



PIPELINE SERVICES PROFILE



At the forefront of pipeline services, we deliver innovative, engineered solutions that meet the unique challenges of every project phase. From construction to decommissioning, our expertise in cleaning, testing, and maintaining pipeline integrity ensures operational efficiency and safety. Backed by advanced equipment, precision engineering, and experienced professionals, we help our clients optimize performance, reduce downtime, and safeguard their assets for the future.

What others call specialization, we call standard.





Company Overview

To be the leaders in the energy industry by providing quality and excellence in our services, backed up by solid and innovative engineering.



HEALTH, SAFETY, AND ENVIRONMENT

The most critical mission in all of FourQuest Energy's operations, and for all our employees, is to achieve the highest possible standard of health, safety, and environmental performance. We create value for our clients by conducting our operations in a manner that promotes safe work practices and avoids risk to our employees, our clients, and the environment.



PERSONNEL

At FourQuest Energy, we are focused on our clients' needs; having committed and motivated employees is integral to meeting those needs. A thorough understanding of our customers, their processes, and problems is the key to our accurate and thoughtful problem solving; we have industry leading in-house technical resources. We take pride in providing safe, high-quality and value added services to the energy industry.

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Pipeline Services Overview

Every application comes with unique requirements, and we know that the needs of our clients' are best met by offering innovative engineered solutions.

FourQuest has been involved in numerous Pipeline Programs at different stages of a pipeline life cycle. At any phase of the pipeline life cycle, FourQuest can provide value-driven services ranging from consulting to full-scale execution.

FourQuest firmly believes that every pipeline operation offers the opportunity for actionable insight into the condition of the pipeline. Every utility pig run can be analyzed to provide key information related to the surface condition of the line – roughness, debris buildup, ovality, bends, buckles, and dents. Providing clients with actionable insights will ensure a well-maintained asset and minimize risk before deploying inline inspection runs. Choosing the correct pig is important; however, understanding the pig condition and behavior leads to insight.

Phase	Needs
Construction	<ul style="list-style-type: none">> Removing Construction Debris from the line> Acceptance testing (Water filling, dewatering, hydrostatic testing, etc)> Commissioning
Operation	<ul style="list-style-type: none">> Pipe wall cleaning> Condensate Removal> Product Separation (batching)> Applying inhibitors
Inspection	<ul style="list-style-type: none">> To check for physical damage (geometry)> To detect corrosion, laminations or cracking> Leak Detection> Sampling
Maintenance and Repair	<ul style="list-style-type: none">> Corrosion Inhibition> Pre-inspection Cleaning> Isolation> Recommissioning
Renovation and Rehabilitation	<ul style="list-style-type: none">> Gel Pigging> Applying coatings> Chemical Cleaning> Scale removal> Cleaning for product conversion
Decommissioning	<ul style="list-style-type: none">> Product removal> Pipe wall cleaning> Inspecting/testing> Inerting

