Pan America Environmental, Inc.

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ENGINEERING SPECIFICATION

BOWTS Bilge Oily Water Treatment System

Engineering Specification

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PRODUCT PAGE

https://www.panamenv.com/bilge-oily-wastewater-treatment-system/

System Process Description

The wastestream will be pumped from ship sources to the LET tanks for collection prior to being pumped to the pretreatment OS64 oil water separator at 100 GPM, (oils/fuels are removed pump fed out of the OS64 oil water separator to the external, 2,000-gallon oil and sludge storage tanks). OS64 treated effluent water gravity flows to the CT-CpF ChemClear system where the flow is chemically reacted to break any emulsion prior to the DAF flotation system. The CT-CpF ChemClear System provides a two-stage (pH adjust/coagulation/ flocculation) system to meter and react the waste flow to break an emulsion.

The reacted wastestream gravity flows from the CT-CpF into the inlet of the PD50 Dissolved Air Flotation DAF. The DAF will float the flocculated solids and separate them from the wastestream. The resulting skimmed float and any settled sludge will be pumped out of the DAF to the external, sludge tank where the sludge is held prior to de-watering. The sludge in the storage tank will be pumped to a screw press pre-conditioning stage where a reaction tank is provided to meter in polymer and flocculate the sludge. The flocculated sludge is then pumped to a screw press for de-watering. De-watered sludge is deposited in a movable dumpster for movement to a collection truck or larger dumpster for haul-off.

The treated DAF effluent gravity flows to the polishing OS64 oil water separator treated effluent gravity drains to the SMH and to final sewer discharge.

Oils/fuels and sludge is pump fed out of the OS64 to the external, 2,000-gallon oil and sludge storage tanks.

Major Sub-System & Component List	Inlet/outlet fitting sizes
1) OS64 oil water separator pretreatment to system (elevated)	4” flange
1) OS64 polishing oil water separator for polishing treatment at end of system	4” flange
2) LET tanks 40,000 gallon each	3” flange
1) CT-FF-1000 Flash flocculation chemical pre-treatment system	4” flange
1) PD50 Dissolved Air Flotation system	4” flange
2) Oil storage tank 2,000 gallon	2” NPT
1) Cone bottom sludge tank 2000 gallon	1” NPT/out: 3” NPT
1) Polymer blending system (for CT-CpF)	1” water inlet

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- 1) Vertical screw press system
- 2) Sludge dumpsters
- 1) Screw press pre-conditioning reaction tank system
- 1) MCC Motor Control Center

4) Sludge pump-out systems	1.5” NPT
1) Float pump-out systems	1.5” NPT
2) Oil pump-out systems	1” NPT
1) LET effluent pump-out system (2 pumps)	3” flange

- 4) Walkways
- 1) AFFF Monitoring System

1) Hydro-pneumatic water supply system	1” NPT

OS Series Steel Oil/Water Separator Engineering Specification

OS-64 (pretreatment & polishing)

SECTION 1.0 OIL/WATER SEPARATORS

Performance

The Pan America Environmental OS Series Oil/Water Separators are designed to produce an effluent concentration of 10 mg/l or less of oil droplets 20 micron and larger of non-emulsified, free and dispersed oils. By virtue of our Flopak coalescing media and tank design, readily settleable solids are also removed.

1.01 Design

The oil/water separator will be designed and fabricated per the following specifications. Rectangular tankage with features as described designed per API #421 Design & Operation of Oil/Water Separators Manual and stokes law. The design will incorporate flexible flow rating capability based on application parameters.

1.02 Influent Chamber

Influent flow enters the clog proof influent diffuser and is immediately spread out across the depth and width of the chamber. Any readily settleable solids drop to the bottom of the V-shaped solids accumulation chamber located directly under the Flopak coalescing media pack.

1.03 Oil/Water Separation Chamber

The separation chamber is to be packed with Flopak cross-fluted coalescing media. The media pack will be designed to create a quiescent zone, a laminar flow pattern to facilitate the impingement of oil on the media, and will provide numerous impact sites and changes of flow direction. The media shall have a 60-degree cross-flute angle.

1.04 Solids Accumulation Chamber

The separator shall have a V-shaped solids accumulation chamber located under the coalescing media. This chamber will provide temporary solids storage. The chamber walls are to be pitched at 45 degrees to assure simple and thorough solids removal. Dual outlet ports will be provided for sludge removal.

1.05 Clean Water Effluent Chamber

The cleansed water will flow under the oil retention baffle, over the water weir and into the effluent chamber. This chamber is to have the capability to be expanded at the factory by modifying the standard integral chamber so a greater volume of water is available for pump suction directly from the OS tank.

1.06 Oil Reservoir

A fixed weir oil skimmer with an integral oil reservoir is to be provided for the temporary storage of separated oils. This chamber is located at the effluent end of the separator. The reservoir will have fittings for pump suction, high/low level switch accommodation and vent. This chamber is to have the capability to be expanded at the factory by modifying the standard integral chamber so a greater volume of oil can be stored and pumped directly from the OS tank to desired point of discharge.

1.07 Separator Cover

The separator is to have a multi-section cover that provides complete closure of the tank. The separator cover will be mounted to the tank via zinc plate hardware and vapor sealed with an industrial grade closed cell, compressible polyethylene gasket.

