Operation & Maintenance Manual

Pump & Treat Water Treatment System

Model FII-5-P&T- MLE-OWS-1-CS

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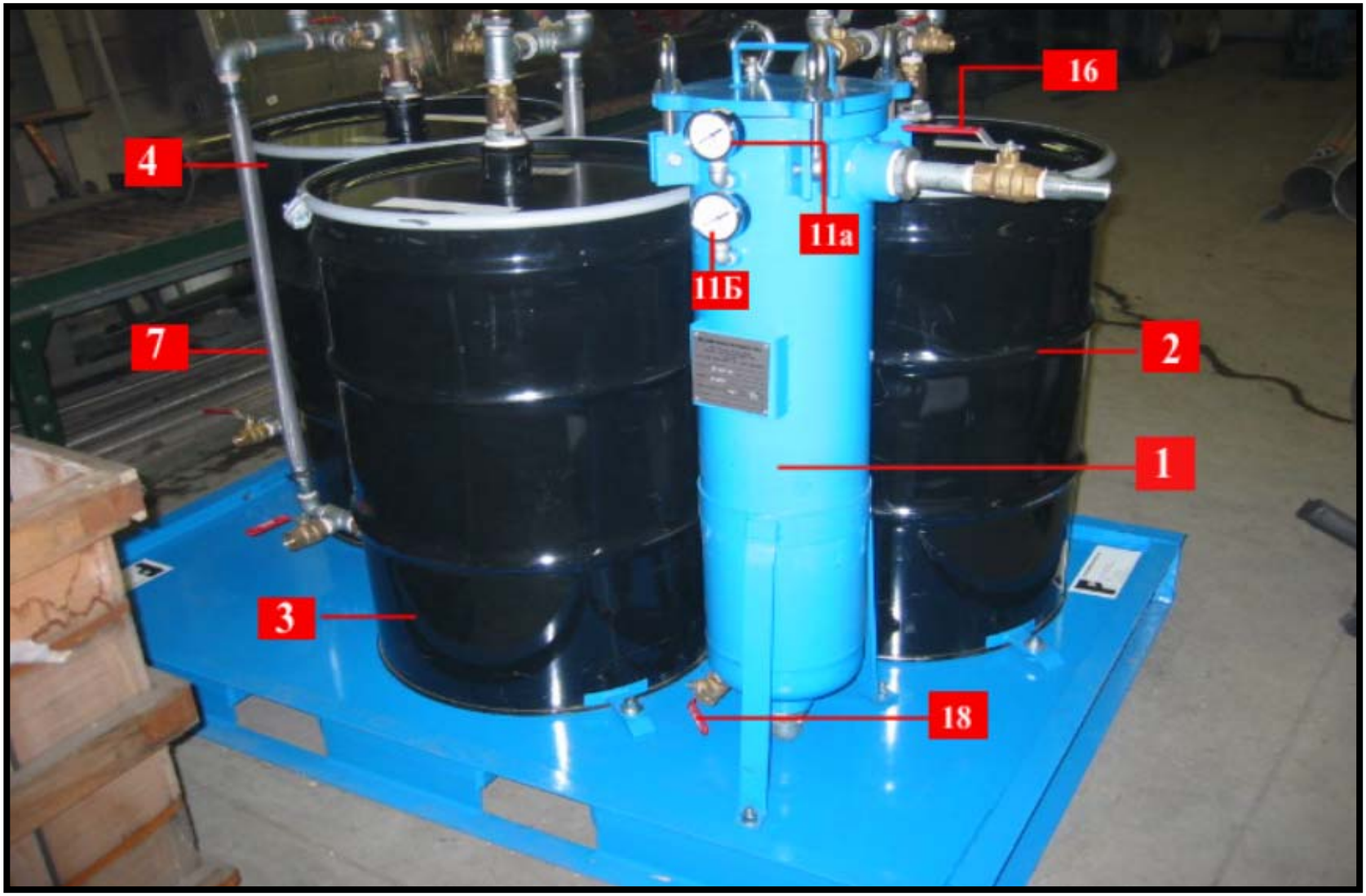
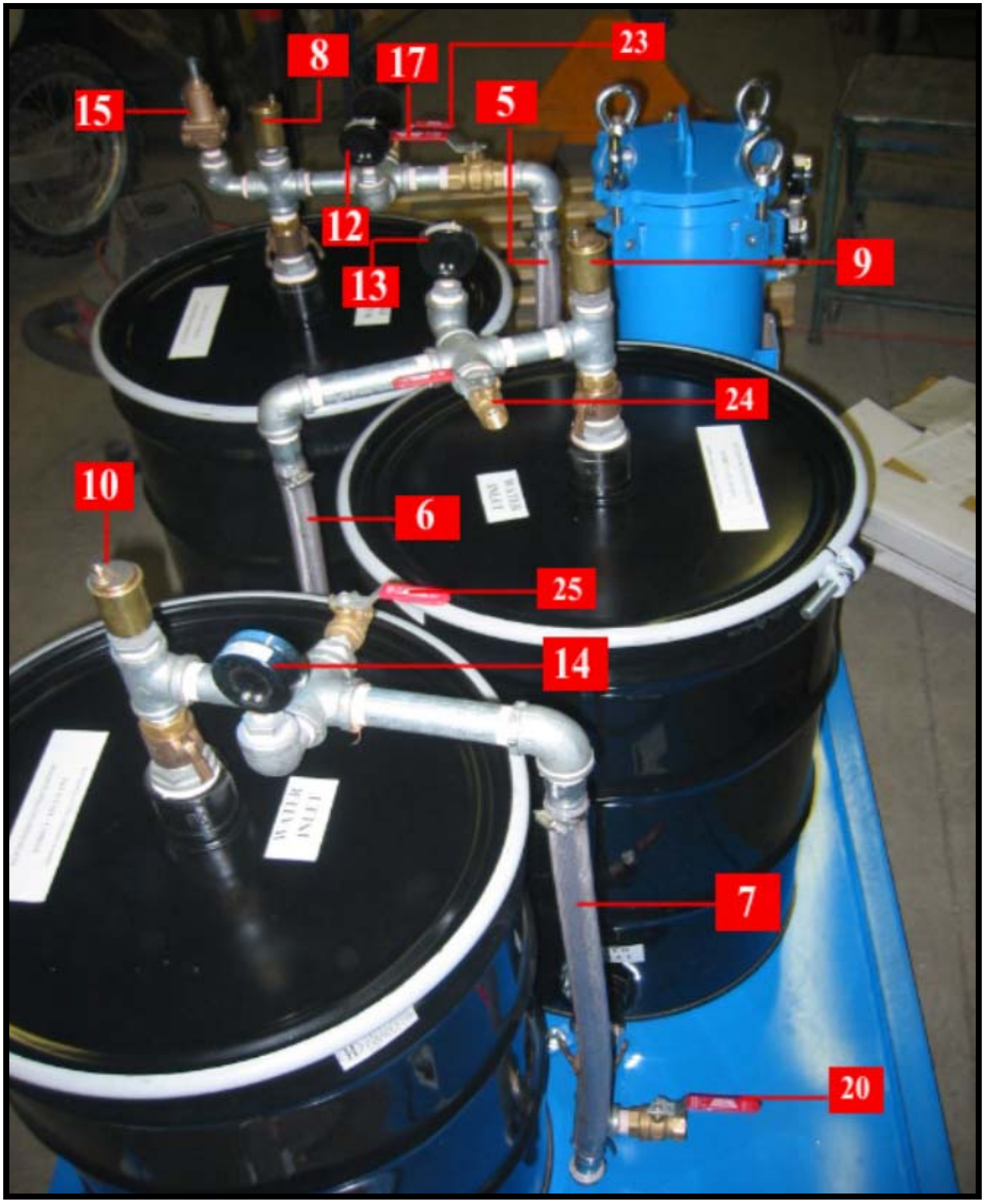


