

# Process and Flow Technologies Water Solutions





## Water Solutions

### Our integrated water solutions keep your operations flowing.

Every oilfield and industrial site we visit has one important element in common—water. We provide process expertise and innovative technology that enhances the efficiency and profitability of your business throughout your project’s lifecycle, and we deliver smart solutions to help you manage your water operations.

Whether in oil and gas or across various industrial markets, we work with you from the beginning to develop an integrated solution with superior performance—maximizing your project lifecycle economics. By consistently providing reliable, technical solutions, we will help your business grow and provide you with the confidence you are looking for in a strategic partner.



## Services and Aftermarket

Service expertise drives predictable uptime that is critical to your operation. In every situation, you can rely on us to provide quick and effective support throughout the entire life of your project. Our deep knowledge of your processes ensures you have the latest technology for your application to get the job done right, with trusted products you can depend on—first time, on time, every time.

### GoConsult: Consulting and Engineering Services

- We provide facilities layout and equipment selection consulting, custom engineering of equipment based on client needs, and assessments of inefficient operations, maintenance and equipment.
- Regular data reviews and consultations on process equipment packages

### GoSpares: Spare and Universal Parts

- We provide and install spare parts for all our products as well as universal parts to keep your equipment up and running.

### GoServe: Field Services

- We support our customer’s onsite after equipment delivery providing local field services like installation, commissioning, decommissioning, troubleshooting and maintenance.
- We review and confirm proper equipment choice for the customer’s situation and application.
- We provide regular health checks of equipment as needed, including optimization and troubleshooting.

### GoConnect: Automation and Technology Support

- We provide support for automated, onsite control systems and remote monitoring services.

### GoDevelop: Training Services

- We provide specialized training courses, tailored to fit the customer’s need, available at the field location or in a classroom convenient for our customers.

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## Offshore Oil and Gas

With top-of-the-line topsides processing design, manufacturing and fabrication, we can handle all your water collection and treatment needs offshore.

### Separation and Pressure Vessels

Separation packages and modules can be designed and customized to suit the needs of each production facility. With high-efficiency vessel internals available and software to optimize the design, our vessels are the superior choice.

- 2, 3, 4 phase separation vessels
- Test and well cleanup
- Bulk desanding
- Production separators
- Slug catchers
- Free water knockouts

### Produced Water Treatment

Our complete, produced water treatment and injection solutions are designed to manage increasing levels of water production. We offer water treatment packages from design to fabrication including:

- Hydrocyclones
- Assisted gravity separation
- Fine filtration
- Gas stripping
- Dynamic oil recovery
- Compact flotation

### Sea Water Treatment

Developing an efficient and effective sea water treatment strategy plays an important part in the success of your offshore operations. We offer a variety of sea water treatment topsides packages, customized to suit your needs, including:

- Self-cleaning coarse strainers
- Cartridge or media filtration
- Ultrafiltration
- Deoxygenation
- Sulphate removal
- Reverse osmosis desalination
- Low salinity

