SECTION 11350 - SCUM CONCENTRATOR

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing [ ] scum concentration systems with decant tanks, concentrated scum holding tanks, heating systems, concentrated scum pumps, and all appurtenant work.

B. The WORK requires that a single manufacturer be given responsibility for furnishing the indicated system without altering the CONTRACTOR's responsibility under the Contract Documents.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 09800 Protective Coating
2. Section 11000 Equipment General Provisions
3. Section 11175 Pumps, General
4. Section 13300 Instrumentation and Control
5. Section 16040 Electric Motors

1.3 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1.	SSPC SP-6	Surface Preparation Specification No. 6 Commercial Blast Cleaning
2.	SSPC SP-10	Surface Preparation Specification No. 10 Near-White Blast Cleaning

1.4 SHOP DRAWING AND SAMPLES

A. Shop drawings and samples shall comply with the requirements of Sections 01300 and 11000. The following shall be submitted:

1. Assembly drawings of system components.

2. Coordination drawings to scale showing locations of system components.

3. Design calculations for heating system.

4. Control panel layout drawings, wiring, and schematic diagrams.

5. Loop Diagrams for each analog loop in accordance with Section 13300

6. Technical brochures, bulletins, and data sheet for all control and instrumentation components.

1.5 OWNER'S MANUAL

A. OWNER'S Manual shall comply with the requirements of Section 01300.

1.6 SERVICES OF MANUFACTURER

A. Manufacturers' services for training OWNER'S personnel, equipment system testing and startup shall comply with the requirements of Section 11000.

B. **Inspection, Startup, and Field Adjustment:** An authorized representative of the manufacturer shall visit the site for not less than [ ] days to furnish the indicated services.

C. **Instruction of OWNER'S Personnel:** The authorized service representative shall also furnish the indicated services for instruction of the OWNER'S personnel in the operation and maintenance of the equipment including step-by-step troubleshooting procedures with necessary test equipment for not less than [ ] day.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Equipment Numbers:

Quantity	Description	Equipment Numbers
	Decant Tank	
	Concentrated Scum Holding Tank	
	Concentrated Scum Pump	
	Scum Concentrator Local Control Panel	

B. The scum concentrator shall receive scum from the [primary sedimentation basins] [secondary clarifiers] and be capable of concentrating the scum to a minimum of [40] percent dry solids. The scum concentrator shall receive scum from the sedimentation basins at a rate not to exceed [ ] gpm, at [ ] percent solids.

C. Each scum concentrator system shall consist of the following components:

1. Decant tank and skimming mechanism.
2. Holding tank.
3. Holding tank heating system.
4. Holding tank level measurement.
5. Mixer
6. Concentrated scum pump.
7. Subnatant return piping and valves.
8. Control panel.

9. Service platform and access stairway.
10. Odor containment covers.

D. The scum concentrator overall dimensions shall not exceed [ ] feet wide by [ ] feet long by [ ] feet high including walkway.

2.2 DECANT TANK AND SKIMMING MECHANISM

A. Dilute scum shall be discharged to the decant tank for gravity separation. After decanting, the skimmed material shall be discharged directly into the holding tank and the effluent shall discharge to a gravity drain.

B. The decant tank shall be rectangular with nominal dimensions of [ ] wide by [ ] long. The tank shall be fabricated from minimum 1/4-inch steel plate and shall be provided with all necessary structural steel stiffeners and supports.

C. The decant tank shall have a working volume of not less than [ ] gallons, which shall be equal to not less than [30] minutes retention time and shall have an effective skimming surface area of not less than [ ] square feet for a surface loading rate not greater than [1.0]gpm per square foot.

D. The tank design shall include an inlet flow distributor, decant compartment, scum and underflow baffle, mechanically adjustable level control assembly, 6-inch influent nozzle, 4-inch drain/cleanout nozzle, 6-inch diameter effluent nozzle, skimming beach ramp and a full surface area skimming mechanism. The mechanically adjustable effluent level control assembly shall be operated by a hand lever accessible from the service platform. The level control shall be capable of varying the liquid level 3 inches.

