intensity Sensor(s):
 - a. Only germicidal sensors, as defined in the UVDGM, shall be allowed.
 - b. A minimum of one sensor per MP lamp and one sensor per bank of LPHO lamps shall be provided. The variation in sensor readings within each reactor shall be validated and within the requirements of the 2006 UVDGM.
 - c. Submittal for intensity sensors shall include details of sensor calibration and traceability, as well as information on uncertainty from linearity, temperature response, spectral response, angular response, and long-term drift, in compliance with the 2006 UVDGM.
 - d. Include the sensor life and sensor calibration interval in compliance with the 2006 UVDGM. The sensor calibration interval shall be the time from installation into the operating facility until a sensor check versus a reference sensor requires sensor replacement.

- e. "Wet" Intensity Sensors shall not be used.
- 5. Cleaning System, if available on proposed model:
 - a. Each UV reactor shall be equipped with an automatic quartz sleeve cleaning system.
 - b. The cleaning system shall provide cleaning abilities for the lamp sleeves and UV sensor.
 - c. Automatic cleaning systems shall be:
 - 1) Fully operational while still providing disinfection
 - 2) Complete with an automatically initiated and controlled cleaning cycle.
 - 3) Field adjustable via the operator interface. Manual cleaning system control shall be available through the operator interface.
 - d. The system shall be provided with the cleaning reagents and solutions required for initial equipment testing and equipment startup.
 - e. Cleaning reagents and solutions used shall be NSF 60 approved.

C. Control Panels:

- 1. UV Reactor Local Control Panels (LCP):
 - a. Power distribution and control for each UV reactor shall be through the associated LCP. The LCP shall house all power supplies and control hardware for the reactor.
 - b. Each UV reactor LCP provided shall have a PLC and local OIU.
 - 1) The PLC shall be interconnected to the UV system master control panel PLC through the UV treatment facility Ethernet control network.
 - 2) The OIU shall communicate with the LCP PLC using one of the following communications methods:
 - a) Serial.
 - b) Ethernet.
 - c. Reactor to its Associated LCP Cables: Supplier shall supply the cables and terminator for connecting the UV reactor to its associated LCP. Cable shall be installed by the Installing Contractor in either PVC Coated RGS conduit or liquid-tight flexible metallic conduit. Cable shall be rated for the proper power and temperature operating conditions. Cable length will be less than 50 feet per run (refer to Contract Drawings for UV equipment layout).
 - d. The LCP shall include all control power transformers for all required voltages. The Supplier shall provide a complete power distribution system for the ballasts/lamps and ancillary equipment associated with each reactor. The electrical system shall comply

- with all requirements of NFPA 70, the National Electrical Code (NEC).
- e. The LCPs of each UV system will be powered through a dedicated 480-volt, or 480/277-volt, 3-phase isolation transformer (provided by others). The UV System Supplier shall include, if necessary, any harmonic filters to limit distortion (measured on the supply side of the isolation transformer) to 5 percent THD (current) and 5 percent THD (voltage) per IEEE 519 with the Point of Common Coupling being the LCP input power terminals.
 - f. Disconnecting Means, each LCP shall be equipped with a main disconnect switch. This shall be interlocked with the door so that the door can not be opened with the disconnect switch in the closed or "ON" position, the disconnect switch shall also be capable of being padlocked in the OFF position. A circuit breaker shall be included for the main disconnect switch and ahead of each internal transformer, other circuit shall be fused per NEC requirements. All breakers shall be fully rated, series rating is not acceptable. Available fault current shall be 30,000 amps symmetrical at 480 volts.
 - g. The LCP enclosure will be located indoors and shall be minimum NEMA 12, stainless steel. The room will be ventilated and kept lower than 80 degree F during summer.
2. UV System Master Control Panel (MCP):
- a. Control of the UV treatment system shall be provided through the MCP. The following functions shall be provided through the MCP.
 - 1) UV reactor start/stop and power modulation.
 - 2) UV system communications to the Plant SCADA system.
 - b. The MCP shall have a PLC and local OIU.
 - 1) The PLC shall be interconnected to the UV reactor LCP PLCs and the treatment facility PLC through the UV treatment facility Ethernet control network.
 - 2) The OIU shall communicate with the LCP PLC using one of the following communications methods:
 - a) Serial.
 - b) Ethernet.
 - c. Disconnecting Means, each MCP shall be equipped with a main disconnect switch. This shall be interlocked with the door so that the door can not be opened with the disconnect switch in the closed or "ON" position, the disconnect switch shall also be capable of being padlocked in the OFF position. A circuit breaker shall be included for the main disconnect switch and ahead of each