### Tore™Scrub Sand Cleaning Solution

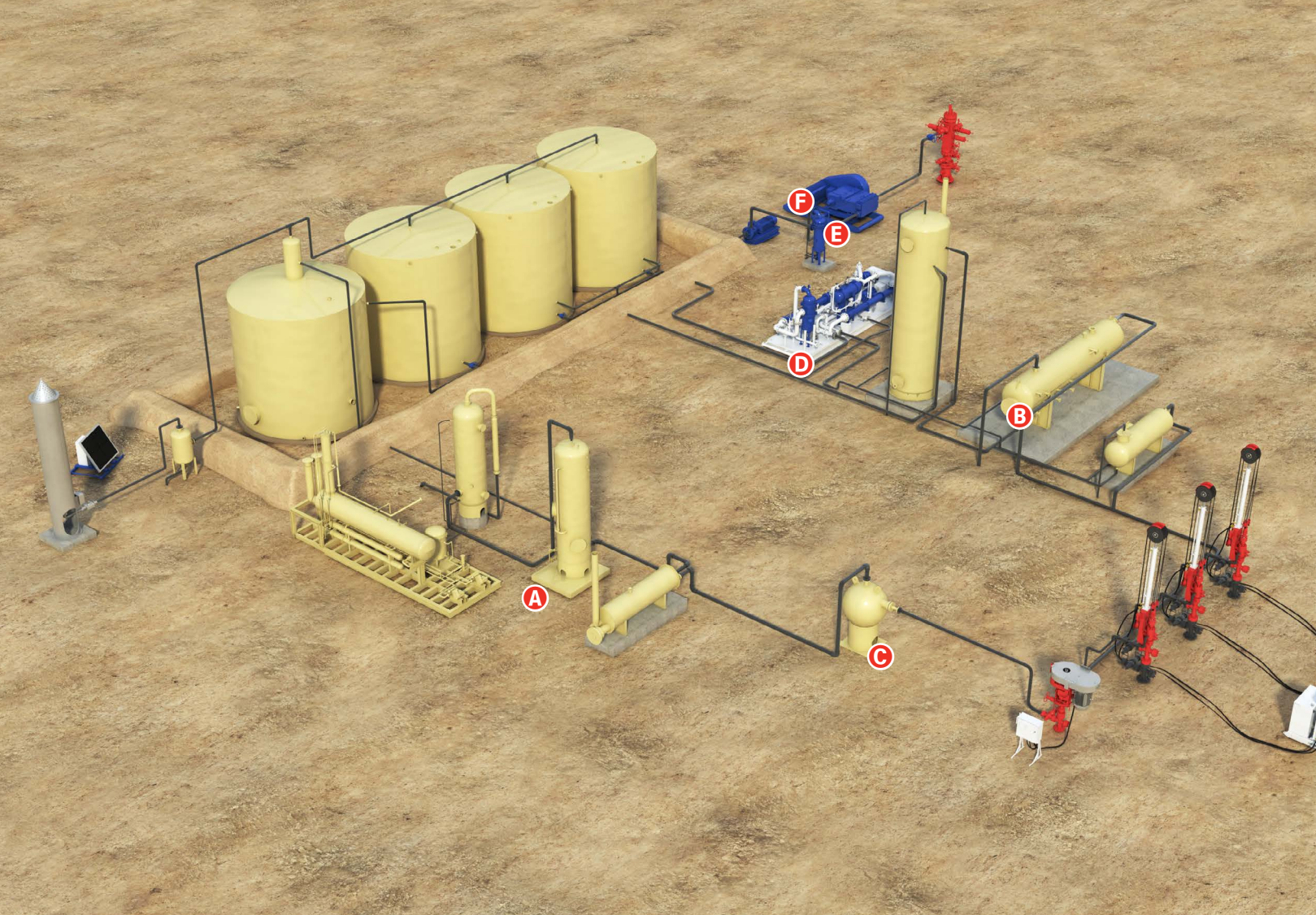
The ToreScrub solution is a compact sand-washing device that uses a combination of solid/liquid cyclones, a Tore, and a jet pump to get the job done quickly and efficiently.

- With a small footprint and no moving parts in contact with the sand, maintenance requirements are low.
- The ToreScrub washes sand to strict environmental standards, providing an environmentally friendly solution to return clean sand back to nature.
- Insensitive to motion on FPSOs, the ToreScrub is an ideal sand-cleaning solution for your offshore production facility.

### Petro-Pile™ Sump Caisson

With over 30 years of field experience and design improvements, the Petro-Pile sump caisson is the most effective device available today for collection, treatment and discharge of wastewater from offshore platforms.

- Our oil reclamation chamber provides an oil collection area that is unaffected by wave action, tidal changes or storm surge.
- Provides a large contained volume and therefore a long settling time, without taking up any deck space



## Onshore Oil and Gas

Each wellsite is unique, with varying production characteristics, so you need water handling and treatment equipment that's just right for you.

### A Separation

We offer a wide variety of separation equipment to handle varying production needs, including:

- 2, 3, 4 phase separators
- Free water knockouts
- Heater treaters
- Indirect line heaters

### B Tore™ Online Vessel Desander (OVD)

The Tore Online Vessel Desander (OVD) solution typically comprises four Tore fluidizers and is installed into a separator. This provides guaranteed, effective sand removal whenever required by the operator. It has gained rapid acceptance by the industry as the preferred solution for sand removal and is replacing traditional

methods. It is not a jetting system, but utilizes the unique, localized and controlled tornado like action of the Tore device to lift and remove the sand without disturbing the oil and water interface. By introducing a liquid or gas as motive fluid, the Tore generates a vortex which fluidizes the solids immediately around it. More reliable than traditional solids transport systems such as slurry pumps and conveyor belts, a 1" Tore can transport up to 4 tons per hour of sand and a 2" Tore can transport 16 tons.

