

DRAFT LIFT STATION

STANDARD OPERATING PROCEDURES AND PREVENTATIVE MAINTENANCE

Each type of lift station will be different. This document addresses the characteristics and specifics common to each type of lift station.

THE FUNCTION OF A LIFT STATION

Lift stations help to move wastewater downstream. Wastewater flows by gravity to a wetwell at the lift station. Pumps in the lift station then pump the wastewater to a higher level, allowing gravity to move the wastewater downstream in the collection system.

LIFT STATION CONTROLS

The most common type of lift station is where the pumps are submerged in the wetwell. The controls are located in a panel outside the wetwell. The pumps are lowered into the wetwell on a rail and latch onto a base anchored to the bottom of the wetwell. The on/off controls are usually a float system and can be adjusted to determine the amount of water pumped at a given interval. Most lift stations have some type of alarm system to notify the operator of a problem in the station.

LIFT STATION SITE/BUILDING

The site/building is the physical location of the lift station. The building can house the control panel, generator, and spare parts for the lift station. It can also be the access point to the dry well. The site should give the operator a safe location to park out of traffic. The site may be fenced or have secured access...

Lift Station Site/Building Maintenance

The site/building should be well maintained. If the control panel is mounted on posts, the posts should be firmly set in the ground and not wiggling. The board that the panel is mounted to should be free of rot and painted. The parking area should be clearly marked to allow the plowing of snow in the winter. Landscaping should be maintained. The outside of the building should be maintained. If there are blowers in the building, the filters should be checked quarterly and replaced yearly or as needed. Follow the manufacturer's recommendations for maintenance.

WETWELL

The wetwell collects the water flowing through the sewer so it can be pumped up and allow gravity to carry it to the next point.

Maintenance on the Wetwell

The wetwell should be cleaned at a yearly minimum. The solid buildup should be either removed or flushed to the pumps. The best option is to remove the solids as pumping them into the collection system does not solve the problem; it just moves it to another location in the system. The walls of the wetwell should be washed to remove grease build-up. Check sidewalls for the spalling of concrete from hydrogen sulfide (H₂S). The combination of H₂S and water makes sulfuric acid, which will eat the concrete and metal in the station. Any deterioration of the concrete or metal should be repaired. The wetwell is a confined space! If the operator must enter the wetwell “Confined Space Procedures” must be followed.

FLOATS

Floats are used to turn on or off the pumps and to trigger an alarm. The floats are designed to be either in a standard closed or open position, depending on what you want to happen when the float changes position. When the float rolls up (goes from hanging straight down to floating), it will turn on the pump, closing the circuit, this would be a normally open position. When it is floating and rolls down (hangs at the end of the cord) that would be a normally closed position, and the pump is turned off.

Floats are usually set from the bottom up, Per the following functions:

1. The lowest float turns all pumps off
2. The second float up turns the lead pump on
3. The third float up starts the lag pump
4. Top float signals to the operator that there is a high well condition

Sometimes there is a float below the ‘all pumps off float’ that will trigger an alarm notifying the operator that the pumps did not turn off.

Maintenance to be completed on the floats

Follow manufacturer recommendations for maintenance. The floats should be checked for operation. Does the float turn the pump on or off as required? Do the alarm floats trip the alarm? Floats are checked by removing them from the station and either tipping them up or down to check the contactors in the electrical panel for operation. If a float does not trip the contactor, determine if the problem is the float or the contactor. If it is the float, replace the float. Then check again to make sure it is working. If it is the contractor, call an electrician.

Floats should be clean and not covered in grease. Grease or other floatables may prevent the float from either rolling up or rolling down. Floats may be cleaned manually or the wetwell may be kept free of excess grease.

BUBBLER SYSTEMS

Bubbler systems consist of an air compressor and a static tube located in the wetwell. The pressure to push the air out the tube determines the depth of the water. The pumps are set to turn on and off, depending on the pressure. Alarms are triggered in the same manner.

Maintenance on the Bubbler Systems

Follow manufacturer recommendations for maintenance. The compressor should have the water drained at each visit, and the compressor tank should be emptied monthly. Watch the compressor refill it to make sure the system is operational. If there is an hour meter attached to the compressor, record the hours. The static tube should not be clogged or blocked. Grease may become lodged in the tube if the water level becomes too low.