E. The tank outlet to the drain pipe shall be fitted with a 4-inch eccentric plug valve. Piping shall be fabricated Schedule 40 steel pipe with 150-pound flanges.

F. The skimming mechanism shall be capable of skimming at a variable rate of 3 to 9 fpm. The mechanism shall consist of ½-hp variable speed traction-type drive with adjustable torque limiting device, driving a single roller chain which in turn drives two strands of [polymeric] [or] [cast] pintle chain carrying [stainless steel] [fiber glass reinforced plastic] flights with neoprene wiper blades on minimum 30-inch centers.

G. The chains shall be supported by [polymeric] [or] [cast] sprockets fitted to cold rolled steel shafts which ride in ball bearing take-ups. Take-ups shall have minimum 4 inches of adjustment. Drive shall be provided with a galvanized steel drive guard.

H. Provide a high current overload sensing device which will sense a high torque condition and trigger skimmer mechanism shutdown and an alarm as described below.

2.3 HOLDING TANK

A. The holding tank shall have a working capacity of [ ] gallons.

B. The tank shall be fabricated from 1/4-inch steel plate and shall be provided with all necessary structural steel stiffeners and supports.

C. The tank cone sides shall have a slope not less than 60 degrees from horizontal. A 12-inch knife gate valve with Type 304 stainless steel trim shall be installed on the tank discharge.

D. The holding tank shall be equipped with a vertical mixer with stainless steel shaft and minimum of two stainless steel impellers. The mixer shall be gear driven with helical gears designed for AGMA Class II service and maximum speed of 100 RPM. The electric motor shall be a minimum [5][7.5][10] HP, maximum 1800 RPM, and shall comply with Section 16040 - Electric Motors.

2.4 HOLDING TANK HEATING SYSTEM

A. The holding tank heating system shall be capable of maintaining the concentrated scum at a temperature of 130 degrees F.

B. The holding tank shall have a factory installed 480-volt, [9 kW] resistance heating system fixed to the exterior of the cone bottom. The heating elements shall be protected by an insulated removable fabricated steel cover.

C. The temperature of the scum shall be regulated by a thermocouple and indicating temperature controller with operator-adjustable setpoint between 80 and 130 degrees F. mounted in the control panel. The controller shall have operator interfaces as listed below.

D. An adjustable high temperature switch that senses the temperature of the tank interior wall in the area of the heaters shall be provided.

2.5 HOLDING TANK LEVEL MEASUREMENT

A. The holding tank shall have four level switches: LOW LOW, LOW, HIGH, and HIGH HIGH. LOW, HIGH, and HIGH HIGH shall be mounted in the tank; and LOW LOW shall be mounted below the knife gate. Mounting heights shall be as recommended by the manufacturer to achieve functions described below.

B. Level switch mounting provisions shall be completely fabricated at the factory. No field cutting, drilling, welding, or threading shall be required to install the switches. Level switches may be shipped separate from the tank if appropriate.

C. Level switches shall operate on the principle in which submersion of a vibrating paddle causes a detectable dampening of the vibration. Switches shall be suitable for use in concentrated primary scum.

D. Level switches shall have discrete outputs rated no less than 2 amp at 120-volt, 60-Hz.

E. Level switches shall be Dynatrol, or equal.

2.6 CONCENTRATED SCUM PUMP

A. Each scum concentrator system shall be provided with a factory installed scum pumping system mounted directly below the holding tank.

B. The pump and drive shall be supported by steel members affixed to the tank support columns.

C. The scum pump shall be open throat progressive cavity type, with materials appropriate for the intended service conditions, with fixed speed gear motor drive. The gear reducer shall be rated for minimum AGMA Class II service. Provide mechanical seals as indicated in Section 11175. Pump shall be a Robbins & Myers, Netzch, or equal.