Product Characterization, Pigging, and Pigging Frequency

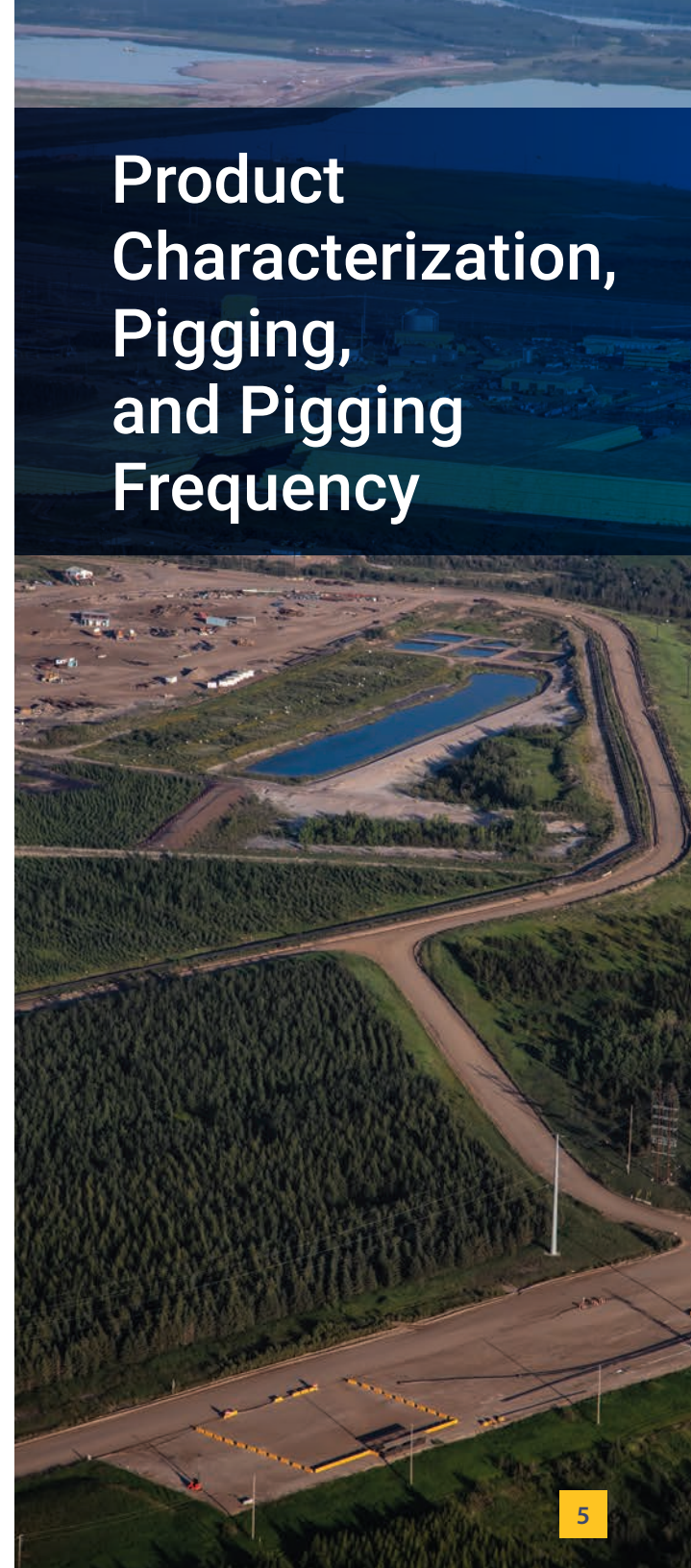
FourQuest has extensive experience removing various debris types from pipelines; the types and amount of debris vary depending on the service of the pipeline. For example, pipelines are typically limited to construction debris, corrosion, and water during construction. If a pipeline is in service, depending on the commodity, the following table shows typical types of debris.

Service	Type of Debris	Typical Amount of Debris
Refined products	Corrosion product	Little
Crude oil	Hard and soft paraffin (wax), asphaltenes, sand, hard scale, corrosion product	Potentially large depending on product composition, temperature, and crude velocity
Multiphase	Hard scale, sand, wax, corrosion product	Potentially large depending on product composition
Injection water	Hard scale, sand, corrosion product	Potentially large depending on product composition
Dry gas	Corrosion product, compressor oil, black powder	Usually little if pipeline is regularly cleaned and not affected by black powder

Once the type of debris is characterized, a pig recommendation and application program can be established. Determining the optimum pigging frequency involves a thorough understanding of the product(s) being shipped. The characteristics of deposition (heavy hydrocarbons or sediments) or water is analyzed in laboratory evaluation. By performing static and dynamic settling tests on pipeline products, a starting point is established to determine the frequency of pigging required based on the deposition rate. Additionally, FourQuest studies the interface between batches of pipeline products, as often a unique “incompatibility” occurs between two products, causing rapid deposition due to a shift in the equilibrium of either product.

FourQuest relies on simulation programs to understand the dynamics of flow in the pipeline system and relates this knowledge to the results of settling tests to establish a starting point in pigging frequency. Optimization of pigging frequency occurs from data collected during utility pigging runs.

FourQuest is always aware of the negative effects of deposition in a pipeline and specifically looks for precursors to corrosion in the deposits removed from pigging operations and the role it plays in under-deposit corrosion. Maintaining a clean operating surface in a system mitigates under deposit corrosion, improves throughput, and lowers pump energy costs. FourQuest recognizes that water in a pipeline system poses the greatest risk to corrosion and has worked extensively with clients in the interpretation of water analysis and interpreting its effect on corrosion.