### C Spherical Sand Trap

The 48" spherical-shaped sand trap has inherent design qualities that allow up to three times greater removal efficiency over traditional vertical and horizontal designs. The larger diameter also creates greater holding capacity, which leads to longer time intervals between dumping. Plus, unlike its standard vertical and horizontal counterparts, the spherical sand trap allows online sand removal and is ideal for problematic surge applications without sand blow-by.

The end result is full protection and no sand carryover to those cost-sensitive pieces of production equipment, saving you time, money

and resources. Our pre-engineered, inventoried models are eligible for "Quick Ship" on-demand delivery because we know that you need equipment on time.

### D WaterWolf™ Dynamic Oil Recovery (DOR) System

The revolutionary water treatment system recovers oil and suspended solids from produced water in a single stage of treatment, without chemicals or filters, and reduces the need for complex skim tank batteries and expensive chemical treatments.

It builds on the heritage of proven hydrocyclone technology, long used offshore to optimize produced water handling and extend well life. Combining deoiling and desanding hydrocyclones with the non-shearing action of industry-leading Moyno™ progressing cavity pumps, the WaterWolf DOR System can recover as much as 20 additional barrels of oil per every 10,000 barrels of water produced.

### E ToreTrap Desander

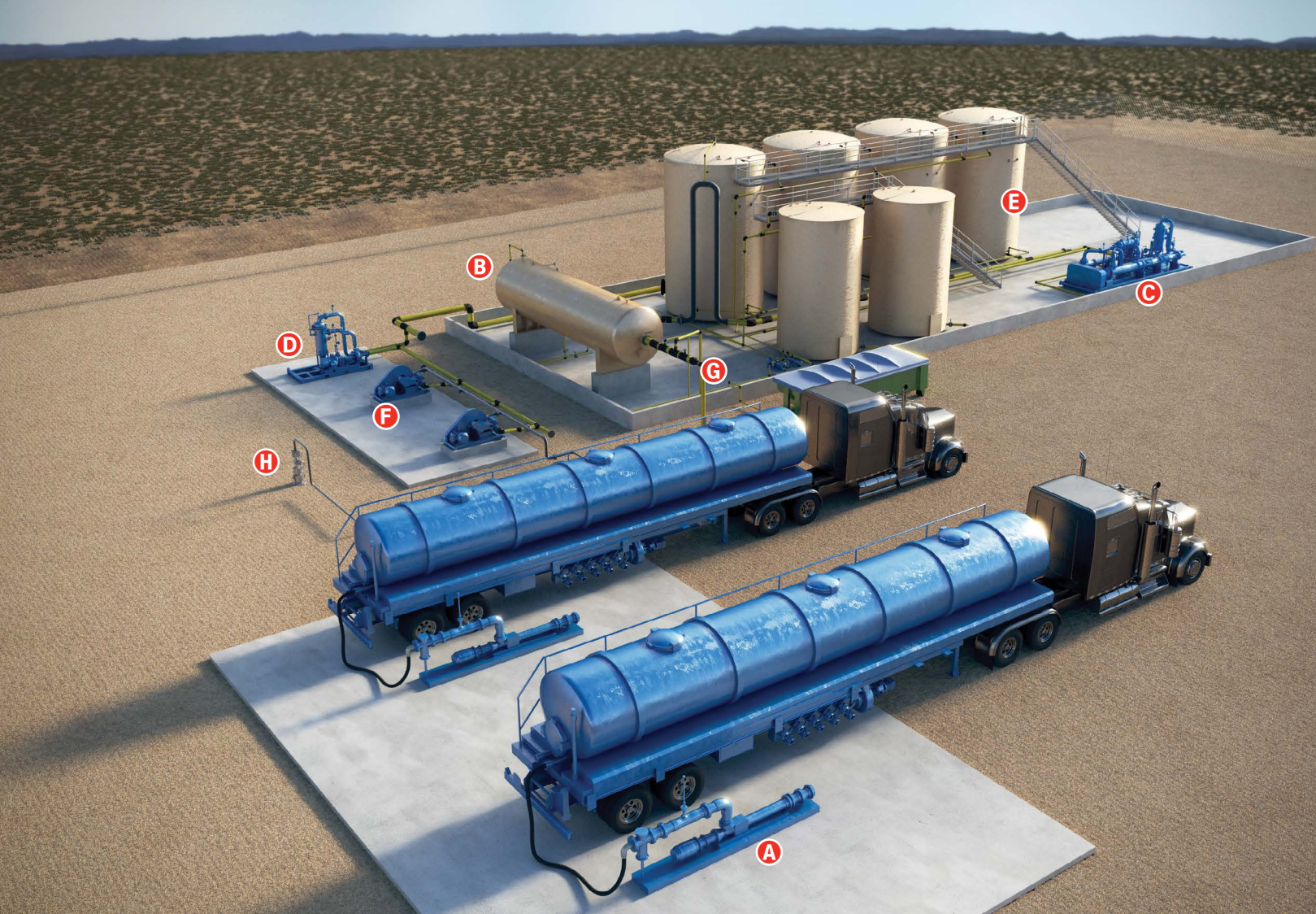
The ToreTrap system is a highly efficient single vessel desander designed to remove sand from an inlet fluid stream with minimal disruption to the flow or process. Solid/liquid hydrocyclones separate sand and/or solids from the liquid stream. The Tore fluidizer, installed at the base of the vessel, allows online solids discharge. With the installation of an optional level switch, the slurry discharge process can be fully automated.