1.08 Skid & Lifting Lugs

The OS tank shall be provided with an integral, skid base with anchor bolt holes (hardware by others). Lifting lugs shall be provided.

1.09 Fittings

All fittings are to be FNPT coupling up to 3". Fittings larger to be 150# FF ANSI B16.5 flange.

1.10 Flow Meter

A flow meter is provided loose for installation at the influent of the OS64 polishing oil water separator. Flow meter shall be an impeller type design and will provide totalizing function.

1.11 Elevation Stand

The pretreatment separator will be provided with elevating legs to provide effluent gravity flow to CT-FF chemical treatment system. The legs will be detached for shipment.

1.12 Walkway

Both separators are provided with an aluminum construction walkway on one side of the each tank the full length of the tank. Construction shall be aluminum with aluminum grating, aluminum handrails and aluminum ladder. Handrails, ladder access, decking, kick plates and self-closing access safety gates are provided. Walkway is supported by the tank and will be detached for shipment. Design will follow OSHA requirements.

BOWTS Use

- Bilge water treatment system

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- Bilge water separator
- Oily water separator (OWS)
- Marine bilge water treatment
- Oily bilge water treatment
- Bilge water filtration system

Type Description

- 15 ppm bilge water separator
- 5 ppm oily water separator
- IMO MEPC.107(49) compliant bilge system
- Centrifugal bilge water separator
- Coalescing bilge water separator
- Emulsified bilge water treatment
- Bilge water oil content monitor
- Marine oily water separator
- Ship bilge water treatment system
- Bilge holding tank treatment
- Overboard discharge bilge water system
- Bilge water polishing unit
- Gravity vs centrifugal bilge separator

Feature and Technology Based

- Coalescer bilge separator
- Membrane bilge water treatment
- Ceramic membrane oily water separator
- Flocculation bilge water system
- Biological bilge water treatment
- Adsorption bilge water filter
- Automatic backflushing coalescer
- Oil content monitoring system (OCM)
- Bilge economizer
- Clean bilge monitoring system
- High-speed centrifugal separator
- Emulsion breaking bilge treatment

SECTION 2.0 MATERIALS OF CONSTRUCTION

2.01 Steel Construction

Tank shell, baffles, cover and external structural members shall be constructed of ¼” thick, A-36 carbon steel. Welded joints are continuous double welded and dye penetrant tested.

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2.02 Surface Preparation

Interior surfaces shall be prepared to an SSPC-SP10 near white metal blast. Exterior surfaces shall be prepared to an SSPC-SP6 commercial blast.

2.03 Coatings

Interior coating shall be coated with Ameron High Build Coal Tar Epoxy Amercoat 78HB (16 mils DFT).

Exterior coating shall be coated with Ameron epoxy primer, Amerlock 2, (5-8 mils DFT). Final coat to be Ameron Amershield Aliphatic Polyurethane Enamel coat (5 mils DFT). Finish color to be white.

2.04 Piping

Internal piping shall be ASTM, A-53 black steel.

2.05 Coalescing Media

Flopak, cross-fluted, oleophilic, PVC coalescing media shall be provided as manufactured by Pan America Environmental. The media shall be packed in a stainless steel frame with lifting lugs.

2.06 Cover Gasketing

Closed cell, industrial grade polyethylene constructed vapor sealed cover gasketing shall be provided. No neoprene shall be permitted.

2.07 Manufacturer

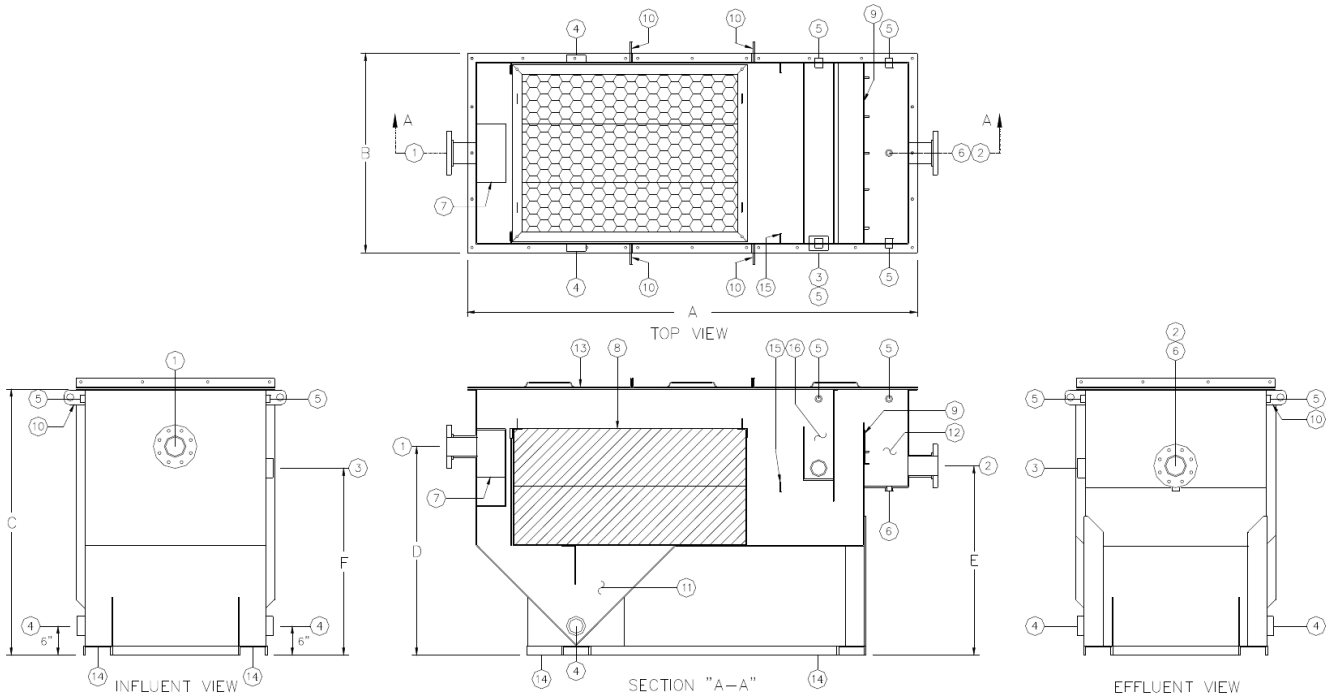
The manufacturer of preference shall be:	Pan America Environmental