Chemical Batch Pigging Applications



If conventional pigging methods require additional cleaning or passivation requirements, a chemical treatment may be considered in the form of batch pigging.

Access to our own line of chemistry gives us a unique advantage to create customized blends specifically tailored to the scope. By utilizing a chemical batch pigging approach our industrial chemists and engineers focus on data extracted from analyzing samples to characterize debris and select/design fit for purpose chemical. Batch pigs will also be selected by factoring in compatibility, required contact time, pipeline diameters, distances, elevations, and geometry. For example, customized film pigs can be utilized to leave a thin film of corrosion inhibitor in the event passivation is required.

FQE Barium-Clear PATENTED

Highly effective at dissolving and removing mineral scale deposits including carbonates, calcium/barium sulfates, and iron sulfides with alkaline pH to align with equipment metallurgy longevity. FQE® Barium-Clear will control and dissolve mineral scale in operating systems where traditional acid treatments are not effective or acidic conditions would be deleterious to the equipment. This product is frequently used to increase oil and gas flow rates and decrease pressure losses.

FQE Ultra

FQE® Ultra is a water-based cleaner that provides advanced cleaning power when elevated application treatment temperatures can't be established. Not having to use hydrocarbon cutter stock simplifies the cleaning process; just add water. Upon job completion, the effluent cleaning solution will separate into discrete oil, water, and solids phases preferred for waste management disposition. Combining multiple steps is ideal for the race to inspection.

FQE Pipeline Cleaner NG

FQE Pipeline Cleaner NG has been specifically developed to address the challenges posed by complex deposits like black powder, iron-rich solids, and paraffinic wax, which often clog pipelines and compromise in-line inspection tools.

Pipeline Decommissioning /Abandonment



FourQuest Energy employs global experience and a technical engineering approach to execute even the largest, most technically challenging pipeline decommissioning projects.

We optimize projects from design to execution, addressing unique challenges with key engineering principles, chemistry, and operational support.

Typical pipeline decommissioning services include:

- Chemical and water tank farm management
- Custom chemical planning and development
- On-site blending and injection
- Residual testing for regulatory compliance
- Effluent disposal

Our in-house chemical design and testing are tailored to meet target hydrocarbon residuals, using field experience and innovation to create optimal treatments. On-site specialists ensure clean pipelines and adherence to schedules.

Our project management focuses on clear communication, safety, and seamless collaboration with clients and subcontractors. We test and develop effective, environmentally friendly chemicals that are safe and operator-friendly.

Through engineering reviews, we optimize project costs, timelines, and resource allocation while maintaining high cleanliness standards and accelerating schedules. This detailed planning ensures successful pipeline cleaning on time and with zero safety incidents.

Inline Tools and Cleaning



Pipelines require routine cleaning to maintain a good operating surface free of debris and pre-cursors to corrosion.

Engineered cleaning of a pipeline begins with a thorough understanding of the products delivered through the pipe system and the resultant deposition that occurs with time and temperature

FourQuest Energy, a global leader in technical services to pipelines works closely with operators to understand their cleaning requirements and engineer fit-for-purpose solutions for all types of piping systems. Our extensive experience in oil and gas guides our solutions and execution plans so operators are assured of proven techniques and predictable outcomes.

FourQuest works closely with world-leading manufacturers of inline tools to design cleaning solutions specific to the characteristics of the pipeline. Our engineered approach isn't just a design exercise; we monitor cleaning performance in the field and can make adjustments on-site to continually optimize and improve results based on real-time information. FourQuest makes the effort to analyze the behavior of inline cleaning tools as they traverse the pipeline to understand the deposition in the pipeline and where it is located. We compliment this actionable insight with our analytical capabilities and knowledge to responsibly report when chemical treatment makes sense.

Understanding and analyzing our client's goals and restrictions is the starting point of all engineering. We are curious by nature and ask a lot of questions so we can deliver, with confidence, the results of the campaign safely and responsibly – we are a best practices company.