- internal transformer, other circuit shall be fused per NEC requirements.
- d. The MCP enclosure will be located indoors and shall be minimum NEMA 12, stainless steel.
3. Remote Control Station (RCS)
 - a. A OIU capable of full control of the UV System shall be provided in a panel to be mounted in the basement of the UV facility. This OIU shall be programmed to be a remote access point to the system and shall have all the same functionality as the OIU in the MCP.
 - b. The RCS enclosure will be located indoors and shall be a minimum of NEMA 12, stainless steel.
 4. Control Panel General Requirements (MCP, LCPs, and RCS):
 - a. Control wiring within each panel shall be segregated within the panel based on voltage. All voltages above 120V shall be separated by a solid metal barrier. Analog and dc wiring shall be kept separate from 120V ac and 480V ac wiring. Wiring shall be, minimum, No. 14 AWG for 120V ac control wiring and No. 16 AWG for analog wiring, minimum. In all cases, size wire for connected loads and include calculations for verification, showing appropriate derating, where needed. All wiring shall have an insulation rating of 600 volts.
 - b. All panels shall be pre-wired to the maximum extent possible, requiring only field connections for power and field devices. For communication circuits, provide cable and connectors per device Supplier's recommendations. Provide measurements to certify that lead length limitations on communication circuit cabling have not been exceeded.
 - c. All control panels shall be provided with electrical safety interlocks, which prevent the panel from being opened when the main panel electrical disconnect is closed (providing power to the panel). Alternatively, an interlock may be provided to disconnect power from the panel when the door is opened. Safety interlock shall be Cutler-Hammer Flex Shaft, or equal.
 - d. Provided electrical safety interlocks shall be in full compliance with the NEC, applicable panel ratings (e.g., UL or approved by an NRTL-Nationally Recognized Testing Laboratory), local ordinances and requirements, and any additional plant safety rules.

D. Instrumentation and Controls - General:

1. The Supplier shall provide instrumentation and control for the UV System, which allows for the UV disinfection process to be fully automated and deliver the required UV dose under conditions of varying

flow rates and varying UV transmittance. Transmittance signal shall be wired directly to the UV System Master Control Panel.

2. The Supplier shall make all program functions, I/O addresses and internal registers within their PLCs accessible by Owner's SCADA system. Coordinate all register units, ranges and conventions with Owner's System Integrator to facilitate data exchange.
3. Owner's System Integrator shall be responsible for programming Owner SCADA system to provide supervisory control for all UV reactors, related valves, pumps, and instruments.
4. The Supplier shall provide the Owner with hard and electronic copies of the software installed in Supplier's PLCs, annotated to carefully detail all program instruction functions and purposes. Minimum control, monitoring and alarm signals/information are detailed in the Functional Requirements paragraph in this section.

E. Programmable Controllers:

1. UV control system (PLCs) shall be Allen-Bradley SLC 5/05 processor, as specified below.
2. Communications: On-board Ethernet port for connection to the Plant SCADA system.
3. Power Supply Modules: As required.
4. Digital Input Modules: Provide isolated inputs.
5. Digital Output Modules: Provide relay outputs.
6. Analog Input Modules: Provide 4-20 mA, isolated.
7. Analog Output Modules: Provide 4-20 mA isolated.