2.08 Warranty

Pan America Environmental warrants its products to be free of defect in materials and workmanship for a period of one year from the date of shipment.

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OS Series Steel Separator Tank Drawings



Model	Length	Width	Height	Inlet	Outlet	Oil Outlet	Sludge Vol. Gal.	Oil Chamber Gal.	Inlet Size	Outlet Size	Sludge Outlet Size	Oil Outlet Size	Empty Weight	Operat. Weight	Flow Rate GPM (Max.)
	A	B	C	D	E	F									
OS-2	6’-0”	1’-6”	3’-0”	1’-11”	2’-0”	2’-1”	7	2	2”	2”	2”	2”	600	835	5
OS-4	6’-0”	2’-4”	3’-0”	1’-11”	2’-0”	2’-1”	15	4	2”	2”	2”	2”	654	1709	10
OS-8	6’-0”	2’-4”	4’-0”	3’-5”	2’-10”	3’-3”	15	4	2”	2”	2”	2”	800	2400	25
OS-12	6’-0”	3’-4”	4’-0”	3’-5”	2’-10”	3’-3”	30	6	3”	3”	3”	3”	1150	3500	35
OS-16	6’-0”	4’-4”	4’-0”	3’-5”	2’-10”	3’-3”	40	8	3”	3”	3”	3”	1300	4600	50
OS-24	7’-9”	3’-4”	4’-7”	3’-7”	3’-3”	3’-3”	66	12	4”	4”	3”	3”	1400	4745	72
OS-36	7’-9”	3’-4”	5’-7”	4’-6”	3’-9”	4’-3”	66	12	4”	4”	3”	3”	1520	5720	108
OS-48	7’-9”	3’-4”	6’-7”	5’-6”	4’-9”	5’-3”	66	15	4”	4”	3”	3”	1810	6902	144
OS-64	7’-9”	4’-4”	6’-7”	5’-6”	4’-9”	5’-3”	91	20	6”	6”	4”	4”	1920	9435	192
OS-80	7’-9”	5’-4”	6’-7”	5’-6”	4’-9”	5’-3”	113	25	6”	6”	4”	4”	2030	11404	240
OS-96	7’-9”	6’-4”	6’-7”	5’-6”	4’-9”	5’-3”	136	30	6”	6”	4”	4”	2142	13377	288
OS-128	7’-9”	8’-4”	6’-7”	5’-6”	4’-9”	5’-3”	158	40	6”	6”	4”	4”	2302	15396	384
OS-144	7’-9”	9’-4”	6’-7”	5’-6”	4’-9”	5’-3”	203	50	6”	6”	4”	4”	2802	19492	432

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Item	Qty	Description	Item	Qty	Description
1	1	Inlet	9	1	Weir
2	1	Outlet	10	4	Lift lug
3	1	Oil Outlet	11	1	V-hopper
4	1	Sludge outlet	12	1	Effluent chamber
5	4	Vent 1" NPT	13	3	Cover
6	1	Drain 2" NPT	14	1	Skid
7	1	Inlet Diffuser	15	2	Retpak Lug
8	1	Flopak media	16	1	Cover

Dimensions, design, weights and capacities are not for construction and are subject to change without notice.

SECTION 3.0 PROCESS & STORAGE TANKS

3.01 LET Tanks

Two (2) identical tanks are provided per the following. Each LET tank shall be an above grade, 40,000-gallon, single walled Load Equalization Tank. The tank shall be steel constructed and designed for vertical installation and will include the following features or equal:

