



Industrial Wastewater Treatment Technologies

Any industry produces some type of waste product either from production or maintenance. Hazardous and nonhazardous wastes need to be properly stored, treated and discharged to sewer system or disposed of. Wastewater treatment is a multi-stage process to renovate wastewater before it is discharged to the municipal sewer system. The goal is to reduce or remove organic matter, solids, nutrients, diseasecausing organisms and other pollutants from wastewater in compliance with regulatory limits and to discharge processed wastewater to a municipal sewer for a fraction of the cost of waste hauling.

Newterra offers industrial wastewater treatment technologies to allow industries to treat almost any industrial waste stream including those high in suspended solids, fats, oil and grease, organics and other contaminants.

To reduce environmental impacts of effluents from a variety of wastewater generated by industries, Newterra ensures that wastewater is treated using one or a combination of two or three technologies and practices that minimize harmful environmental impacts, and that the sludge removed during wastewater treatment is recycled or disposed of properly.

Direct Line Environmental

Direct Line Environmental Services Inc. is a fully integrated liquid waste management company that has been involved in the collection and processing of waste in the Province of Ontario for over twenty years.

Direct Line's current "Physical and Chemical Waste Treatment Plant" totals approximately 13,000 square feet. To expand the processing capabilities, an adjacent 8.5 acres has been acquired and additional 29,000 square feet will be also added to the facility.

Direct Line industrial/commercial waste management programs include, but are not limited to, the transport and/or treatment/recycling/disposal of wastewater, non hazardous and hazardous sludge, laundry, acid and alkaline wastes, waste oil and spent fuels, interceptor waste, used oil filters, parts washer and gun cleaner solvents, spent glycol and paint sludge.

Their goal is to provide responsible environmental services that meet or exceed the requirements of

regulators and industry standards. To that end, Direct Line is committed to "quality management" and continuous improvement in all areas of by being both ISO9001 and ISO14001 registered.



Treatment of Industrial Wastewater at Direct Line Environmental

The construction of a larger wastewater treatment system was identified at Direct Line in order to increase the capacity of the water treated by the old plant. The facility's capacity has increased from 250,000 gal. to 2.5 millions gal.

Currently, there are 20 tanks in the tank farm. Nine of them are 13 ft in diameter and 40 ft high. The rest of them are 10 ft in diameter and 40 ft high.

To treat different types of wastewater received by Direct Line Environmental, Newterra was contacted to design and install a complete wastewater treatment package.

Treatment Stages

A group of processes were designed to separate, modify, remove, and destroy undesirable contaminants in the wastewater collected from various industrial sources contaminated by acid, caustic, emulsified oil, coolants and etc. Wastewater is held in collection tanks for several hours allowing the particles to settle to the bottom and the grease to float to the top.



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The solids will be then removed from the bottom of the tanks and the oil and grease will be skimmed off by an oil water separator. Water is pumped from the bottom of the storage tanks to the first stage of the treatment system. A RevoScreen will screen out or separate debris from the wastewater. Large particles, sand, gravel, etc., are removed at this stage.

A RevoScreen is internally fed rotary drum incorporating wedge wire screen with slots ranging from 0.010" to 0.100" oriented perpendicular to the direction of rotation.



The feed enters a non-clog flow diverter where it is evenly distributed onto the sidewalls. This leaves screenings on the inside of the drum as the liquid flows radially through the openings as the screen rotates.

It has a stainless steel construction with a TEFC motor, a shaft-mounted gear drive and an enclosed solids discharge chute. The collected debris will be then disposed of in the landfill.

Oil and grease is removed from the wastewater using a specially designed oil water separator. However, hydraulic oils and the majority of oils that have degraded to any extent will also have a soluble or emulsified component that will require further treatment to eliminate.

A 100 GPM oil water separator draws oil particles out of the water phase using the oleophilic media.

As additional droplets continue to collect, they coalesce with the previous droplets and rise to the surface of the separator.

On the surface, an adjustable product skimmer collects the oil and transfers it to the oil outlet coupling.

Following solids and oil separation, the wastewater will be transferred to the chemical treatment system where the pH is adjusted and additional organics, inorganics and particulates are removed.

The chemical treatment process consists of a four-compartment system to fully treat the incoming wastewater. The pH adjustment will be done automatically using either acids or bases.

Followed by pH adjustment, the coagulation and flocculation occur using Alum and polymers. The water overflows to the slant plate clarifier and then pumped into a clean tank.

If further polishing is required, the water is pumped into the Organo clay and activated Carbon vessels.

Two bag filters in series are used for filtration of sediments down to 1 micron. The particulate filters effectively remove any dirt and particulates which would prematurely plug the media contactor vessels. Each bag filter housing consists of a pressure vessel, the micron rated disposable filter bags and restrainer basket (to support the filter bag).

The disposable filter bag is a triple layered bag having a filter rating of approximately 1 micron. It will hold approx. 5 pounds of dry solids. Rapid access to the filter bag ensures a quick and easy clean-up of the vessel, since filtered contaminants are trapped within the bag. The bag filters are followed by a clay treatment system removing traces of oil. The oil absorbing media is contained in a large contactor vessel. The media absorbs oil and grease through a partitioning phenomena. The unique characteristics of the media results in a slight swelling of the bed as it removes the hydrocarbon from the contaminated liquid.

Following the oil adsorbing unit, two carbon contactor vessels will remove the organics. The primary carbon absorption unit removes all low molecular weight organics and the secondary carbon absorption unit polishes any contaminants that may flow from first





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carbon contactor vessel. Filter Innovations virgin activated carbon made from the finest grades of bituminous coal, it is ideal for many liquid phase applications including the removal of organics from water streams and the purification of potable water.

During monitoring, when the primary carbon vessel becomes saturated, it will be replaced by the secondary carbon vessel and a new replacement unit will be used as the polishing unit. Sludge from the clarifier will be sent to a filter press for sludge thickening. The filter elements are supported in a fabricated mild steel filter press framework.

At one end of the filter is the feed head and at the other is the cross head containing the hydraulic closure, both with integral legs and base. The moving head (tail plate) which along with the feed head will enclose the filter elements by hydraulic force provided by the power pack.

Extensive use of box designs and heavy gauge plate ensure a rugged and robust framework design, ideally suited to the rigorous duties encountered during the filtration.

Sludge will be sent to hazardous or non hazardous landfill depending on the quality of waste.

Three automatic valves are added on three pump stations and all the pumps are controlled by a PLC control system.

Once all the particulates, oil and grease, organics, and chemicals are removed, the treated water will be then discharged to the sanitary sewer system.

Control System

At Direct Line, instead of relay logic panels (hard wiring and electro/mechanical Relays), a Programmable Logic Controller (PLC) has been used as illustrated in the picture.

A PLC is a small computer with inputs and outputs that executes a set program stored inside in nonvolatile memory. Field devices such as level switches, pressure switches, flow meters are connected to the system inputs. Motors, solenoid valves and other electric devices are connected to the outputs. The logic to control the system is entered as a program into the PLC.

The custom designed, programmed PLC at Direct Line operates at 575 Volts and utilizes Direct Logic DL 250 controller, a 15" color touchscreen, Westinghouse variable fire gauge drives and square D contractors.

PLC's natural advantage over relay systems is that the logic could be easily modified, and more complex logic could be also accomplished.

The system also has Ethernet compatibility and can be monitored and controlled from offsite by connecting to a phone line via a modem. This enables communication from remote distances. The huge benefit of using the remote access system with a PLC on site is that all the information about the system could be viewed, pumps could be run remotely to clear alarms, and systems could be restarted, all with no operator visit.