F. Operator Interface Unit (OIU):

1. Panel-mounted graphical operator interface capable of bi-directional communication with PLC-based control system.
2. An OIU shall be mounted in each UV reactor local control panel, in the UV system master control panel and in the UV System remote control station.
3. Include all cables necessary to interface with the PLC control system and to a personal computer.
4. All OIUs shall be AB Panel View Plus 1000.

G. Functional Requirements:

1. The UV Control System shall calculate the UV dosage based on validated sensor setpoint or dose calculation. The UV reactor flow shall be provided to the LCP from the flowmeter upstream of the UV reactor (provided by others). The UV transmittance signal shall be provided by

- the UV transmittance analyzer. UV intensity sensors located within the UV reactor shall accurately sense any change in lamp power and compensate for any reduction in the UV-C output due to sleeve fouling and lamp aging. For emergency operation, an alternative manual control system shall be available which shall be based on assumed UVT and end of life power or user selected inputs.
2. The UV Control System shall monitor for equipment failure or malfunction and shut down the reactor in response to such a failure. Each control panel face shall be provided with an emergency STOP pushbutton, which upon activation will shut down the reactor and send the shutdown signal to the Plant Control System.
 3. The UV System MCP shall send a signal to the Plant SCADA with the maximum flow per reactor based on the current UVT and validated limits.
 4. For plant startup, the Plant SCADA System shall provide a signal to the UV System MCP to start the correct number of UV reactors based on an operator entered flow setpoint during a plant start command and the maximum flow per reactor based on the signal from the MCP.
 5. A permissive to start a UV reactor shall be a start command from the Plant SCADA and the position of the UV Reactor influent and cooling water drain valves (if necessary). If the influent and cooling water drain (if necessary) valves for the reactor are in the OPEN position, the UV reactor shall be allowed to warm-up. The MCP shall determine which reactor(s) to start. An automatic rotation process shall be used.
 - a. When a reactor start command is received, the UV system MCP will open the UV reactor cooling water drain valve (if necessary) prior to warming up the UV Reactor.
 - b. Once the UV Reactor is ready, the UV system MCP will send a Reactor ready signal to the Plant SCADA system and the Plant SCADA system will open the UV Reactor isolation valve.
 - c. The Plant SCADA system will send the UV System MCP the UV Reactor flow control valve position and the UV System MCP will close the cooling water drain valve (if necessary) on receipt of the UV Reactor flow control valve open signal.
 - d. If the UV Reactor flow control valve fails to open within an appropriate time as determined by the Supplier, the UV Reactor shall shutdown and the MCP shall cool the reactor down through the normal cool-down sequence.
 6. During normal operation, the Plant SCADA system will monitor the plant flow and determine the number of UV reactors required based on the maximum flow at the current UVT. If a second UV reactor is required, the Plant SCADA system will request an additional UV reactor from the MCP.

- a. When a reactor start command is received, the UV system MCP will open the UV reactor cooling water drain valve (if necessary) prior to warming up the UV Reactor.
 - b. Once the UV Reactor is ready (warmed up), the UV system MCP will send a Reactor ready signal to the Plant SCADA system and the Plant SCADA system will open the UV Reactor isolation valve.
 - c. The Plant SCADA system will send the UV System MCP the UV Reactor flow control valve position and the UV System MCP will close the cooling water drain valve (if necessary) on receipt of the UV Reactor flow control valve open signal.
7. If two UV reactors are on-line and the plant flow drops so that only one reactor is needed, one reactor will be taken off-line.
- a. The UV System MCP will send the UV Reactor minimum validated flow at the current UVT to the Plant SCADA System.
 - b. If the UV Reactor Flow drops below 125% of the minimum validated flow at the current UVT, the Plant SCADA System will close the UV Reactor flow control valve.
 - c. Upon receipt of a UV reactor flow control valve closed signal, the UV System MCP will open UV Reactor cooling water drain valve (if necessary) and begin the UV Reactor cool-down period.
 - d. At the completion of the UV Reactor cool-down period the UV System MCP will close the UV Reactor cooling water drain valve (if necessary).
8. At least one reactor shall be in standby under all anticipated conditions, as defined by the design setpoints.
9. Control and monitoring of the valves, pumps, and other devices external to the UV LCPs will be provided by the Owner's System Integrator. UV supplier shall coordinate details of external interfacing and communications with them.
10. As a minimum, the UV Control System shall provide the following process monitoring and status information to the Plant Control System:
- a. Status of the UV Reactor: OFF, Warming Up, Ready (no flow), ON (water flowing), and Cooling Down.
 - b. Cumulative number of ON/OFF cycles for the UV lamps.
 - c. Run time for each lamp.
 - d. ON/OFF status for each lamp.
 - e. Reactor power setting.
 - f. System Ready: UV Reactor is ready to operate and no faults or unusual conditions exist.
 - g. UV dosage.
 - h. UV transmittance.
 - i. Power draw.