Photograph 1 – 5 GPM Pump & Treat System (First View)



Photograph 2 – 5 GPM Pump & Treat System (Second View)

Photograph 3 – 5 GPM Pump & Treat System (Third View)

2.0 General Information

2.1 Product Overview

The *Filter Innovations* Pump & Treat Water Treatment System is the simplest, most efficient and most versatile method for removing organics, oil, and grease from wastewater streams. Contaminant levels below those set out in the Municipal Sewer-Use Bylaws can be readily achieved.

Filter Innovations Pump & Treat Oil Absorption Equipment (Model FII-5-P&T-1-P) consists of three basic components:

2.1.1 The Particulate Filter

The Particulate Filter is a pre-filter designed to effectively remove any dirt and dust particles that might prematurely plug the oil-absorbing media. It is a bag filter system consisting of a pressure vessel, a micron-rated disposable filter bag and a restrainer basket to support the filter bag.

The disposable filter bag is a triple-layered bag with a filter rating of approximately 1 micron. It can hold between 1 and 5 pounds of dry solids before becoming plugged. Contaminants which have been filtered out are contained within the bag, and rapid access to the filter bag ensures the quick and easy clean-up of the vessel. “Spaghetti” media is added to the clean filter bag to enhance its particulate-holding capacity by up to 5 times.

2.1.2 The Oil Absorbing Media

The Oil Absorbing TM Media (TM 100) is contained in removable drums. The steel drums are epoxy-coated, making them both chemical- and abrasion-resistant. The TM media absorbs oil and grease through a partitioning phenomenon. The unique characteristics of the media result in a slight swelling of the bed as it removes the hydrocarbon from the contaminated liquid. At the maximum pressure allowance of 8 PSI, pumping action through the system will be stopped due to saturation of the media. The flow of unfiltered liquid through and out of the system will be automatically prohibited until the TM Media is replaced.

2.1.3 The Activated Carbon

The *Primary* carbon absorption drum removes all low molecular weight organics. This unit can hold 160 pounds of granular, activated carbon and comes complete with inlet and outlet headers.

The *Secondary* carbon absorption drum polishes any contaminants that may flow from the primary carbon drum. When the primary drum becomes saturated, it should be replaced with secondary drum. A new drum should be placed in the secondary position.

Both carbon absorption drums contain GC 12x40, a virgin activated carbon that is granular in form. Made from the finest grades of bituminous coal, it is ideal for many liquid phase applications including the removal of organics from water stream and the purification of potable water.

2.2 Warnings

The Pump & Treat System **should not be used for the separation of chemical oil emulsions.**

The Pump & Treat System is designed with disposable *FII* filter products of the type and model specified in the operation instruction manual and drawings. Safe operation and performance is guaranteed with the specific *FII* filters. We will not guarantee the performance and function of the system with other makes, models or types of components. **Any accidents or damages caused by using incorrect, non-specified filters or media are the full responsibility of the operator or user.**

3.0 Pump & Treat System Installation

Setting up the Pump & Treat System for the first time:

1. Remove the unit from the skid, being careful not to damage any of the system components.
2. **Note:** Be sure to correctly identify the inlet and outlet connections of the unit to avoid piping the unit backwards. The filter will not perform if the connections are reversed.
3. Proceed with the required piping by referring to the drawings.
4. Tighten all bolts evenly and securely. **Note:** Check to make sure that the bag filter has been installed in the filter vessel before tightening the end cover bolts.
5. Install all pressure gauges, air eliminators and pressure relief valves.
6. Ensure that the drain piping is led well away from the unit. The water drain lines can be connected into a common drain system.
7. After all connections have been made and all bolts have been tightened securely, the unit is ready.

4.0 Pump & Treat System Operation

4.1 System Start-Up

To place the unit in operation, the following procedures must be observed:

1. Close all drain valves [18,19,20,21] and open the discharge valve [22].
2. Open the flow control valve [17] slightly.
3. Check the flow. If it is greater than 5 GPM, immediately adjust it with the control valve [17].

Warning: If the flow is greater than 5 GPM, the quality of the treated water will be severely compromised due to reduced contact time between the water and the media. If excessive flow or pressure (greater than 15 psi) is allowed, damage to the drums or leakage will occur.

4. Allow water to completely fill the system. This will purge any air trapped in the filters.
5. Check the flow and ensure that it is still less than 5 GPM.
6. All water to flow approximately 5-10 minutes to ensure all trapped air, TM-fines and carbon fines are removed from the system.

Warning: The unit should only be drained when changing filter elements or when it is no longer in service. The oil-absorbing media must remain immersed in water to eliminate air pockets that can compromise its oil-absorbing capabilities.

7. Observe the pressure gauges and record differential pressure readings for future reference.
8. Samples of incoming water may be taken from sampling drain valves [18-21] and samples of discharge water after filtration may be taken from sample drains [21] or [22].
9. The system is now ready to treat your wastewater.

4.1 Monitoring System Pressure

The filter system requires minimal attention after the initial installation. However, regular attention should be paid the differential pressure readings within the system.

1. When the differential pressure across the bag filter vessel [1] reaches 15 psi, as shown by the gauge [12], the pump should be shut off. The bag filter is plugged and needs to be changed.
2. When the differential pressure across the oil-absorbing drum [2] reaches 8 psi, as shown by the inlet and outlet pressure gauges [11a &11b], the pump should be shut off. The oil-absorbing drum is saturated and needs to be replaced.