D. Operating Conditions

1.	Design flow at maximum speed and design differential pressure (gpm)	- [ ]
2.	Design differential pressure (psig)	- [50]
3.	Max brake horsepower (HP, clean water, 70 degrees F, design flow rate, max speed, design differential pressure)	- [ ]
4.	Min motor size (hp)	- [ ]
5.	Max motor speed (rpm)	- [1,800]
6.	Max pump speed (rpm)	- [70]
7.	Min pump stages	- [2]
8.	Rotor material	- Type 316 Stainless Steel
9.	Stator material	- Buna N or Nitrile

2.7 RETURN PIPING AND VALVES

A. Each system shall be provided with subnatant return piping and isolation valves to route subnatant from the holding tank via the concentrated scum pump into the decant tank. The piping shall be 2-inch size, and valves shall be ball type.

2.8 CONTROL PANEL

A. **General:** All control and instrumentation components shall meet the applicable requirements of Section 13300.

B. **Control Panel Construction:** Scum concentrator systems shall be provided with NEMA 4X [stainless steel] control panels which meets the applicable requirements of Section 13300. Control panels shall be attached to the holding tank support structure.

C. **Control Panel Operator Interfaces:** At a minimum, the following functions shall be provided on the face of each panel:

1. Handswitches

   a. Panel power ON/OFF.
   b. skimming mechanism ON/OFF.
   c. scum pump START/STOP.
   d. mixer START/STOP.
   e. LOCAL/DCS control.
   f. RESET (from skimmer overload or heater overtemperature condition).

2. Temperature Controller

   a. Holding tank temperature indication.

b. Holding tank temperature set point adjustment.

3. Alarms: The following alarms shall be provided at an annunciator:

a. Skimming mechanism overload.
b. Holding tank level HIGH HIGH.
c. Holding tank level LOW LOW.
d. Holding tank temperature HIGH (overtemperature condition).

4. Status

a. panel power ON.
b. skimming mechanism ON.
c. scum pump ON.
d. heater ON.
e. mixer ON.

5. Continuous Indications:

a. holding tank level.

D. **Control Panel External Interfaces:** Provide the following interfaces between the control panel and systems outside the scum concentration system.

1. Discrete Outputs from Control Panel to DCS: Provide the following maintained contact outputs which will be used as discrete inputs by the DCS. Contacts shall be noble metal or hermetically sealed, and be suitable for 1 amp at 24V DC.

a. DCS (contact closed when DCS selected).
b. Temperature HIGH (contact closed on HIGH).
c. Holding tank level HIGH (contact closed on HIGH).
d. Holding tank level HIGH HIGH (contact closed on HIGH HIGH).
e. Holding tank level LOW (contact closed on LOW).
f. Holding tank level LOW LOW (contact closed on LOW LOW).
g. Skimming mechanism ON (contact closed when ON).
h. Scum Pump ON (contact closed when ON).
i. Skimming mechanism overload (contact closed on overload).
j. Mixer ON (contact closed when ON).

2. Analog Output to DCS: Provide 4 to 20 mA DC holding tank level output to be used as a DCS input. Output shall be suitable for driving a 750-ohm load.

3. Discrete Inputs: Contacts will be rated for 5 amps at 120V AC. Sensing voltage shall be 120V AC.

a. From DCS:

(1) skimming mechanism RUN, (maintained contact closed on RUN).
(2) scum pump RUN, (maintained contact closed on RUN).

b. From Flow Switch: LOW flow input from an ultrasonic flow switch downstream of the scum pump. The ultrasonic flow switch is part of the WORK of Section 13300.

4. Discrete Outputs to MCC: Provide maintained dry contact outputs rated for 10 amps at 120V AC for motor starter circuit.

    a. Scum concentrator RUN (close contacts to RUN).
    b. Scum pump RUN (close contacts to RUN).
    c. Tank heater ON (close contacts for ON).
    d. Mixer RUN (close contacts to RUN).