11. As a minimum, the UV Control System shall provide the following alarms to the Plant SCADA System:
 - a. Lamp failure.
 - b. Ballast failure.
 - c. Lamp run time hours exceeded.
 - d. Multiple lamp failure.
 - e. Multiple ballast failure.
 - f. Ballast high temperature.
 - g. Lamp calibration check required.
 - h. High chamber/lamp temperature.
 - i. Low UV intensity.
 - j. GFI breaker trip.
 - k. Low reactor water level.
 - l. Low UV calculated dose.
 - m. Cabinet high temperature.
 - n. Dose communication time out.
 - o. UV sensor signal loss.
 - p. UV sensor signal saturated.
 - q. Calibrate UV sensor.
 - r. Loss of UVT signal.
 - s. Lamp start-up failure.
 - t. High/Low flow rate.
 - u. SCADA communication fail.
 - v. Control panel emergency stop.
 - w. Wiper jam/fault.
12. The UV Control System shall receive the following commands from the Plant SCADA System:
 - a. UV reactor required to be put IN-SERVICE.
 - b. Fault RESET.
 - c. UV reactor remote ON/OFF.
 - d. Influent valve OPEN/CLOSED.
 - e. UV Reactor effluent valve position.
13. The UV Control System shall receive the following process monitoring information from the Plant SCADA System:
 - a. UV reactor flow.

H. Field Instruments:

1. UV Transmittance Analyzer:
 - a. Provide a continuous reading, flow-through UV transmittance spectrophotometer suitable for measurement of UV transmittance of the chlorinated water. The unit shall be self-contained and shall include sensor and analyzer. The sensor shall consist of a UV light source, filter, sample cell, and detector.

- b. The analyzer shall be suitable for a 120V ac power supply and housed in a NEMA 4X enclosure.
- c. The analyzer shall comply with the accuracy, uncertainty, and reliability requirements defined in the 2006 UVDGM.

2.04 SCOPE OF SUPPLY FOR INSTALLING CONTRACTOR

- A. Installing Contractor shall be responsible for supplying and installing all the necessary materials, equipment and appurtenances not supplied as part of the scope of supply for the UV System, but required for a complete, functional and operational UV System. Including, but not limited to:
 - 1. Supports required to install the UV reactors that are not supplied by the UV System Supplier (supports not directly connected to the UV Reactors, i.e. pipe supports for upstream and downstream piping whether it supports the UV reactor or not. All structural calculations shall meet the requirements of the local building code, be reviewed by the UV System Supplier and be signed by a registered Professional Engineer in the State of Alaska with a Structural or Civil discipline.
 - 2. All the hardware, fasteners, anchor bolts, nuts, plates and angles necessary for the installation of the UV System. All hardware, fasteners, anchor bolts, nuts, plates, angles, etc. shall be Type 316 stainless steel.
 - 3. All mating flanges, insulating flanges, couplings, gaskets, bolts, nuts, and all necessary piping specialties to install the reactors, and analyzers, supplied by the UV System Supplier. Mating flanges shall be as required in the pipe schedule. All bolts, nuts shall be Type 316 stainless steel. Gaskets shall be EPDM.
 - 4. All conduit, fittings, supports, hubs and wiring including wire terminations and terminators necessary for the complete installation of the UV reactors, LCPs, instruments, analyzers, devices and OUIs supplied as part of the UV System.
 - 5. All the equipment supports, u-bolts, and all necessary hardware to install all the ancillary equipment supplied by the UV System Supplier. Ancillary equipment shall include UVT analyzers, control and power panels, and other equipment needed for a fully functional and validated UV system.
 - 6. Provide on-site assistance to UV System Supplier during Functional Testing as defined in the Functional Test Procedures developed by the UV System Supplier and approved by the Engineer.
 - 7. Provide on-site assistance to UV System Supplier during Performance Testing as defined in the Performance Test Procedures developed by the UV System Supplier and approved by the Engineer.