FourQuest is sensitive to costs and approaches the client's needs with sound economic reason. Sometimes the use of selective chemistry in pipeline cleaning may be cost-prohibitive. In such cases, FourQuest is often relied upon to design pipeline cleaning programs using commodity products and solvents readily available to the pipeline operator in their normal course of delivery. We firmly believe that with thorough knowledge and the correct engineering controls in place, every job can be designed and completed safely; on time and on budget.

While FourQuest has the most advanced fleet of pipeline pumping equipment in North America, our most valuable asset is our people. We are well-trained, competent, honest, and hard-working people who make good decisions regarding safety, the environment, and the public.

Hydrostatic Testing



The main purpose of hydrostatic testing is to identify any leaks by checking the integrity of the pipeline and welded joints.

The system will be pressurized with a hydrotest medium (water, glycol, or methanol) to meet specified strength and leak pressures, following standards like CSA Z662.

1) Fill

Temporary hydrotest heads with bidirectional pigs are installed. The lines are prepacked with dry air or nitrogen to prevent vapor locking. Hydrostatic test equipment is set up, and pumps are used to manage head pressure and pig fill speed. After filling, the system is allowed to stabilize before pressurization.

2) Hydrotest

Pressurization – System will be pressurized using a positive displacement hydrotesting pump at a predetermined rate. It is recommended to build pressure in stages of approximately 25%, 50%, 75%, 100% of the strength test pressure. Yield plotting will be conducted by a professional engineer if required.

- **Strength Test** – Once the strength test pressure is reached, stabilized, and the system has been visually checked for leaks, the positive displacement hydrotest pump can be disconnected and bull plug/flange is to be installed. The pressure is to be locked in and held between maximum and minimum strength test pressures at a specified percentage of the Maximum Operating Pressure
- **Leak Test** – Once the strength test is complete, the system will be depressurized at a controlled rate until the designated leak test pressure is attained.
- **Depressurize** – System will be depressurized at a pressure controlled rate to the point where a desired back pressure is achieved for displacement.

3) Displacement

Similar to filling, the necessary back pressure will be applied to control pig speeds. Displacement of the hydrotest medium will typically be performed utilizing air or nitrogen.

Dew Point Control and Pipeline Drying



Pipelines require strict dew point control to ensure control of the corrosion environment on the pipe surface and product quality control. Pipeline drying is a critical phase of pipeline commissioning in new construction and when the system has been opened to the atmosphere for maintenance.

The integrity program of pipe assets also includes engineering control of the system's environment before feed in.

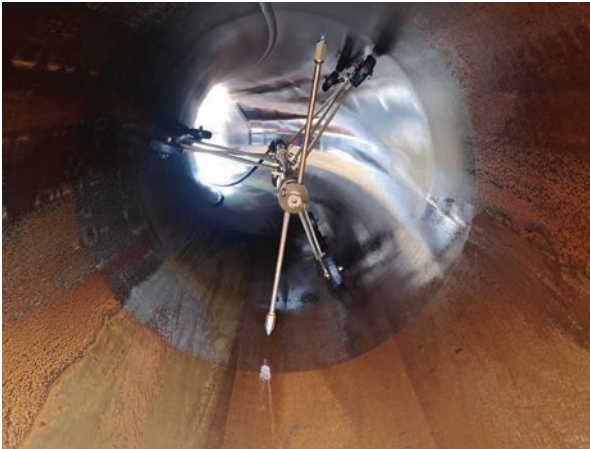
FourQuest Energy, a global leader in technical services to pipelines works closely with operators to understand their pipeline specification requirements and engineer fit-for-purpose solutions for dew point control in all types of piping systems. Our extensive experience in oil and gas guides our solutions and execution plans so operators are assured of proven techniques and predictable outcomes.

FourQuest often factors nitrogen use to achieve dew point control in pipe systems. Nitrogen use results in an inert atmosphere in the pipe environment and being a very dry gas, achieves low dew points quickly and efficiently. Vaporizing liquid nitrogen to gaseous nitrogen results in an expansion factor of 694 times; this powerful characteristic allows for a very compact footprint of equipment along the pipe right-of-way yet delivers a large gas volume impact to drying any size or length of the pipe system.