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Dimensions:	Nominal inside diameter: 14.85', nominal eave height: 34.22'
Design/materials:	Single wall design, carbon steel construction – A1011 Gr. 40, A36, A572 Gr.50, A572 Gr.60, A572 Gr.70
Panel type:	Rolled tapered panel (RTP) bolted design, field assembled
Bottom style:	Flat steel bottom
Tank support:	Reinforced concrete as provided by others
Roof style:	Steel cone with 2" rise to 12" run (9.46°) slope
Roof support:	Self-supported with internal rafters
Usable capacity:	42,391 US gallons
Design criteria:	Seismic: AWWA D103-97: Zone = 4, I=1.25 Wind design: AWWA D103-97: 100 mph, I=1.0
Design criteria:	Deck live/snow load: 25 lbs per ft2, Liquid stored: water, specific gravity 1.0, pH range: 4-9
Design criteria:	Operating pressure/vacuum: atmospheric, temperature: ambient
Tank empty weight:	31,500 lbs Each
Sealant:	Sidewall/cover/bottom: high performance moisture-cured elastomeric sealant, white
Hardware:	Plastic encapsulated JS500 coated grade 8 minimum bolts w/ JS500 coated flat washers & hex nuts
Interior coating:	LIQ Fusion 7000 FBE, 7 mils nominal DFT (also both sides of bottom)
Exterior coating:	EXT Fusion SDP 3 mils DFT + 3 mils 5000 FBE primer, color white
Coating:	All coatings to be baked on formulation with SP10 surface preparation
Accessories:	(20) 1" diameter cast in place anchor bolts & nuts
Accessories:	Lightning suppression, (2) grounding rods & cable (cable bolts to one of the tank anchor bolts)
Manways:	(1) 20"D (center of roof) (1) 24" square w/lockable hinged cover in roof, (1) 24"D sidewall w/bolt on hinged cover
Fittings:	Inlets/outlet, vents and level switch fittings as required for BOWTS system
Ladder:	Caged ladder w/lockable hoop with partial handrailing 10' both sides of ladder
Underlay:	1/2" thick asphalt impregnated fiberboard located under steel bottom
Sheeting:	Polyethylene sheeting between foundation and fiberboard, 4 mil thk
Site supervision:	A manufacturer's certified field supervisor is provided for 7 days, in one trip. Additional days available at $1,100.00 per

diem + expenses. PAE will provide lodging, transport & meals for supervisor for the 7 days.

Provided by contractor:	Local assembly manpower, tools and equipment, concrete foundation
Not provided:	Leak monitoring is not provided
Freight to Guam:	Freight of the tank parts is provided to the port of Guam

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3.02 Oil Storage Tank

Two (2) 2,000-gallon fuel/oil storage tanks are provided, the tank shall be a fireguard type, fire resistant design with concrete (or other material) filled, UL142/2085 double walled design per NFPA. The tank shall be steel constructed and designed for horizontal, above grade installation. The coating system shall be identical or similar to the OS separators. The inlet shall allow gravity flow feed or pump feed from both OS separators. The approximate tank dimensions shall be 6'D X 12'-6"L. Features provided: (2) waste oil inlets, (1) waste oil pump out line with hose connection, oil level detection float switch, interstitial detection float switch (both switches are provided with an external junction box). Alarms for high oil level and leak detection shall be provided in the system MCC.

Two (2) identical oil storage tanks are provided in this quote.

3.03 Sludge Storage Tank

A 2000-gallon, cone bottom tank is provided for sludge storage. The single walled, open top tank shall be steel constructed and designed for vertical installation and includes a cover with hinged inspection hatch. The preparation and coating system shall be identical to the OS separators. Features provided: (3) 1" NPT inlet connections, internal diffuser, 30° cone, 3" cone outlet fitting, level switch wiring outlet port with external junction box, 2" vent, lifting lugs. High/low level switches are provided to control sludge transfer pump. Approximate tank dimensions: 84"D X 10'H

SECTION 4.0 ChemClear SYSTEM

CT-CpF Series Chemical Reaction Treatment System

Engineering Specification

https://www.panamenv.com/chemical-treatment/chemical-treatment-systems/

https://www.panamenv.com/chemical-treatment/stax/

4.01 CT-CpF-1000 Coagulation / Flocculation

The two-stage, CT-CpF tank will provide wastestream pH control and flocculation on a continuous basis. CT tank will be skid mounted and designed for gravity flow into the DAF.

Tank construction: The CT tank, internal baffles, external structural and tank skid will be constructed of ¼" thick, A36 carbon steel. Flash tank to be provided with 10 minutes of retention (1000 gal.). Flocculation tank to provide 5-minute retention (500 gal.).

Approximate tank dimensions: 8'-10"L X 7'H X 4.5'W, mixers add approximately 14" to tank height.

Surface Preparation: Interior surfaces shall be prepared to an SSPC-SP10 near white metal blast. Exterior surfaces shall be prepared to an SSPC-SP6 commercial blast.

Coatings: Interior coating shall be a self-priming, coal tar epoxy (14-18 mils DFT). Exterior coating shall be epoxy primer coat (4-5 mils DFT) followed by a second coat of epoxy enamel (4-6 mils DFT). Finish coat is to be a polyurethane enamel coat (1-2 mils DFT). Finish color is white.

Polymer Makeup: For preparation and metering of the polymer a polymer blending system is provided to draw in neat polymer, mix it with fresh water and blend/age it prior to injection into the flocculation chamber. On/off controls for the blending system shall be integrated into the MCC.

Chemical Metering Pumps: Flash tank will be provided with coagulant & NaOH (pH) injection pumps, flocculation tank will be provided with a polymer blending pump system. Each pump shall be an electronic, chemical metering pump. Each pump will be compatibility matched to the chemical being metered. Pumps will have frequency and stroke adjustment located on face of pump.