- B. Installing Contractor shall refer to the UV Supplier's Submittal's for additional requirements.

2.05 WORKSHOPS AND MEETINGS

- A. The Supplier shall provide the following engineering and consultation services in support of Engineer's design of the final Contract Documents for the Water Treatment Plant.
 - 1. Provide one (1) engineering consultation site visit by Supplier's Project Manager to the Engineer's Bellevue, Washington office for a period of one full working day (travel time excluded) to attend a design workshop. The purpose of this workshop will be to provide engineering support, especially in instrumentation and control and system layout, to the design team. All decisions of whether to accept or reject Supplier recommendations shall reside entirely with the Owner and Engineer.
 - 2. In addition to the site visit, the Supplier shall provide an anticipated maximum of 40 hours of remote engineering support to the Owner and Engineer up through issuance of the final Contract Documents. This shall also include documentation including equipment drawings noting connections and space requirements and specification of Supplier-designed components and review of building and equipment layouts to meet Supplier's installation requirements.
 - 3. Supplier shall provide an anticipated maximum of 60 hours of remote assistance to the Owner and Engineer in obtaining Alaska Department of Environmental Conservation Certificate to Construct prior to start of construction and Certificate to Operate at completion of construction for the UV system.
- B. Supplier shall attend a 2-day coordination meeting specified below at the Owner's facility, prior to start of programming.
 - 1. Supplier shall coordinate with the Owner's Systems Integrator (OSI) for the configuration and programming of the SCADA OSI.
 - a. Supplier shall attend a SCADA development workshop at the Owner's facility to create preliminary sketches (developed by System Integrator) for all displays that will be developed for the project. This workshop shall include:
 - 1) Overview display design.
 - 2) Process graphics.
 - 3) Display paging and navigation.
 - 4) Equipment control features; pop-up windows.

- 5) Data entry through OIU.
 - 6) Coordination issues with plant-wide SCADA.
 - 7) Color conventions and symbols in compliance with Owner's standard.
 - 8) Define all Alarms and security setup.
 - 9) Portability of database and graphics into plant-wide SCADA i.e., ensure no conflicts in databases.
 - 10) Memory mapping between local PLCs, OIUs and plant-wide SCADA.
 - 11) The Owner/Engineer shall be allowed to request changes at this point without any additional cost to the Owner.
2. Provide recommended overview display graphic. This can be in the form of a sketch or typical graphic and should convey to Owner's System Integrator what information is important to display and monitor concerning system operation.
 3. Provide recommended detail display graphics (if any). Sample graphics may include more detailed monitoring screens, data displays, increased process or equipment detail vs. the overview graphic, etc. Information is expected to be in the form of a sketch or typical graphic display, similar to above.
 4. Provide memory mapping to clearly identify all registers to be used for external monitoring and control with a detailed description of the meaning and function of each register, including values expected, minimum and maximum values, engineering units of value, etc. For Boolean registers, clearly define the meaning of each state.
 5. Provide recommended list of points and values to alarm, including recommended alarm set points on analog values.
 6. It is the responsibility of the Supplier to inform the Installing Contractor that the above workshops must be included in the schedule. It is the responsibility of the Installing Contractor to schedule the above workshops with the Owner in a timely manner. The Installing Contractor must also include the participation of the SCADA system integrator in the above workshops.