When a filter bag or drum is plugged, it must be cleaned before pumping can resume. When the primary carbon drum [3] becomes saturated, it should be disposed of and

replaced with the secondary carbon drum. A new carbon drum should be put in the secondary position.

5.0 Pump & Treat System Maintenance

5.1 Changing Filter Bags

Note: Figure numbers refer to Photograph 1 (Section 1.2)

1. Check pressure gauges [11a, 11b] to confirm that either the filter bag is plugged or the replacement is mandated by daily change-out requirements.
2. Shut the system off.
3. Shut the bag filter isolation valve inlet into the bag filter [16]. This will prevent wastewater from continuing into the bag filter.
4. Shut the flow control valve [17]. This will prevent any backflush water from entering the bag filter.
5. Open the sampling valve [18] at the discharge of the filter. The product drained from the filter may contain contaminated wastewater and should be piped or collected accordingly. This will also relieve any internal pressure.

Note: The most important step when replacing filter bags is to ensure that the pressure in the filter vessel is relieved prior to opening the unit. This is accomplished by opening the sampling valve [18] at the discharge of the filter.

6. Loosen bar knobs on the lid so that they are free and the eye bolt assembly can be swung away.
7. Remove and discard the filter bag.
8. Insert the clean filter bag into the restrainer basket (already installed) and form the bag to the contours of the basket by pressing against the restrainer basket.
9. Check positioning of the O-ring, which should be properly seated in the filter. The ring of the filter bag must be seated in the edge provided by the restrainer basket.
10. Close cover carefully. Do not drop. Tighten bar knobs evenly and securely.
11. Close the drain valve [18].
12. Re-open flow control valve [17] slightly and open bag filter isolation valve [16].
13. The unit is ready to operate. Restart the system. Upon restart, ensure that the flow is less than 5 GPM. If the flow is greater than 5 GPM, adjust the flow control valve [17].
14. In the logbook, record the time, date and number of gallons processed for the bag filter change.

5.2 Changing the Oil-Absorbing Drum

Note: Figure numbers refer to Photograph 1 (Section 1.2)

1. Check pressure gauge [12] to confirm that the oil-absorbing drum is plugged and requires a change-out.
2. Shut down the system. Close the isolation valve [16] prior to inlet connection on bag filter.

3. Open the drain valves [18] and [19] to relieve internal pressure and remove any water which may remain in the drum. Wait 10 minutes to allow all drain-water to escape.

Note: The most important step when changing the oil-absorbing drum is to ensure that the pressure in the system is relieved prior to removing the drum. This is accomplished by opening the drain valve [19] at the bottom of the drum.

4. Undo the inlet and the outlet of the drum.

Note: The saturated weight of the drums and media is approximately 500 pounds. The drums must be handled with proper equipment when removing them from the skid.

5. Remove spent drum.
6. Replace with new drum. Replace and retighten inlet and outlet of drum.
7. Close drain sample valves [18] and [19] and open isolation valve [16].
8. Unit is ready to operate. Restart the system. On restart, ensure that the flow is less than 5 GPM. If the flow is greater than 5 GPM, adjust the flow control valve [17].
9. Record in the logbook the time, date and gallons processed for the TM-100 change.

5.3 Changing Activated Carbon Drums

Note: Figure numbers refer to Photograph 2 (Section 1.2)

1. Check water samples from valves [20] and [21]. If water quality is the same, then the carbon drum is saturated and must be replaced.
2. Shut the system off.
3. Close the isolation valve [16] prior to inlet connection on bag filter.
4. Open drain valve [18], drain valve [19] at the bottom of the TM-100 drum and drain valve [20] at the bottom of the carbon drum to relieve internal pressure and remove any water which may remain in the drums. Wait 10 minutes to allow all drain-water to escape.

Note: The most important step when changing the activated carbon drum is to ensure that the pressure in the system is relieved prior to removing the drum. This is accomplished by opening the drain valve [19] at the inlet to the activated carbon drum.

5. Undo the inlet and outlet of the activated carbon drum.

Note: The saturated weight of the drums and media is approximately 250 pounds. The drums must be handled with proper equipment when removing them from the skid.

6. Remove the activated carbon drum.
7. Replace and retighten the inlet and outlet of the carbon drum.
8. Close drain valves [18], [19] and [20] and open the isolation valve [16].