Mixers: CT mix chambers: Flash mixer chamber will be provided with a 1725 rpm, fixed speed mixer fixed, universal mount with 316 stainless steel impeller shaft and dual axial flow style impellers. Flocculation mixer chamber will be provided with a 30-350 rpm, variable speed mixer, fixed universal cup mount with 316 stainless steel impeller shaft and dual, axial flow impellers. Mixer controls will be located in system Motor Control Center (MCC) and will include a variable speed, programmable, AC drive with speed knob on front of control panel door. Mixer motors to be TEFC.

pH Controller: The waste flow pH will be continuously monitored and chemical metering pump controlled by a microprocessor based controller transmitter with tactile keyboard, large, bright, 5 character LED readout. Controller features shall include: switch selectable operation in pH units or mV, isolated 4-20 mA powered output, self configurable for manual temperature or ATC, dual relay outputs for alarms or control, adjustable or built-in deadband. pH range is to be 0-14 pH with a resolution of at least 0.01 pH. The controller shall be housed in the system MCC control panel.

pH Probe: The pH probe shall be a flat surfaced, sealed reference design. The probe shall be detachable from the probe body and will include a body-to-probe seal. Body and probe construction shall be CPVC. The probe shall be mounted to a quick remove/replace assembly to allow removal and replacement without tools. Probe to be wired to the controller via a wire lead or BNC style cable.

4.02 Walkway

CT is provided with an aluminum constructed walkway on one side of the tank the full length of the tank. Construction shall be aluminum with aluminum grating, aluminum handrails, aluminum ladder. Handrails, ladder access, decking, kick plates and self-closing access safety gates are provided. Walkway is supported by the tank and will be detached for shipment. Design will follow OSHA requirements.

SECTION 5.0 DISSOLVED AIR FLOTATION SYSTEM

DAF Series Dissolved Air Flotation Engineering Specification

https://www.panamenv.com/dissolved-air-flotation-daf/pdaf-plate-dissolved-air-flotation/

Model:	PD50
Flotation area sq. ft.:	83'
Influent flow rate:	100 GPM
Recycle %:	30
Recycle flow rate:	30 GPM
Combined flow rates:	130 GPM (influent + recycle) = total flow
Total hydraulic loading:	1.52 GPM/sq. ft.
Surface loading:	1.223 lbs/ft2/hr

Performance

The Pan America Environmental DAF Series systems are designed to remove fats, oils & greases (FOG) and suspended solids. Clarification rates as high as 97% can be achieved using the DAF systems.

A percentage of the clean effluent is recycled and super-saturated with air, mixed with the wastewater influent and injected into the DAF separation chamber. The dissolved air comes out of solution, producing millions of microscopic bubbles. These bubbles attach to solids and float them to the surface where they are skimmed and removed from the tank.

Rationale For DAF Sizing

The specification requires the ft2 loading of 1.5 lbs/ft2/hr (7.3 kg/sq.m/hr). Assumption is made that the pretreatment oil water separator will reduce the maximum oil & grease loading of 14,475 mg/L from document MIL-HDBK-1005/9A, page 19, Table 2 down to 150 mg/L based on a majority being free and/or dispersed product and the 150 mg/L being emulsified. The O&G + TSS of 1521 mg/L and an assumed added chemical load of 400 mg/L gives a total DAF inlet loading of 2071 mg/L. Based on this rationale a calculated required DAF ft2 of 69 was the result.

Equipment

The DAF Dissolved Air Flotation system will be designed and fabricated per the following specifications. The tank shall be a rectangular design with features as described.

5.01 Float/Separation Chamber

The separation chamber provides a velocity decreasing horizontal separation surface area that minimizes turbulence and maximizes flow and solids throughput. The mixed wastewater enters this chamber where separation and flotation occur.

The Separation chamber includes the float storage chamber, float baffle, water baffle with adjustable water weir, settleable sludge hopper, surface float skimmer, clean water effluent chamber and the skim ramp.

5.02 Float Storage Chamber

As the surface float skimmer continuously skims float from the water surface it conveys float up the skim ramp and deposits it in the float storage chamber which is provided to allow temporary float storage. The chamber has sloped sides to allow solids to slide to the bottom sludge outlets.

5.03 Effluent Chamber

The waste flow and float run into the float baffle at the effluent end of the tank. The float is contained while the water is directed under the baffle and over the adjustable 304 stainless steel weir plate. The clean water accumulates in this chamber and is discharged.

5.04 Sludge Hopper

A sludge hopper is located under the separation chamber to provide temporary storage of any settleable solids. A sludge auger is provided to convey sludge to the sludge outlet. V-hopper walls are provided to accommodate the sludge auger.

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5.05 Sludge Auger System

The solids hopper is provided with a rotating, ribbon screw type sludge auger. The auger consists of stainless steel shafts with stainless steel, ribbon screw auger and UHMWPE bearings driven by a slow speed (3-5 RPM), direct drive gear motor drive assembly. The auger extends the full length of the solids hopper and conveys solids to the sludge outlet. Power required: 460V/3ph/60Hz. Motor to be TEFC.

