State of Alaska
Department of Environmental Conservation
Village Safe Water Program
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November 22, 2021

To: Vendor List

Re: Amendment 2
ITB 22-VSW-TLT-032
Packaged Water Treatment System
ITB Due Date: December 6, 2021 @ 10:00 AM AST

The following are vendor questions and the department's response:

1. Vendor: WesTech is named to supply the Water Boy package treatment unit which consists of flocculation/clarification/filtration processes however, we can't bid the Water Boy equipment as the specifications currently stand. The specifications are currently written around AWC's ST package treatment system which while similar to the Water Boy in process is much different in terms of design. In addition, the Water Boy is our very first package plant designed back in the 60s/70s and as such has some unique design features that don't quite line up with modern requirements. See below on where the Water Boy does not meet the specification requirements:
    a. First and likely foremost is regarding the NSF 61 certification requirement found in Part 2.1.B - Products that will be in contact with process water (raw, treated, chemical batching) shall have NSF 61 certification. No exceptions. The Water Boy tube modules are not NSF 61 certified and cannot be exchanged with another tube module as this product uses a unique 7.5 degree module design made from food grade ABS and there is no NSF 61 certified material available to construct these modules from. See addendum revision to question 3.
    b. Part 2.6.F.3 – states there should be two stages of mechanical flocculation, the Water Boy unit only has one stage of mechanical flocculation Addressed via addendum.

c. Part2.6.F.4.a – states the tubes need to be fabricated from 20-mil PCV where the Water Boy has tube modules that are only made from ABS plastic at a minimum of 10-mil– Addressed via addendum.
d. Part2.6.F.4.a – states there should be an operator adjustable sludge wasting system. There is no sludge blanket developed in the Water Boy clarification section. Due to the 7.5 degree tube modules the sludge developed is stored within the tubes and then flushed out to waste during a filter backwash. – Addressed via addendum.
e. Part2.6.F.5 – states there should be a wash trough with adjustable weirs, this is not available on the Water Boy. – Addressed via addendum.
f. Part2.6.F.6 – states the filter underdrain shall be either a block or plenum w/ nozzle design, neither of these designs would be applicable to a Water Boy as we use a Sch. 80 PVC header & lateral design. – Addressed via addendum.

Department: See attached updated specification 46 07 13. The following changes are required:

a. Revise and add 46 07 13, Paragraph 2.1.B.: "Products that will be in contact with process water (raw, treated, chemical batching) shall have NSF 61 certification **unless otherwise noted**. No Exceptions."
b. Revise 46 07 13, Paragraph 2.6.F.3.a.: "Chambers: Minimum total retention time of 40 minutes at design flow rate through **one or** two chambers."
c. Revise and add 46 07 13, 2.6.F.4.a.1): "**or minimum 10-mil food grade ABS. If ABS is used, submit food grade certifications**."
d. Revise 46 07 13, Paragraph 2.6.F.4.c.: **"Sludge Wasting: manufacturer's standard process."**
e. Delete 46 07 13, Paragraphs 2.6.F.4.c.1) through 3).
f. Revise 46 07 13, Paragraph 2.6.F.5.b.: **"Provide wash-water through manufacturer's standard weir configuration."**
g. Revise 46 07 13, Paragraph 2.6.F.5.c.: **"Provide manufacturer's standard backwash process."**
h. Delete 46 07 13, Paragraphs 2.6.F.6.c and 2.6.F.6.d. and add new Paragraph 2.6.c.: **"Shall be manufacturer's standard."**

Bidders must acknowledge this amendment on Submittal Form A – Bidder Information. A bid that doesn't acknowledge this amendment may be found non-responsive and rejected.

Evan Patterson

Procurement Specialist

SECTION 460713
PACKAGED WATER TREATMENT EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes work necessary to furnish a packaged water treatment system with a treated water capacity of 20 gpm for treatment of iron, manganese, and arsenic laden groundwater with high organics and color. The water treatment equipment will be located in a new modular facility located adjacent to the water wells and a new water storage tank.

B. The water treatment system will treat water from an existing groundwater well. After treatment the water will be disinfected and conveyed to a water storage tank and then to the distribution system. Settled solids and filter backwash water will be conveyed to an on-site lift station for conveyance to the Community's sewage lagoon.