5. Discrete Inputs from MCC: Accept a dry contact maintained input from motor starter circuit, rated 10 amps at 120V AC. Sensing voltage from scum concentrator control panel shall be 120V AC. Motor starter and starter circuits are provided under Division 16.

    a. Scum concentrator ON (contact closes when ON).
    b. Scum pump ON (contact closes when ON).
    c. Tank heater ON (contact closes when ON).
    d. Mixer ON (contact closes when ON).

E. **Control Panel Electrical:** Service voltage shall be 120V AC.

F. **System Operation:**

1. When selected LOCAL, the skimmer mechanism, mixer, and scum pump may be started and stopped from the control panel.

2. When selected DCS, maintained run commands from the DCS shall start and stop the skimmer mechanism and scum pump. When RUN is first received, start the equipment. When RUN is removed, stop the equipment. Mixer shall start and stop locally only.

3. When the skimming mechanism is operating in either LOCAL or DCS modes, on skimmer mechanism overload, stop the skimmer and lock it out until RESET is issued at the control panel.

4. When the scum pump is operating in either LOCAL or DCS modes, on scum pump flow LOW or on holding tank level LOW LOW, stop the pump and lock it out until RESET is issued at the control panel.

5. Open the scum pump seal water valve whenever the scum pump is running.

6. Enable the heater controller when the tank level is above the heaters. Disable heater controller when tank level is below LOW level switch.

7. On holding tank wall temperature HIGH, turn off heater power and lock it out until RESET is issued at the control panel.

G. **Other Instrumentation and Controls:** Provide all additional items not indicated which are required to implement the functions above.

2.9 MOTORS

A. Motors shall be 460-volt, 3-phase, 60-Hz, 1,800 rpm, TEFC in accordance with Section 16040.

2.10 SERVICE PLATFORM AND ACCESS STAIRWAY

A. The concentrator shall be fitted with a service platform along the entire length of one side of the concentrator as indicated. Minimum width shall be 2 feet 9 inches and the support structure shall be fabricated from structural steel shapes.

B. The platform shall have 1-1/2-inch by 3/16-inch bearing bars under aluminum deck grating, 1-1/2-inch diameter Schedule 40 aluminum handrails, and an aluminum access stairway. Clips and bolts shall be stainless steel.

2.11 ODOR CONTAINMENT COVERS

A. The decant and holding tanks shall be covered with 14 gauge stainless steel covers. The covers shall be fabricated with hinges and sections for easy removal and lifting for inspection. Cover handles shall be of stainless steel. No section shall weigh more than 50 pounds. Nuts and bolts shall be type 316 stainless steel.

2.12 SPARE PARTS

A. The following spare parts shall be furnished for each concentration system:

1. Two bearing assemblies for skimmer take-ups.
2. One pair skimmer chain sprockets.
3. One replacement skimmer drive chain.
4. Six replacement neoprene wiper blades.
5. One replacement scum pump drive chain or set of belts.
6. One scum pump stator.
7. One set of packings for scum pump.

2.13 COATING

A. Scum concentrator systems shall be coated in accordance with Section 09800 - Protective Coating.

2.14 MANUFACTURERS

A. Systems shall be as manufactured by the following, or equal.

1. FMC
2. RDP Company

PART 3 -- EXECUTION

3.1 GENERAL

A. Unless otherwise indicated, execution of the WORK shall comply with Section 11000.

3.2 FACTORY ASSEMBLY AND TESTING

A. All components shall be assembled and tested prior to preparation for shipment.

B. Decant tank, holding tank, support structures, platform, and walkway shall all be assembled and checked for bolt hole alignment and fit. Decant drive and skimmer system shall be

assembled and operated to check for alignment and operation. Holding tank shall be filled with water to check level sensors and bottom seals. Motors shall be operated to assure proper equipment installation. The control panel shall be energized to check all drives and sensors.

C. The manufacturer shall furnish photographs of the assembled units from all sides plus selected views to guide the installing contractor. The equipment shall be disassembled at the factory into as few pieces as possible for shipment.

- END OF SECTION -