2.06 ACCESSORIES

- A. Equipment Identification Plate: 16-gauge stainless steel, with 1/4-inch engraved block type black enamel filled equipment identification number and letters shown in the Contract Drawings. Mount securely in a readily visible location. Identification Plates shall be supplied and installed by the Installing Contractor. Identification Plates shall be provided for all reactors and control panels.

- B. Space Heaters: Thermostatically controlled. Locate in each panel, for operation from 120-volt power source derived internal to LCP.
- C. Lifting Lugs: For all pieces of equipment weighing over 100 pounds.
- D. Anchor bolts shall be Type 316 stainless steel, supplied and installed by the Installing Contractor.

2.07 SOURCE QUALITY CONTROL

- A. All UV System equipment and unit specific controls shall be factory tested at the Supplier's testing facility before shipping. Factory testing must be approved by the Engineer before shipping.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installing Contractor shall install products in conformance with UV System Supplier's shop drawings and installation instructions.
- B. Installing Contractor shall energize all space heaters as soon as the equipment arrives on site.
- C. Installing Contractor shall provide all interconnecting structures, equipment, piping, electrical and instrumentation work, finish painting, and appurtenances as shown on the Drawings and UV System Supplier's approved drawings, to achieve a complete and functional system.
- D. Installing Contractor shall provide foundation pads for products as shown. Verify exact dimensions and configuration of all pads, including penetrations, with UV System Supplier's furnished product shop drawings.
- E. Anchor Bolts:
 - 1. Where required, Installing Contractor shall provide anchor bolts, fasteners, washers, and templates needed for installation of UV Equipment.
 - 2. Size and locate anchor bolts in accordance with UV System Supplier's product shop drawings, calculations and installation instructions.
- F. Installing Contractor shall properly align, plumb and level, with no stresses on connecting piping or conduit all mechanical and electrical equipment.

- G. Installing Contractor shall verify operability and safety of electrical system needed to operate equipment. Check electrical system for continuity, phasing, grounding, and proper functions.

3.02 TESTING

- A. The UV System Supplier shall be required to complete several required tests. These tests shall include:

1. Factory Test.
2. Functional Test.
3. Performance Test.

- B. Factory Test:

1. The UV System Supplier shall be responsible for the Factory Test that shall be conducted by the UV System Supplier, after the shop drawings are approved and before system is shipped to the site.
2. The UV System Supplier shall factory test all major system components of the UV System during a single test session for compliance with the construction and functional requirements specified herein.
3. The UV System Supplier shall submit a Factory Test Plan, for approval, to the Engineer that will demonstrate the full operability of UV Reactors. The test plan shall include, but is not limited to the testing of the delivery of the UV dosage, the lamps, the intensity sensors, the cleaning system, local control panel for each of the reactors, and the instrumentation and controls for each of the reactors, and operator interface units. The scope of the Factory Test shall demonstrate that each individual component of the UV System operates as specified.
4. After approval of the Factory Test Plan by the Engineer and Owner, the testing shall be performed and may be witnessed by the Engineer and Owner at the UV System Supplier's testing facility. Engineer and Owner's travel expenses to factory testing will be at Owner's expense.
5. The UV System Supplier shall submit a Factory Test Report discussing the tests performed, items witnessed, and the results for the approval of the Engineer and Owner upon conclusion of the Factory Test.
6. The UV System shall not be shipped until the Factory Test Report is approved.