Commonly used on both production wellsites and saltwater disposal facilities around the globe, the ToreTrap is the ideal option for sand removal. It is sold as an individual vessel or a complete skid-mounted system with pumping and automation included.

### F Water Injection Pumps

With 100 years of manufacturing experience in reciprocating pumps, our water reinjection pump packages are top quality. Specific locations carry inventoried models for quick delivery. Our brands include: National™, Oilwell™, Wheatley™, Gaso™, Bear™ and MSW.





## Saltwater Disposal

We're here to change the way the industry looks at saltwater disposal. With over 150 years of industry experience, our team of experts has the know-how to advise you on a more efficient site layout from start to finish.

Our engineers conduct studies of your site and recommend complete, optimized designs. We then assist with equipment selection, fluid level automation and onsite monitoring, followed by site construction and install, and complete support through commissioning and start-up. Finally, we provide service and support with wellness checkups and any spare parts or repairs. We're a one-stop shop for your total saltwater disposal site solution.

Whether you're constructing a new site from the ground up, looking to optimize an existing facility, or looking to purchase individual pieces of equipment, we can handle it all.

**A Moyno™ EZstrip™ Offload Pumps**– The non-shearing action of our Moyno EZstrip pump is an ideal offload solution that helps grow oil droplet size, allowing better recovery. Able to unload a standard tanker in under 10 minutes, our Moyno progressing cavity pump

technology has an 85+ year history of success in industrial use. The unique EZstrip pump design allows for easy disassembly for maintenance, saving you time and money.

**B Horizontal Gun Barrel**– Far more efficient than traditional or enhanced vertical gun barrels, our horizontal gun barrel is engineered with saltwater disposal in mind. A single horizontal gun barrel replaces multiple offload tanks, gun barrels and transfer pumps that are conventionally used. With our unique online solids removal system, tank cleanouts can be eliminated. Our system completely eliminates the repumping of water into tanks, and produces cleaner, drier oil. Our customers have reported that this system is producing pipeline-quality oil.

**C WaterWolf™ Dynamic Oil Recovery System**– Our breakthrough WaterWolf Dynamic Oil Recovery System is a revolutionary water treatment system that recovers oil and suspended solids from produced water in a single stage of treatment, without the use of expensive chemicals or filters. This skid-mounted solution combines the non-shearing action of progressing cavity pumps with deoiling



and desanding hydrocyclones, creating a highly efficient oil recovery solution with as much as 20 additional barrels recovered for every 10,000 barrels of water produced.

**D ToreTrap Skid**– With some of the components of our WaterWolf system, the ToreTrap skid is another highly efficient solids removal system. Able to remove fine solids down to 10 to 15 microns, the ToreTrap allows solids removal without the disruption of process. Reduced solids in the stream leads to less filter change-outs, minimal tank cleanouts, and reduces the opportunity for damage of pumps and injection wells.