C. It is the intent of this specification that a complete, pre-fabricated, packaged water treatment system be supplied by a single supplier and that it shall include, but not be limited to, the following components, designated with an * on the Drawings:
   1. Raw, backwash, and treated water flow meters
   2. Oxidation detention tank
   3. Factory-built, welded-steel-packaged water treatment system, with necessary tankage and equipment, capable of treating groundwater to meet potable standards.
   4. Oxidant blending and dosing
   5. Coagulant blending and dosing
   6. Flocculation
   7. Clarification
   8. Gravity filter
   9. Blowers
   10. Backwash pump
   11. Chlorine disinfection
   12. Filter piping manifolds and valves
   13. Allen-Bradley PLC based automatic Process control system
   14. J-Boxes for wire terminations on treatment train
   15. Required instrumentation for process control
   16. Grating
   17. Handrail and access ladder
   18. Bolts and lifting lugs

D. Work by the Supplier includes:
   1. Submission of Shop Drawings, Operation and Maintenance Manuals, and other descriptive information.
   2. Fabrication of the equipment.
   3. Factory test of each unit to be supplied.
   4. Delivery of the equipment to Bethel, Alaska.
   5. Installation assistance, quality control, quality assurance, and inspection.
   6. Onsite performance testing, equipment startup, and training of the Owner's staff.

E. The Supplier shall manufacture and supply the equipment. The Contractor will integrate the equipment into the water treatment facility.

F. The following system components will be designed by the Engineer and installed by the Contractor:
   1. Raw water supply and yard piping
   2. Water treatment plant building
   3. Water storage tank and distribution pumping
   4. Connecting piping and power to the packaged water treatment system, chemical feed systems, blower, and backwash pump.

1.2 DEFINITIONS

A. ADEC or DEC: The Alaska State Department of Environmental Conservation.

B. Clarification: Treatment process that removes suspended solids from water. Clarification may be accomplished by gravity settling, in which solids settle to the bottom of a settling tank, ~~or by adsorption bed clarification, in which solids are captured by a bed of media suspended in the tank from water flowing upward.~~

C. Coagulation: Treatment process that causes colloid-size suspended solids in source water to coalesce into clumps with sufficient mass to settle under the influence of gravity.

D. Coliform Bacteria: General class of bacteria used as indicators of potential contamination of drinking water.

E. Contractor: General contractor responsible for delivery and assembly of the WTP building, transport of the packaged water treatment system from Bethel to Tuluksak, AK, and installation of the equipment in the WTP Building.

F. Design Flow: Required treated water flow rate.

G. Disinfection: Destruction of bacteria and protozoa and deactivation of viruses by the action of a chlorine solution.

H. Filtration: Treatment process that removes small, suspended solids after the clarification process by means of granular media.

I. Flocculation: A process wherein colloids come out of suspension in the form of floc or flakes by the addition of a clarifying agent.

J. Good: All equipment and materials supplied under this Specification.

K. HMI: Human machine interface.

L. Installer: Supplier provided field technician for installation assistance, on site performance testing, equipment start up and training of Owner’s staff.

M. Modular Building Manufacturer: The vendor responsible for fabrication of the water treatment plant building including the plumbing, electrical, and control systems inside the building.

N. NSF: NSF International, an independent, non-profit organization which provides voluntary consensus standards, product testing procedures, and certification services in the areas of public health, safety, and the environment.

O. Supplier: Packaged water treatment equipment supplier.

P. Raw Water: Water supplied from the groundwater well to the water treatment plant.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data for system materials and component equipment.

B. Submittals required with Bid Documents:
   1. Submittals provided with Bid shall be for the purpose of advancing the design of the WTP to facilitate the project schedule.
      a. Exceptions: Identify any exceptions to these Contract Documents.
      b. Drawings: provide drawings showing WTP equipment plan, minimum space between units or equipment and minimum separation clearances on all sides.
      c. Preliminary Shop Drawings:
         1) Equipment dimensions, weights (shipping and installed), and connection points.
         2) Process and Instrumentation Diagrams.
            a) Details of backwash and solids removal frequency, duration, and flow rates.
         3) Total connected electrical load in kW, kVA, and amperes for complete system.
         4) Location of single point of connection for power supply to the packaged water treatment system.
      d. Process Control Narrative.

C. Submittals required after Notice of Award:
   1. Detailed Shop Drawings:
      a. Final complete shop drawings of all water treatment system equipment.
      b. System materials and component equipment, including detailed wiring and control diagrams.
      c. Fabrication, installation, anchoring, fasteners, and other details.
   2. Electrical:
      a. One-line diagram(s), including transformers, drives, panelboards, meters, and protective devices.
      b. Panel elementary diagrams of prewired panels, including control devices and auxiliary devices.
      c. Wiring and control diagrams of systems and equipment.
      d. Interconnecting wiring diagrams. Include conductor size, type, and number between all electrical and control components. Include conduit size and type.
      e. List number and capacity of transformer(s), if any.
      f. List of special motor features being furnished (i.e., space heaters, altitude corrections, and thermal protectors).
      g. Complete motor rating for motors 3 horsepower and larger, including motor no-load, starting, and full-load current at rated voltage; full-load speed and full-load

current at 100 percent voltage; motor efficiency and power factor at 1/2, 3/4, and full load at rated voltage.