- C. Functional Testing:

1. The first on-site element of the required testing shall consist of Functional Testing for all UV reactors. For the Functional Testing, the Installing Contractor and the UV System Supplier shall verify operation

- of all system components, all control system functions, all system alarms, and communication links. The Functional Testing shall also include verifying the operation of the control system for local and remote operation. The lamp output shall be changed to verify that the sensor outputs are sufficiently sensitive to pick up the decrease in UV intensity. Functional testing shall demonstrate impacts of loss of UV transmittance signal, UV intensity signal, and flow rate signal. In addition the accuracy of the reference sensors shall be checked against the other reference sensors, and each duty sensor will be checked against a reference sensor. Any sensor not in compliance with UVDGM requirements shall be replaced.
2. The UV System Supplier shall inspect the installed UV System for proper alignment, proper equipment supports, correct operation, proper connection, and satisfactory function of all components. All signals shall be verified, and all alarms shall be tested.
 3. Functional testing shall be performed in coordination with the Owner's system integrator. UV System manufacturer shall test each control signal required to be communicated between the UV control system and the plant SCADA system for proper operation.
 4. The UV System Supplier shall approve the installation and provide written certification that the system components have been installed properly, and are ready for operation. The Installing Contractor shall notify the Engineer and Owner of Functional Testing schedule to allow the Engineer and Owner to witness testing.
 5. The Installing Contractor shall ensure all ancillary systems (valves, control system, etc.) required for Functional Testing are available for use.
 6. UV System Supplier shall coordinate with OSI for control system operation during functional test and shall lead the testing.
 7. The proposed Functional Testing procedure shall be developed by the UV System Supplier, submitted to the Engineer and Owner, and reviewed by the Owner and Engineer before scheduling and performing Functional Testing. In the case of a nonconforming system, as determined by the Engineer and Owner, advancement to Performance Testing shall not commence until the UV System Supplier has made, at no additional cost to the Owner or Installing Contractor, such adjustments and modifications as are necessary to correct the system, and has demonstrated this by repeating the Functional Testing until satisfactory.
 8. The UV System Supplier shall prepare a Functional Testing Report and shall submit two electronic and two hard copies of the report to the Engineer within 14 days of completion of the Functional Testing.

9. Both the UV System Supplier and the Installing Contractor shall be onsite for the duration of the Functional Testing.

D. Performance Testing:

1. The Performance Testing shall include headloss tests, power consumption tests, UVT and intensity sensor calibration checks, power factor measurements, UV System dose (based on UV System control panel readings and calculations), and operation in auto mode. The UV System Supplier shall develop performance test procedures, which shall be approved by the Engineer prior to testing. The Performance Testing shall proceed for a minimum of 3 days continuous operation.
2. Performance testing shall verify system operation without malfunction for a period of 3 continuous days. Any malfunction during this period shall be addressed and the 3-day test shall be restarted until full system performance is approved by the Owner and Engineer.
3. Performance testing shall be completed on all UV reactors. The system must operate for all 3 days, but individual reactors may go in and out of service as needed. The system will be challenged to verify correct operation (i.e., reactor failure or loss of UVT signal).
4. No off-specification operations shall be allowed during the 3-day Performance Test.
5. The test will be conducted by the UV System Supplier and Installing Contractor under the observation of the Engineer. The Owner may obtain the services of an independent consultant or testing laboratory to observe and verify procedures and test results at the option and cost of the Owner.
6. Owner will provide power and process water required to operate the system during the performance test.
7. At least 30 days prior to the proposed testing date, Installing Contractor shall notify the Engineer and UV System Supplier of the testing date and shall submit a report from the UV System Supplier detailing the proposed performance testing equipment and schedule. This submission shall include the following:
 - a. Instruments to be used for measurements.
 - b. Relative precision of the instruments, and methods of calibration.
 - c. Data sheets for recording measurements.
 - d. Procedures for making calculations, including example calculations.
 - e. Procedures for documenting compliance.
8. UV System Supplier shall provide all instruments and other supplies necessary for conducting the tests.
9. UV System Supplier shall collect all data and compile the performance test results, including the calibration data, and submit four copies of the