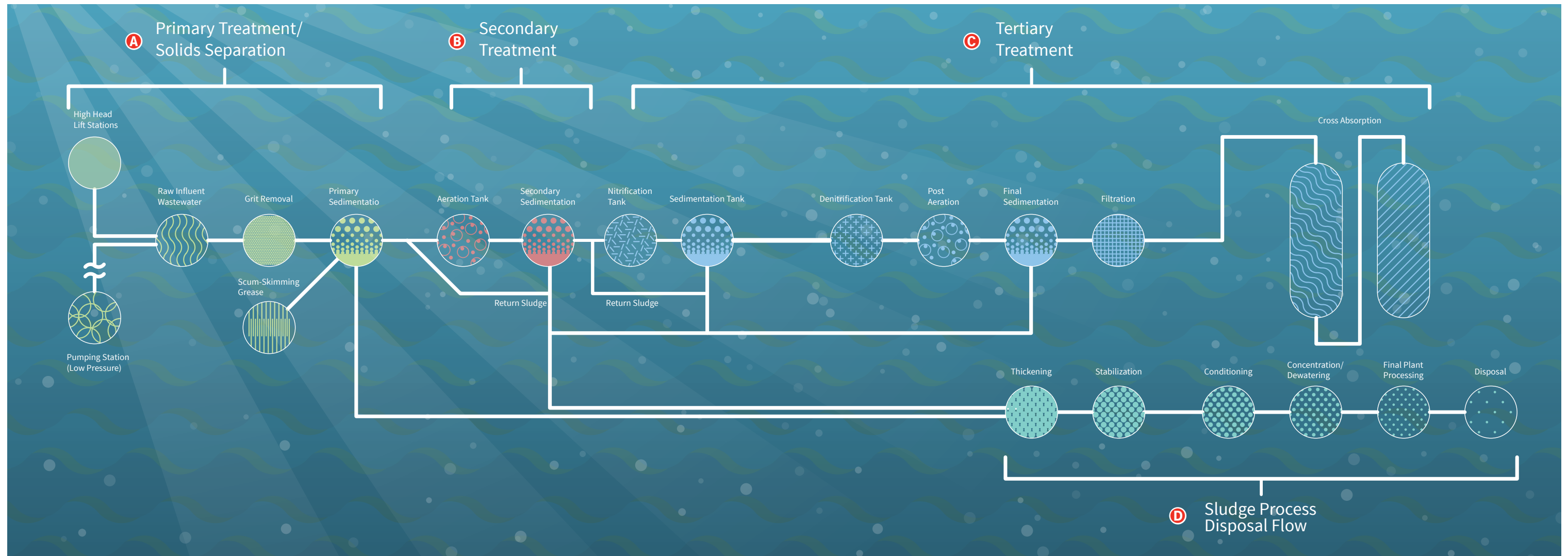
**E Tanks**– We provide steel and fiberglass tanks to suit your site needs. With complete install of pedestals, walkways, stairs and other structural elements, we make the process easy. Whether you need small 400 bbl or large 1000 bbl tanks, we can find the solution that fits your site requirements.

**F Injection Pump**– With a century of pump manufacturing under our belts, we have top-of-the-line injection pumps ready to suit your needs. With either reciprocating or multistage centrifugal injection pump package options, our field-proven, reliable pumps are backed by a global technical support team.

**G Fiberglass Pipe**– We manufacture composite pipe and fittings engineered for efficiency and performance. Our lightweight corrosion-resistant design is maintenance free, lowering installation and operation costs. We are the only company that offers our customers a complete line of both jointed and spoolable pipe. Backed by a proven

history of longevity—original installation can successfully operate for more than five decades—our economic advantage endures time. We also offer alternative piping options for sites that prefer not to use fiberglass pipe.

**H Wellheads**– We design and manufacture a wide range of wellhead and production tree assemblies for use with all well service conditions and all types of completions. All wellhead systems are manufactured to API 6A requirements as a basic minimum, in a plant that is API Q1 and ISO 9001 approved and certified. Our equipment is backed by certified and capable service teams and OEM spares and replacement parts.



## Industrial Water Treatment

We have decades of application experience, durable equipment and innovative solutions to serve a wide variety of industrial water and process industry needs.

For more than 75 years, our products have been effectively applied and widely used in industrial and municipal wastewater treatment processes. We have continually enhanced the design and operational performance to be able to provide you with innovative, reliable packaged wastewater treatment solutions. We provide an effective combination of products, process solutions, and service support programs to keep plant operations running smoothly and efficiently with little downtime and minimal maintenance. We also have the ability to design custom products or solutions to fit your critical application requirements.

Since 1935 we have provided efficient and reliable fluid transfer to the wastewater industry using our Mono™ and Moyno™ progressing cavity pumps. When packaged with our grinders, screens, static mixers and agitators, we provide a packaged solution to help you manage your solids and keep your pipework free of blockage and flowing freely.