ULTRASONIC SYSTEMS

Ultrasonic systems use an ultrasonic pulse that is sent down to the wastewater surface and bounces back to measure the distance. Based on the level of the water, it will turn the pumps on, off, or send an alarm.

Maintenance on Ultrasonic Systems

Follow manufacturer recommendations for maintenance. Make sure the receiving unit is clean, and there is no fog or mist as this will give an erroneous reading.

PUMPS

The pumps move the water from a lower elevation to a higher elevation to allow gravity to move the water to the next unit process. On all pumps, when checking to see if the pump is running, go to the location that the pump discharges to and check to see if water is being pumped.

SUBMERSIBLE PUMPS

Submersible pumps are located in the wetwell and sit on a base containing the piping connected to the forced main. The pumps ride on a rail that allows the pump to be removed and replaced in the wetwell. The pumps must be covered with water to keep them cool.

Maintenance on Submersible Pumps

Follow manufacturer recommendations for maintenance. The pumps should be pulled every year and checked for wear and plugging. These pumps can not be viewed easily due to the location in the bottom of the wetwell and must be removed to be inspected. The electrical legs should be measured for amps monthly, and the contacts cleaned and tightened yearly. When removing the pump, check the electrical cable for wear and nicks in the insulation. Make sure the pump is spinning the correct direction if you disconnect the electrical leads before sending it back down into the wetwell. When checking to see if the pump is running, put the pump in manual control and turn it on. Touch the rail and look in the wetwell to see if water is being pumped, and by touching the rail, you can feel the vibration of the pump running.

FRAME PUMPS

Frame pumps are either located in the dry well adjacent to the wetwell or mounted above ground. When they are in a dry well, the dry well is a confined space. You may need a confined space program and a permit to enter the dry well to conduct the work. The drywell may be considered a confined space. The dry well should be ventilated before entering and it should be monitored with a gas detector to prevent injury to the operator or loss of life. If it is considered a confined space, the operator must follow “Confined Space Procedures”.

Maintenance on Frame Pumps

Follow manufacturer recommendations for maintenance. Check the packing on the pump as it should have a couple of drips from the packing a minute. Listen for odd noises and check for vibration when the pump is running. Cleanup any spilled or leaking wastewater. Check pump and frame for rust. If rust is forming, clean off the rust and paint.

CONTROL PANEL

The control panel contains all the components to run the pumps. The panel may contain an electrical schematic of the controls for the lift station, spare parts for the electrical system, spare fuses, the alarm system, and a transfer switch to change from line power to generator power in the event of a power outage.

Maintenance on the Control Panel

Check the panel for tampering. The panel should be secured against unauthorized entry either with a padlock or screwed shut. Keep your hands and other objects away from the electrical components inside the panel. When opening the panel, check for insects—wasps and spiders like to build their nest in them. Check to see if it is warm or cold. The components work best if they are not overheated from the sun. Check to see if the fan for cooling or the heater is

operational. Record the hours of operation for each pump on the log sheet at the station. If the sheet is full, replace the log and return the completed log to the office to file under the lift station file. Turn the Hand/Off/Auto (HOA) switch to 'hand' and run the pumps. Make sure the contactors pull in to energize the pump. Look at the attachment points for the wires to the components in the panel, do any of them look burnt? If they are burnt, call an electrician to repair. Check the alarm unit. Does it have power? Cause an alarm condition and see if alerts that there is an alarm. If you have a portable generator that attaches to the control panel for auxiliary power, hook it up to the system and run the system on the generator quarterly. This accomplishes several things: it makes ensures the station will run on generator power and that the generator portion of the standby generator unit is actually running under load and not just the engine is running. The operator will then become familiar with connecting the generator up to the lift station and having the power flow from the generator to the lift station.

Your Lift Station Standard Operating Procedures may be different than these that were written to be a guideline for putting together your own Standard Operating Procedures. The Standard Operating Procedures should be specific to your collection system lift stations. If you have any other type of pump, you will have to write your own maintenance procedures for the particular system you operate.