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FourQuest is sensitive to costs and approaches the client's needs with sound economic reason. Sometimes the use of nitrogen in purging may be cost-prohibitive. In such cases, FourQuest is often relied upon to design pipeline dew point by using dry compressed air with a technique that creates turbulence at the pipe wall resulting in rapid drying without the need for laborious pigging. We firmly believe that with the correct engineering controls, every job can be designed and completed safely.

Surface Engineering/ Hydromilling



Pipelines sometimes require specialized cleaning to engineer an improved operating surface free of manufacturing surface defects, tenacious manufacturing debris, and pre-cursors to corrosion.

Surface-engineered pipe cleaning begins with a thorough understanding of the metallurgy of the pipe, the manufacturing process, and unintended deposition and defects.

FourQuest Energy, a global leader in technical services to pipelines works closely with operators to understand their cleaning requirements and engineer fit-for-purpose solutions for all types of piping systems. Our extensive experience in oil and gas guides our solutions and execution plans so operators are assured of proven techniques and predictable outcomes.

FourQuest works closely with world-leading pipe manufacturers to design cleaning solutions specific to the pipeline's characteristics and the operator's specifications. Our engineered approach isn't just a design exercise; we carefully monitor program performance and can make mid-process adjustments to continually optimize and improve results based on real-time information. In addition, FourQuest makes the effort to analyze the behavior of our surface-engineered solution as it traverses the pipe to ensure uniform results.

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While FourQuest has the most advanced fleet of pipeline pumping equipment in North America, our most valuable asset is our people. We are well-trained, competent, honest, and hard-working people who make good decisions regarding safety, the environment, and the public.

On a global basis, FourQuest has completed more hydro milling than any other company. In the past year alone, we completed surface engineering by high-pressure high volume hydro milling over 40 kilometers of large-diameter pipe. FourQuest was also trusted to surface engineer oxygen piping of higher metallurgy to the exacting cleanliness and surface standards of one of the largest refiners in the world.

ILI Support with Fluid Management



FourQuest Energy provides specialized fluid management and supply associated with relevant pipeline inspection runs.

FourQuest supports ILI execution by supplying, pumping, filtering (if necessary), and properly disposing of fluids required for tool run projects.

After analyzing the various methods of running inspection tools, FourQuest will work collaboratively with the pipeline owner to utilize the optimum fluid for the given application. Among others, factors taken into account will include, safety in regard to transport, handling, and the environment. In addition, we will review performance parameters such as, lubrication, resistance to degradation and friction breakdown.

As a leader in Canadian pipeline services, our experience and comprehensive job preparation provide smooth and successful execution of our projects. FourQuest provides the necessary technical expertise, increased safety and handling, and reliability. We will provide comprehensive project management along with all the necessary equipment to execute these projects to the highest standard. Available equipment consists of but is not limited to:

- Equipment to support all scopes including pumps, hoses, manifolds, portable storage tanks, filtration units, pressure pumping trucks, nitrogen pumpers, bulkers, vac trucks, combo units, launchers/receivers, pigs, mechanical lifting, separators, silencers, sampling, and testing.

FourQuest understands the main factors that influence inspection tool runs and follows industry guidelines and forms defined by the Pipeline Operators Forum to ensure all variables are identified and addressed prior to execution.

Nitrogen Purging and Displacement



Nitrogen purging is highly effective for pipeline purges, product displacement, and process pipeline inerting. Our engineers can develop the most effective and efficient purging techniques for any plant or pipeline environment.