- A Primary Treatment/Solids Separation:** Sludge, polymer, chemical dosing, solids
- B Secondary Treatment:** Sludge, solids handling, aeration
- C Tertiary Treatment:** Sludge, chemical dosing, high solids, nitrification/denitrification
- D Sludge Process Disposal Flow:** Sludge, polymer, high solids

Our products have applications in the following areas of wastewater treatment:

- **Sludge**- Broad term referring to solid or semisolid materials produced during treatment of industrial or municipal wastewater.
- **Polymer**- Polymers in wastewater treatment are used to coagulate solids so they can be removed or dewatered for further treatment.
- **Chemical Dosing**- Chemicals are used in wastewater to perform a variety of functions that can include: coagulation, precipitation, oxidation, ion exchange and disinfection.
- **Solids Reduction**- Refers to the action of taking large difficult-to-treat solids and reducing the size of these particles to be more easily managed in the system.
- **Aeration**- The process of introducing air into the liquid. Air injection increases the oxygen microorganisms need to metabolize, as well as continually mixes the fluid for better contact with the microorganisms.

- **High Solids**- Refers to the material by-product of the dewatering operation. Typical solids concentration is from 15% solids to over 50% solids.
- **Nitrification/Denitrification**- Nitrification is the microbial process by which ammonia is converted to nitrates. Denitrification is the process by which nitrates are reduced to nitrogen gas.



## Dewatering

All over the world, we deliver dewatering solutions that are innovative, reliable and durable enough to stand up to harsh, corrosive and erosive conditions.

We've designed our products to cover all your dewatering applications including mine dewatering, gland water feeding and coal bed methane dewatering. You can rely on our products in the harshest conditions, delivering the consistent performance you need.

Mining minerals like gold, silver, copper and coal is challenging, and so is processing them. Our Mono™ and Moyno™ pumps have been engineered to handle varying viscosities and highly abrasive materials such as mineral slurries, thickened sludges, waste water and drilling muds. We also have extensive experience producing mine dewatering packages to fit the needs of our customers.

- Construction dewatering
- Tunnel dewatering
- Mine dewatering



Our style of pump is one of the most efficient dewatering pumps on the world market today. When comparing to a large multistage centrifugal and even piston pumps, the efficient helical pump will use on average one-third of the power consumption required by these other systems.

Our family of integrated package solutions is designed to help you increase production efficiency and uptime.

**Mine Dewatering Skid**– We can design and supply dewatering packages with 1000V or 415V drives.

**EZstrip™ PC Pumps**– We have taken the challenge out of dewatering by launching the new EZstrip mine dewatering range. We have grown our family of revolutionary maintain-in-place (MIP) solutions by launching yet another EZstrip pump innovation which is set to transform the mine dewatering industry by significantly reducing downtimes.

**Reciprocating Pumps**– As the industry-leading manufacturer of reciprocating pumps, we offer a large array of field-proven, reliable

pumps backed by a global technical support team. Our product line includes continuous and intermittent duty pumps available in single-acting and double-acting models. With simplex, duplex, triplex and quintuplex designs, we have an option that can meet your needs in nearly every application.

**Centrifugal Pumps**– Our centrifugal pump line has proven to be the best centrifugal design for handling abrasive mud. This pump line offers a broad selection of innovative features for a variety of routine, demanding, abrasive and corrosive applications, and are designed for a wide range of flow rates.



## Water Supply and Transfer

Rely on our integrated solar pumping stations to move water for a variety of applications, including agriculture, livestock and rural water supplies.

Reliable, cost-effective and sustainable water movement can be a challenge. Whether you're farming on a small scale or enjoying a rural lifestyle property, our water sourcing and transfer products can help. We offer a wide range of solar and agricultural pumps, including a solar-powered submersible pump system that will help you manage water movement with minimal impact on your wallet, lifestyle and environment. We can pump water from bores, rivers, springs, tanks or dams which is ideal for small-scale irrigation, stock watering, watering gardens and general household use.

We take the time to understand your specific water sourcing needs, and we're proud to offer a number of packaged solutions to help you deliver water when and where you need it most.



**Water supply**– Our solar pumps are designed to withstand remote, harsh, dry conditions found throughout the world in order to meet the water supply needs of livestock, rural villages and irrigated agriculture.

- Sun-Buddy™
- SUN-SUB™ – (submersible pump)
- SRX Range
- Solar Panels

**Water transfer**– Livestock water transfer is a large application

- HSE Animal Effluent
- Longhaul Pumps
- Subrotor
- Borehole





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**Corporate Headquarters**

7909 Parkwood Circle Drive  
Houston, Texas 77036  
USA

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[pft@nov.com](mailto:pft@nov.com)

[nov.com/pft](http://nov.com/pft)