9. Unit is ready to operate. Restart the system. On restart, ensure that the flow is less than 5 GPM. If the flow is greater than 5 GPM, adjust the flow control valve [17].
10. Record in the logbook the time, date and gallons processed for the activated carbon change.

6.0 The Oil/Water Separator

6.1 General Information

The operation of a coalescence type separator is based on the use of relatively close coalescence surfaces that reduce the distance an oil droplet must travel before it reaches a collection surface. Coalescence media are constructed of materials that are both hydrophobic (water-repelling) and oleophilic (oil-attracting) and will therefore draw oil particles out of the water phase. When an oil droplet comes in contact with the media, it reaches a zone of zero velocity and adheres to the surface. The coalescence media thus increases the efficiency of the natural separation action of oil and water.

As the media becomes coated with continuously agglomerating oil, the oil begins to form droplets that coalesce and migrate upward. When the oil droplets reach the top edge of the media surface they will detach and float to the surface of the separation chamber. There are now two distinct zones of liquid in the separator – oil and water. On the surface, an adjustable skimmer will collect the oil and transfer it to a collection chamber for disposal. Meanwhile, clear water underflows the oil and is continuously discharged from the system.

Simultaneous with oil/water separation, solids are settled out through the spacing of the media pack matrix. They are collected in a hopper-bottomed sludge chamber below the coalescence media pack and stored here until disposal.

The Oil/Water Separator package will have either a gravity discharge line for the clean water or a discharge pump. If the discharge pump is present, level switches are

used to control the pump. The oil is usually directed into an external oil tank with a level switch that can shut the system down when the tank is full.

6.2 Oil/Water Separator Installation

Setting up the Oil/Water Separator for the first time:

1. Place the separator on a level foundation – preferably a gravel or concrete base. The separator tank must be level to within 1/8" per foot in order to operate properly. Water should always flow away from the base of the unit.
2. Install valves or plugs in the cleanout and drain couplings.
3. Attach inlet piping to the inlet coupling, if required.
4. Attach outlet piping to the outlet coupling, if required.
5. Mount the level switches, if required.
6. Attach the oil outlet piping to the oil outlet coupling.

6.3 Oil/Water Separator Operation

6.3.1 Filling the Unit

1. Fill the oil/water separator with clean water. Fill from the inlet end until some water spills over the weir into the outlet tank.
2. Adjust the product skimmer inside the unit so that the intake is about ½" above the water level. This ensures that no water will escape down the pipe into the oil storage tank.

6.3.2 Starting Up the Pump

To start up the pump for the first time:

1. Turn on the pump.
2. Check the power draw on all legs.
3. Check the flow rate of the water.
4. Regulate the flow rate of the water with the upstream gate valve. This flow should not exceed the design capacity of the system
5. Check for water leakage around the pump and fittings.

6.3.3 System Start Up Requirements

- System must be started
- Level in the Oil/Water Separator sump must be at the Hi level switch
- Level in the Oil/Water Separator sump must be at the Low level switch
- Any downstream equipment must be ready to accept water
- The main alarm must not be on

6.3.4 System Stop Conditions

The system will stop if any of the conditions outlined in Section 6.3.3 (System Start Requirements) are not met.

6.4 Oil/Water Separator Maintenance

6.4.1 General Troubleshooting Techniques

- Check for leaks around the separator
- Drain and clean the separator on a year or bi-annual basis, as required.
- Remove the coalescing media and clean or replace media if necessary.
- Check the tank anode (if present) and replace is necessary.

6.4.2 Typical Problems and Solutions

Problem: No oil is being discharged from the tubular oil weir
Causes/Solutions:

- Discharge piping is too low – increase elevation by screwing higher
- No oil is accumulating on the surface

Problem: Process water has oil in it
Causes/Solutions:

- Influent flow is too great for the system design – reduce flow by closing the inlet ball valve
- Unit was started without enough solution to exceed the bottom of the vertical weir
- Chemical emulsified oil cannot be separated

Problem: Exit oil has aqueous content
Causes/Solutions:

- Skimmer opening is below the oil/water interface – adjust skimmer alignment to allow more oil to collect before skimming
- Discharge pipe is set too high – reduce elevation by screwing lower
- Coalescer is restricted by dirt – clean unit

Problem: Unit is overflowing
Causes/Solutions:

- Output is restricted – clean unit
- Output too great for system design – reduce flow to coalescer by closing inlet flow control valve

Problem: Pump is picking up air
Causes/Solutions:

- Floating intake is too high – adjust accordingly