3. Instrumentation and Control:
   a. Process and instrumentation diagrams and description of functions monitored, controlled, and alarmed.
   b. Describe instrumentation and control components and features including software, hardware, control features, remote system capabilities, monitoring, data storage, and alarms. Provide examples of HMI screens that have been provided on previous projects. Provide a block diagram of proposed control system including HMI(s), PLC(s), and data highway.
   c. Software Description: Provide narrative description of control system, logic diagrams, summary of control functions, summary of monitoring functions, description of alarms, and other information to describe control system.
   d. Copy of all PLC programming.
4. Product Data Sheets for all components used in the packaged system.
5. Paint data sheets for prime and finish coating systems for each equipment item.
6. NSF 61 certifications for all materials or coatings in contact with water (raw, treated, and chemical batching).
7. Commissioning Plan.
8. Training Plan.
9. Operating and Maintenance Manuals.
10. Crating: Provide an electronic copy and one paper copy of the shipping index for all crates to be delivered. Include in the shipping index the actual scale weight, cube, dimensions, individual piece numbers for all crates, and a detailed listing of the contents of each crate.
11. Manufacturer's Certificate: Products meet or exceed specified requirements.
12. Manufacturer Instructions: Installation requirements, including storage and handling procedures, anchoring, and layout.
13. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
14. Field Quality-Control Submittals: Indicate results of Supplier-furnished tests and inspections.

D. Qualifications Statements:

1. Qualifications for manufacturer, installer, and licensed professional.
2. Manufacturer's approval of installer.

1.4 CLOSEOUT SUBMITTALS

A. Final O&M Manuals: Include updates to any items that were modified during fabrication, installation, and start up.

1.5 QUALITY ASSURANCE

A. The water treatment system equipment shall be the product of a recognized manufacturer whose personnel have been regularly engaged in the design and manufacturing of water treatment systems for at least five years. The manufacturer must be able to demonstrate experience with the design, fabrication, supply and successful operation of at least five systems of similar

process and capacity within the last two years. The manufacturer/supplier shall demonstrate upon the request of the engineer that:

1. They maintain a reasonable stock of spare parts for this equipment.
2. They employ sufficient qualified technical personnel to insure adequate servicing and operational control advice covering chemical, hydraulic, mechanical, and electrical optimization of water treatment procedures and practices.

B. Welders: AWS-certified within previous 12 months.

1.6 WARRANTY

A. Furnish five-year manufacturer's warranty for packaged water treatment equipment.

B. Furnish one-year manufacturer's warranty for chemical metering equipment.

PART 2 - PRODUCTS

2.1 GENERAL

A. The water treatment system shall be provided complete, with all necessary components, pumps, valves, instruments, control systems, accessories, and appurtenances to make a complete and operable system.

B. Products that will be in contact with process water (raw, treated, chemical batching) shall have NSF 61 certification. ~~No~~ exceptions.

unless otherwise noted

2.2 PERFORMANCE AND DESIGN CRITERIA:

A. Flow Rate: 25 gpm.

B. 2021 Average Daily Production: 5,150 gallons per day.

C. 2041 Piped System Average Daily Production: 42,830 gallons per day, with second treatment skid.

D. Finished Water Quality Goals:

1. Turbidity (NTU): < 0.1 NTU.
2. Color (TCU): < 10 CU.
3. Total Organic Carbon (TOC, mg/L): 46.3% Removal
4. Iron (mg/L): < 0.2 mg/L
5. Manganese (mg/L): <0.03 mg/L.
6. Arsenic (µg/L): <5 µg/L.
7. pH: 6.5 – 8.5.
8. Total Trihalomethanes (TTHM µg/L): <60 µg/L.
9. Haloacetic Acids (HAA5, µg/L): <40 µg/L.

2.3 SERVICE CONDITIONS

A. Influent Water Quality Conditions:
   1. Raw water will be pumped to the WTP and supplied at an influent pressure of 15 psi.
   2. Typical raw water quality is:
      a. Arsenic: 36.3 µg/L.
      b. Iron: 6.99 mg/L.
      c. Manganese: 0.331 mg/L.
      d. Total Organic Carbon: 47.1 mg/L.
      e. Dissolved Organic Carbon: 44.8 mg/L.
      f. True Color: 65 PCU.
      g. pH 7.06
      h. Turbidity 0.85 NTU.
      i. Temperature: 35 F, preheated to 45 F.