5.06 Surface Float Skimmer

A mechanical surface drag skimmer assembly is provided to sweep the floating solids (float) from the effluent end of the separation chamber toward the influent end. The DAF is provided with a removable float skimming system with frame assembly and drive motor, sprockets, chains and full width stainless steel skimming blades. The skimmer blades shall be mounted on swivel pins that are fastened to the skimmer chains and maintain the blades in a down position at all times. The conveyor chains shall be provided with drive sprockets on a full width axle at the top return drive end and two, independent driven sprockets at the return end with no cross axle to interfere with the skimmer blade immersion.

The skimmer system frame shall provide the sprocket tension adjustment device and the carrying and return tracks for the chain. The entire system shall be self -supporting with side and end channels, and cross members with lifting lugs that permit removal of the skimmer assembly as a complete unit for cleaning and service. The skimmer drive system shall consist of a TEFC, AC motor driven gearbox, torque limiting overload safety device and removable safety guard system.

5.07 Recycle Saturation System (RSS)

The DAF is provided with an air saturation system that is designed to direct a portion of the treated water from the effluent end of the tank, super-saturate the water with air and then mix this solution with incoming wastewater facilitating intimate mixing of both flows. Recycle saturation pump and schedule 80 PVC piping are mounted on DAF tank with a bypass line to the effluent chamber. The RSS will provide a recycle rate of 30 GPM providing an Air to Solids (A/S) ratio of between 0.015 and 0.040 kg air /kg solids.

5.08 RSS Recycle Pump

A high head, centrifugal, 100 PSI recycle pump mounted to the DAF tank is included to provide air saturated water under pressure to the air/wastewater mixing chamber inlet prior to entering the separation chamber. Controls are provided in the system MCC. Power required: 460V/3ph/60Hz. The recycle pump draws ambient air into the pump and saturates the water with this air under high pressure. No external air source is required. A fine air metering valve with rotameter are provided to control and meter the air flow into the recycle pump. A discharge control and suction control valve are provided to facilitate adjustment and operation of the air saturation process. Discharge and suction pressure gauges are provided. Pump on/off operation is based on an on/off switch in the controls. If another on/off logic is required based on other processes within the installation site this can be integrated on an optional basis (contact PAE for quotation). Once adjusted the recycle system can be turned on and off at will without losing settings and saturation process is virtually instantaneous upon startup. Pump motor to be TEFC.

5.09 Influent Mixing Chamber

The saturated flow mixes with the wastewater flow at the DAF influent via a mixing chamber. Chamber to be constructed of same material as DAF tank.

5.10 Lifting Lugs & Tank Anchoring

The DAF tank shall be provided with 4 integral lifting lugs. The tank is provided with (4) legs. Each leg foot-pad is provided with an anchor hole for a minimum ½" anchor hardware (by others).

5.11 Fittings

All fittings are to be FNPT coupling up to 3". Fittings larger to be 150# FF ANSI B16.5 flange.

5.12 Walkway

The DAF is provided with an aluminum construction walkway on one side of the tank the full length of the tank. Construction shall be aluminum with aluminum grating, aluminum handrails, aluminum ladder. Handrails, ladder access, decking, kick plates and self-closing access safety gates are provided. Walkway is supported by the tank and will be detached for shipment. Design will follow OSHA requirements.

5.13 Controls

All controls will be integrated into the system MCC.

SECTION 6.0 MATERIALS OF CONSTRUCTION

6.01 Steel Construction

Tank shell, baffles and internal structural members shall be constructed of ¼" thick, A-36 carbon steel. Weld joints are to be double welded and dye penetrant tested.

6.02 Surface Preparation

Interior surfaces shall be prepared to an SSPC-SP10 near white metal blast. Exterior surfaces shall be prepared to an SSPC-SP6 commercial blast.

6.03 Coatings

Interior coating shall be coated with Ameron High Build Coal Tar Epoxy Amercoat 78HB (16 mils DFT). Exterior coating shall be coated with Ameron epoxy primer, Amerlock 2, (5-8 mils DFT). Final coat to be Ameron Amershield Aliphatic Polyurethane Enamel coat (5 mils DFT). Surface color to be white.

6.04 Fittings

The tank flanges are to be ANSI 150#, B16.5 flat faced. Couplings shall be NPT.

6.05 Internal Piping

Internal piping shall be ASTM A53 black steel.

6.06 Hardware

All wetted hardware to be ANSI, 316-stainless steel. All non-wetted hardware to be zinc plated.

6.07 I.O.M. Manuals

Three copies of the Installation, Operation and Maintenance manuals will be provided.

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6.08 Assembly

The DAF components will be installed on or in the DAF tankage, plumbed, wired and functionally tested prior to shipping. The manufacturer of preference shall be: Pan America Environmental

6.09 Warranty

Pan America Environmental warrants its products to be free of defect in materials and workmanship for a period of one year from the date of shipment.

SECTION 7.0 PUMPING SYSTEMS

7.01 Sludge Pump-out System (4 SYSTEMS PROVIDED)

Description: The Sludge Pump-out Systems will provide the capability of transferring settled sludge from the OS & DAF sludge hoppers. Each system can be operated via manual or automatic mode. Systems provided for each of the OS64 separators, DAF60 and Sludge tank for transfer to de-watering system. Four (4) pump systems shall be provided one pump at each of the oil water separators, one at the sludge storage tank and one at the DAF for sludge pumping.