- report to the Engineer. Within 14 days after completion of the performance test, two hard copies and two electronic copies of the raw data shall be provided to the Engineer.
10. UV System Supplier shall use portable, factory calibrated kilowatt hour meters with accuracy of 0.25 percent of reading. Factory calibration reports shall be provided to the Engineer for all power meters not less than 10 days prior to the scheduled performance tests.
 11. The flow and water temperature shall be measured with the installed Water Treatment Plant instruments. These instruments shall be calibrated, but readings will not be corrected to account for errors inherent in the equipment. Direct readings will be used.
 12. Except as specifically required, herein, the system shall be operated during the performance tests as intended for normal, long-term operation under the conditions specified.
 13. UV System Supplier and Installing Contractor shall observe the requirements of the Operation and Maintenance Manual, the Plant Safety and OSHA rules at all times.
 14. The power draw and power factor of the system shall include all reactors, sensors, control panels, and other appurtenances.
 15. Power draw shall be measured for each reactor individually and shall be based on each individual reading.
 16. Perform sensor calibration checks of duty and reference sensors and provide uncertainty calculations based on field evaluations. Compare sensor uncertainty based on field evaluations with that provided in the third-party validation report and compliance with the 2006 UVDGM requirements.
 17. Perform UVT monitor calibrations and reading stability checks, with the use of the Owner's laboratory spectrophotometer, and prepare documentation on its compliance with the 2006 UVDGM requirements.
 18. Both the UV System Supplier and the Installing Contractor shall be onsite for the duration of the Performance Testing.
 19. With plant load connected to normal utility source, measure the following to show parameters within specified limits:
 - a. Total and individual current harmonic distortion (up to and including 35th harmonic) at location identified as PCC, under the following load conditions:
 - 1) UV reactors operating at full load and half load.
 - 2) Half of the specified UV Reactors operating at full load and half load.
 - b. Power factor at input side of each UV Reactor. Documented verification that power factor is maintained at 95 percent as power setting goes down from 100 percent to 50 percent.

- c. Test Equipment: Use Dranetz, Model No. 626-PA, harmonic distortion monitor and Series 626 disturbance analyzer or equivalent instrument to document results.
20. With plant load connected to standby power source, measure the following to show parameters within specified limits:
- a. Total and individual current harmonic distortion (up to and including 35th harmonic) at location identified as: PCC, with UV Reactors running at:
 - 1) Full load.
 - 2) Half load.
 - b. Test Equipment: Use Dranetz, Model No. 626-PA, harmonic distortion monitor and Series 626 disturbance analyzer or equivalent instrument to document results.

3.03 TRAINING

- A. UV System Supplier shall provide a minimum of the following training classes to the Owner at the Owner's project site (note the times stated below exclude travel time):
 1. 2 person-days (16 hours) of operational training.
 2. 2 person-days (16 hours) of maintenance training.
 3. 4 days of Owner support through two trips in the first 12 months of operation. Support shall be provided at Owner's request.
- B. UV System Supplier shall provide the Owner with written training course outlines 1 month before the first training session. Owner shall be able to comment on course material, and UV System Supplier shall revise as requested.
- C. Training times shall be as determined by Owner. Session schedules shall be adjusted to account for interruptions in operability of equipment.
- D. The Owner may choose have the training sessions video recorded at the owner's discretion and expense.

3.04 INSTALLATION ASSISTANCE AND TESTING

- A. All times stated below exclude travel time.
- B. UV System Supplier shall provide a minimum of 8 days in two separate trips (two 4 day trips) for installation assistance to the Installing Contractor. The UV System Supplier shall coordinate the site visits with the Installing Contractor. UV System Supplier shall provide a Manufacturer's Certificate of Proper Installation.

- C. UV System Supplier shall provide a minimum of 6 days in two separate trips (two 3 day trips) for Functional and Performance Testing. The UV System Supplier shall coordinate the site visits with the Installing Contractor and Owner.
- D. Owner will approve schedule for all trips.

END OF SECTION