B. The WTP equipment will be located indoors with the room temperature between 60 and 70 F.

C. Treatment Chemicals:
   1. Pre-Oxidant: 1% Potassium Permanganate dosed at 5 mg/L.
   2. Coagulant: 2%, dosed at 10 mg/L.
      a. 80% Nalco 8185 (Aluminum Chlorohydrate).
      b. 20% MagnaFloc LT27 (anionic polymer).
      c. Diluted to 2% solution.
   3. Disinfectant: 2% Calcium Hypochlorite dosed at 1.5 mg/L.

2.4 MATERIALS

A. Equipment shall fully comply with OSHA standards.

B. Electrical material and equipment shall have NRTL listing wherever standards have been established by that agency.

C. Complete electrical assembly shall meet requirements of National Electrical Code (NEC), National Electrical Manufactures Association (NEMA), and National Fire Protection Association (NFPA) and be listed as an assembly (Control panels, VFDs etc).

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

E. Terminal point connections shall be ANSI standard flanges.

2.5 OXIDATION VESSEL

A. Closed FRP vessel with bottom diffuser to provide minimum of 40 minutes of reaction time at a flow rate of 25 gpm for permanganate with iron, manganese, and arsenic.

B. Dimensions: 63” diameter x 99” high, 900 gallon capacity.

C. NSF 61 certified.

D. Pentair #CH31327, or Approved Equal.

2.6 PACKAGED FILTER EQUIPMENT

A. Single process train rated for the design flow rate and criteria defined in Article 2.2 and Article 2.3.

B. The WTP operation shall be as simple as practical while maintaining finished water quality.

C. The packaged water treatment equipment shall be factory assembled and tested to the greatest extent possible. Allowable connection points:
   1. Post-oxidation coagulated water
   2. Filtered water
   3. Clarified solids removal
   4. Backwash supply and discharge
   5. Air scour
   6. Power

D. Valves required by the treatment equipment supplier shall be installed at the filter fabrication facility to the greatest extent possible. Off-skid valves and piping will require the Supplier to provide a service technician to complete the plumbing, electrical, and controls connections in addition to the required start-up and commissioning time. The Installing Contractor will be responsible for installing the plumbing, electrical and controls up to the final connection points.

E. The maximum dimensions for the footprint of the filter skid and the ceiling height are shown on the Drawings.

F. Process Components
   1. Raw Water Flow Control:
      a. Supplier's standard via flow control valve to maintain constant flow rate through the treatment process.
   2. Chemical Blending (3)
      a. Inject treatment chemicals into an inlet pipe section equipped with baffles for hydraulically induced blending of chemicals with incoming raw water.
      b. Provide mixers for installation by Installing Contractor.
      c. Provide static mixer Westfall 2800, or Approved Equal.
   3. Flocculation
      a. Chambers: Minimum total retention time of 40 minutes at design flow rate through **one or** two chambers.
      b. Furnish each flocculation chamber with an independent mechanical flocculator with variable-speed drive.
      c. Furnish flow-straightening vanes to prevent vortexing, and to ensure establishment of a uniform particle contact/floc formation regime.
      d. Velocity Gradient: G=15-100/sec.
   4. Clarification (inclined tubes ~~or adsorption clarifier~~)
      a. Inclined Tubes:
         1) Provide entire surface with tube settlers fabricated from minimum 20-mil PVC. **or minimum 10-mil food grade ABS. If ABS is used, submit food grade certifications**
         2) Minimum Horizontally Projected Bottom Area: Not less than 12 sq. ft. per sq. ft. of plan area

3) Uniformly introduce flow into lower chamber section through low-velocity distribution header
4) Include launder system in upper section, with overflow-leveling provisions

b. ~~Adsorption Clarifiers:~~
1) Media depth: 48 inches.
2) Media retention screen to allow for upflow, restrained operation, without fluidizing bed during normal forward flow operation. Screen shall be corrosion-resistant assembly that allows free passage of water but contains media particles.
3) Media readily fluidized by addition of small amounts of diffused air.
4) Media:
a) Buoyant adsorption media specifically manufactured for use in water treatment. Media shall be buoyant with specific gravity of less than 1.0.
b) Designed to optimize the removal of coagulated particles with clean bed head loss of less than 18 inches at 10 gpm per sq. ft.
c) Capable of building solids to a head loss of 6 feet without disruption or movement of the media

c. Sludge wasting: ~~operator adjustable, initially set to 15-20 minutes.~~ **manufacturer' standard process**
1) ~~Single sludge draw-off header.~~
2) ~~Automatic and timer controlled, entirely independent of filter function.~~
3) ~~Possibly only with system in ON operating mode.~~