Components:

- (4) motor driven, double diaphragm pumps with buna N diaphragms, valved inlet/outlet is mounted, plumbed and wired to the tanks or provided base mounted for installation near the tanks. (by others). Motor: explosion proof and designed for immersion in water, Power req'd: 460V/3ph/60 Hz. Pump performance to be 5 GPM @ 30 PSI discharge.
- NEMA 4 control panel. Controls will be included with HOA operation to control manual and automatic on/off of pump based on a field adjustable timer. Controls will be integrated into the MCC.

7.02 Float Pump-out System (1 SYSTEM PROVIDED)

Description: The Float Pump-out System will provide the capability of transferring skimmed sludge from the DAF float hopper. The system can be operated via manual or automatic mode.

Components:

- (1) motor driven, double diaphragm pump with buna N diaphragms, valved inlet/outlet is mounted, plumbed and wired to the DAF tank. Motor: explosion proof and designed for immersion in water, Power req'd: 460V/3ph/60 Hz. Pump performance to be 5 GPM @ 30 PSI discharge.
- NEMA 4 control panel. Controls will be included with HOA operation to control manual and automatic on/off of pump based on high/low levels in float hopper. Two float switches will be provided installed in the hopper. Controls are to be integrated into the MCC.

7.03 Bilge/Oily Waste/LET Effluent Transfer System (1 SYSTEM PROVIDED)

Description: The LET Effluent Transfer System will provide the capability of transferring effluent from the LET tank to the inlet of the OS64 pretreatment oil/water separator. The system can be operated via manual or automatic mode.

Components:

- (2) motor driven, double diaphragm pumps with buna N diaphragms, valved inlet/outlet, base mounted, inlet/outlet manifold plumbing. Motor: explosion-proof and designed for immersion in water. Power req'd: 460V/3ph/60 Hz. Each pump performance to be 100 GPM @ 30 PSI discharge.

- Controls will be included in the system MCC with HOA operation to control manual and automatic on/off of pump based on high/low levels in LET tank. Two float switches will be provided installed in the LET tank. Controls are to be integrated into the MCC.

7.04 Oil Pump-out Systems (2 SYSTEMS PROVIDED)

Description: The Oil Pump-out System will provide the capability of transferring separated oils or fuels from the internal oil reservoir of the OS Series separator to desired discharge point. The system can be operated via manual or automatic mode. One (1) pump-out system is provided for each of the OS separators (pretreatment & polishing OS64 separators).

Components:

- (1) motor driven, double diaphragm pump with buna N diaphragms, valved inlet/outlet is mounted, plumbed and wired to the OS separator tank or elevation stand. Motor: explosion proof and designed for immersion in water, Power req'd: 460V/3ph/60 Hz. Pump performance to be 5 GPM @ 30 PSI discharge.
- Controls will be included in the system MCC with HOA operation to control manual and automatic on/off of pump based on high/low levels in oil reservoir. Two (2) oil level float switches will be provided installed in the internal oil reservoir. Controls are to be integrated into the MCC.

SECTION 8.0 ALARMS

– Alarms

The system will be provided with the following alarms:

- High-high effluent level in DAF
- High-high effluent level in pretreatment OS64 ows
- High-high effluent level in polishing OS64 ows
- High-high level in sludge storage tank
- High-high level in each oil storage tank
- Leak detect in both oil storage tank interstitial spaces

Each alarm condition will actuate an audible alarm horn and indicating light on MCC door. An alarm silence pushbutton is provided.

SECTION 9.0 SLUDGE DE-WATERING SYSTEM

A vertical screw type press is provided for sludge de-watering.

Features:

- All contact parts will be made of T-304 stainless steel. The nuts used with stainless bolts shall be made of bronze.
- Screw: The 6" diameter screw with five stages of compression features interrupted, reducing pitch flights.
- Drive: The main drive is a direct coupled gear-motor unit, 3 hp motor, 240/480 volt, three phase. A dual shrink disc coupling is used to grip the

screw shaft.

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- Screen: Two piece stainless steel profile bar screen, .015" nominal slot, with stationary resistor teeth.
- Cone: A self-adjusting discharge cone controls press cake moisture content. Dual air cylinders actuate this mechanism. An FRL set and 4-way reversing switch are included for control adjustment.
- Bedframe: Formed stainless steel design. A rectangular flanged inlet hopper is integral with the bedframe. The liquid collection pan has a horizontal drain connection. Screen Cover: A stainless splash guard cover with handle is included.
- Cake dumpster: two, coated carbon steel dumpsters are provided, each provides ½ yard volume.
- Polymer sludge pre-conditioning system consisting of chemical pump, polymer makeup tank, mixer, low-level alarm, fresh water fill connection (plumbing by others), head tank/flocculator, high level cutoff and alarm.

SECTION 10.0 LET AFFF DETECTION SYSTEM

The treatment system will be provided with an AFFF detection system to monitor and alarm on detection of AFFF.

10.01 AFFF Monitor System

Optional not provided.

SECTION 11.0 MOTOR CONTROL CENTER (MCC)

The controls for all of the controlled devices as described in this quotation shall be combined into a single, Motor Control Center (MCC). The MCC shall be mounted in a freestanding NEMA 4X, stainless steel enclosure for outside installation. MCC design shall be per UL845 MCC guidelines. Voltage required: 460V/3ph/60 Hz. A door mounted, power disconnect is provided. The controls provided in the MCC shall be a complete, integrated design for the entire system presented in this quotation. Approximate enclosure dimensions: 133”L X 72”W X 114”H.

SECTION 12.0 SUMP PUMP-OUT SYSTEM

Two (2) submersible pumps rated for 20 GPM @ 30’ TDH will be provided loose for installation by others into an existing sump. The pumps will be controlled via a high/low and high-high level float switch system and will operate in lead/lag order. NEMA 4 controls will be provided in the MCC. Pump motors to be explosion proof and designed for submersion operation. Level switches are provided loose for installation in the sump.

SECTION 13.0 HYDRO-PNEUMATIC SYSTEM

The water supply pumps and hydro-pneumatic system shall consist of an air-gap tank, two electric motor driven, close-coupled, centrifugal pumps arranged in lead/lag operation and a 60-gallon hydro-pneumatic tank. The air-gap tank shall have a float valve to shut off inlet water on high tank level and two outlets for the pumps. The valve outlet shall be 6” above air-gap tank lip. The pumps will feed the hydro-pneumatic tank and shall be controlled by a pressure switch at the hydro-pneumatic tank. Pump motors are to be TEFC. Controls shall be integrated into the MCC.

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SECTION 14.0 WALKWAYS

Four (4) Walkways will be provided for:

- OS64 pretreatment separator
- OS64 polishing separator
- CT-FF
- DAF-60

The walkways will be aluminum constructed with handrails. Features are:

- Handrails per OSHA guidelines
- Deck grating, aluminum
- Self closing safety gate at each walkway access point
- Attachment to tanks in cantilevered design
- Ladder access on each walkway access point
- Detached for shipping

SECTION 15.0 SPARE PARTS

The following spare parts are provided:

- (2) intrinsically safe relays
- (3) chemical pump rebuild kits
- (1) pH probe
- (2) oil level float switch assemblies
- (1) polyblend seal kit
- (2) float switches
- (1) DAF pump seal kit
- Touchup paint for tanks

SECTION 16.0 SITE STORAGE

Pan America is not providing any materials or services for maintaining the equipment in storage until system is required for operation.

SECTION 17.0 FIELD TECHNICIAN ASSISTANCE

One (1) field technician is provided for three (3) days, one (1) trip to perform, startup of system at job site. This quotation does not include weekends and holidays.

SECTION 18.0 QUOTE VALIDITY & PRICING

This quotation is valid for 30 days from quote date. Costs may change after this date and pricing must be reviewed at time of order placement.

SECTION 19.0 WARRANTY

Pan America Environmental warrants its products to be free of defect in materials and workmanship for a period of one year from the date of installation, not to exceed 60 days from equipment receipt.

SECTION 20.0 SUBMITTAL PACKAGE

20.01 Submittal Approval Package

Upon receiving an order Pan America Environmental will engineer and produce a Submittal Approval Package, which allows you the customer to review and change or keep aspects of the system detailed in this quote. The submittal package provides the following at a minimum:

- General arrangement drawings, 2D, 3D, plan, end, sectional, detail and other views
- Hydraulic profile
- Electrical schematics
- Control panel physical layout
- Process/control narrative (where project size is applicable)
- Component datasheets
- Component cutsheets

Options

- P&ID
- Structural, seismic, wind load, lifting lug review, anchorage and/or other PE review calculations
- Design sizing PE calculations and/or calculations of any other types
- Testing review and implementation during fabrication and assembly, i.e. NDT, NDE, radiographic, x-ray, ultrasonic, magnetic particle exam, others
- Piping testing per desired standards, i.e. ASME B31.1 power piping, ASME B31.3 process piping
- Rigging and lifting guide, drawings and/or procedures and methods
- WPS, ITP, PQR, PMI, others
- Document, QC report and/or other project document binder
- Mill certificates

Revisions & Meetings

The submittal package contains a limited amount of engineering and provides a maximum of Two (2) revisions of up to 10% maximum each. This quote does not include open ended, extensive or continuous revisions until approval is given. This submittal package does not include: Iterative R&D and review projects, design/redesign projects, pre-submittal before or after order placement to attain approval from the end user before order is placed, honored or executed by Buyer, engineers/consultants, contractors and/or other parties involved with this project. In addition, numerous and/or excessive meetings relative to

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the system design and complexity are not provided as PAE strives to have all valuable communications in writing so as to create a trackable/traceable project evolution.

Engineering Only

The quotation provides a limited amount of engineering and does not provide “Engineering Only”. The limited engineering is part of the system cost and is provided to give direction and final understanding as to what is being provided to you in the system design. The quoted and submitted system is a proprietary PAE product and PAE will not produce drawings for you to build, license, bid out or produce and/or market as your product for your or any other entities use.

Photo of A Pan America Environmental, Inc. BOWTS-16085 Bilge Treatment System

360/60 GPM complete turnkey facility



Photos of A Pan America Environmental, Inc. BOWTS-250500 Bilge Treatment System

250 GPM complete turnkey facility

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Specifying a BOWTS Bilge Oily Water Treatment System for your project?

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