5. Filtration
a. Separate chamber with total area provided to establish maximum application rate of 2.0 gpm/sq-ft, except during backwash.
b. Provide wash-water ~~trough with adjustable weirs.~~ **through manufacturer's standard weir configuration.**
c. Provide ~~surface agitation assembly to augment backwash process.~~ **manufacturer's standard backwash process.**
d. Filter Media:
1) Anthracite: Depth: 18"; Specific Gravity: 1.5-1.7; Effective Size: 0.9-1.1 mm; Uniformity Coefficient: <1.7.
2) Silica Sand: Depth: 14"; Specific Gravity: 2.5-2.7; Effective Size: 0.45-0.55 mm; Uniformity Coefficient: <1.7; Silica Content: ≥98%.
3) Garnet: Depth: 4"; Specific Gravity: 3.8-4.2; Effective Size: 1.5-1.7 mm; Uniformity Coefficient: <1.2.
4) Gravel: Depth: As Required; Specific Gravity: 2.5-2.7; Effective Size: 3/16" (#4 mesh) – 3/8".

6. Filter Underdrain
a. Provide for uniform collection of filtered water and even distribution of backwash water and air scour across the full area of the filter bed. It shall be capable of accepting air scour, without further modification, even if this is not provided initially.
b. Ensure mal-distribution of the backwash flow and air scour does not exceed +/- 5%.
c. ~~Be of HDPE or stainless steel construction.~~ **Shall be manufacturer's standard.**
d. ~~Incorporate either:~~
1) A nozzle/plenum design. Nozzles shall be of plastic construction and incorporate a diffuser with slots no wider than 0.2mm. The nozzle spacing shall be no greater than 6.0 inch centers. The plenum shall be not less than 14 inches in depth and shall extend over the full area of the filter. The plenum roof shall be plane with no intrusions from supporting structures that

could impeded the even generation of the air/water interface within the plenum. An inspection access panel shall be provided into the plenum.

2) After market block underdrains with type "S" retention plate with an optional gravel support layer will not be required.

7. Effluent Pump:
   a. Provide effluent pump to transfer water from the filters to the water storage tank.
   b. Required head: 30 ft.
   c. Control: VFD based effluent discharge control system to maintain constant flow for the plant. VFD's shall be of sufficient size to accommodate the power rating of the selected effluent discharge pump motor. ALLEN BRADLEY Power Flex 70 Fan and Pump Control assembly.
8. Backwashing:
   a. Chlorinated backwash water will be supplied from the community's water storage tank.
   b. Backwash loading rate: by filter equipment Supplier.
   c. The backwash flow rate shall be automatically controlled to maintain a pre-set flow rate. For combined air scour and backwash, the backwash flow control system shall allow for pre-set flow rates, one setting for use during combined air scour and one, higher setting for use when backwashing only following air scour. Each flow setting shall be manually adjustable.
   d. The filter piping and valves shall include the ability to filter to waste after each backwash.
   e. Pump:
      1) Sizing: by filter equipment Supplier.
9. Air Scour:
   a. Blower:
      1) Provide single blower for cleaning clarifier and filter media during flushing and backwashing operations.
      2) Provide blower with inlet filter, pressure relief valve, and dirty filter indicator.
      3) Maximum air inlet temperature: 100 degrees F
      4) Minimum air inlet temperature: 40 degrees F
      5) Plant elevation: approximately 40 ft above sea level
      6) Provide complete with check valve, inlet filter and pressure relief valve
      7) Sizing: by filter equipment Supplier.

G. Materials of Construction
   1. All tankage, plate steel, and structural members, including all troughs, launders and collectors shall be fabricated from type 304 stainless steel or painted carbon steel.
      a. All fabrications shall be undertaken by a fabricator able to demonstrate at least five years of experience in the fabrication and welding of steel structures for potable water applications.
      b. Plate thickness and structural reinforcements shall be designed in accordance with accepted engineering practices for the materials used.
      c. Welding shall be performed by fully qualified and experienced welders in accordance with AWS D1.6 and shall use an inert gas shielded arc or resistance welding process.
      d. Weld penetration, strength, and integrity shall ensure optimum Brinell hardness, tensile strength, modulus in tension, compression, and shear to be exerted on the finished product.