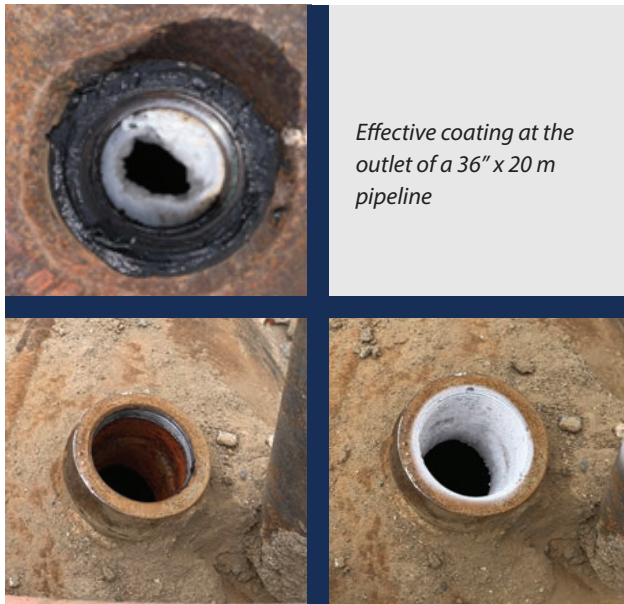
FourQuest Energy can design custom procedures for the removal of unwanted atmospheres by nitrogen purging, including the removal of hydrocarbons, oxygen, and other toxic or reactive gases. Our engineers will determine the optimum rate, temperature, and volume required to remove unwanted products in the safest and most efficient way possible. Because nitrogen is inert, it will not support combustion. Therefore, once a system has been purged using nitrogen, there is no risk of ignition within that system or pipeline. The nitrogen atmosphere reduces the corrosion caused by oxidation, making it ideal for preserving piping for prolonged periods without use.

Nitrogen gas provided by FourQuest Energy nitrogen pumping equipment provides 99.99% pure nitrogen with a dewpoint of -70°C .

This clean, extremely dry gas is effective for drying out any pipeline or process system. When combined with high temperatures, the drying time to achieve the required dew point is significantly reduced compared with conventional drying methods.

Because nitrogen gas is inert, it is ideal for filling pipelines or process systems that may go unused for long periods of time—months, even years. By maintaining a positive nitrogen atmosphere inside a pipeline or process system, ongoing corrosion can be reduced and even eliminated, provided the system is dry and there are no leaks present. This service is particularly effective for drying of chemically sensitive systems such as oxygen and hydrogen.

Vapour Phase Corrosion Inhibitor Applications



Effective coating at the outlet of a 36" x 20 m pipeline

Figure A

Figure B

Before (A) and after (B) of VPCI application. In the "after" image (B), clear visibility shows that molecules adhere to the metal surface. This phenomenon leads to the formation of a protective layer on the metal surface.

Corrosion inhibitors are chemicals used to reduce the rate of corrosion and are applied in many different ways.

VPCI execution entails the use of air or nitrogen to atomize the chemical, as well as utilizing the temperature differential between the injected vapor fluid and the pipe walls to condense and form a protective layer. This will substantially decrease the corrosion rate and prolong the pipe's life expectancy. The injected chemical is converted into a vapour that disperses throughout the enclosed space ensuring comprehensive coverage. This includes hard to access crevices and pitting on metal surfaces. A protective film is created when the molecules adhere to the metal surface due to temperature differences.

As an added benefit, VPCI can migrate to the topside of the pipe, effectively addressing topside corrosion, a prevalent issue in the pipeline industry. Studies have found that VPCI applications are effective up to one year after application. Specialty nitrogen and pumping equipment allows for the injection of precise flow rates and pressure, ensuring the right amount of chemistry is delivered to the correct locations.

FQE has designed customized injection manifolds that combine the nitrogen and chemical injection stream before introducing the mixture into the client's system, eliminating the need for a second injection point. This innovative solution results in significant cost savings for the client as the requirement for additional drilling, cutting, or welding to accommodate additional injection points is minimized.

The benefits of utilizing VPCI are as follows:

- **Saves Time and Costs:** VPCI offers a highly cost and time-effective alternative compared to conventional filming pig methods. Achieving the same results while reducing up to 80% of the pigging treatment cost.
- **Elimination of Waste Products:** VPCI produces ZERO waste generation as it is designed to coat the internals of the piping without the need to fill the entire line. Additionally, this greatly reduces the possibilities for spills or environmental release.
- **Comprehensive Coverage:** VPCI can protect metal surfaces, including crevices, welded joints, and other hard-to-reach areas, where traditional corrosion protection methods may not be as effective due to accessibility.

Lube Oil Flushing



FourQuest Energy utilizes proven proprietary flushing skids (FS), which are self-contained, self-sufficient units that include an onboard pump, heater, mixing tank, reverse flow manifold, and filtration system to capture insoluble matter.

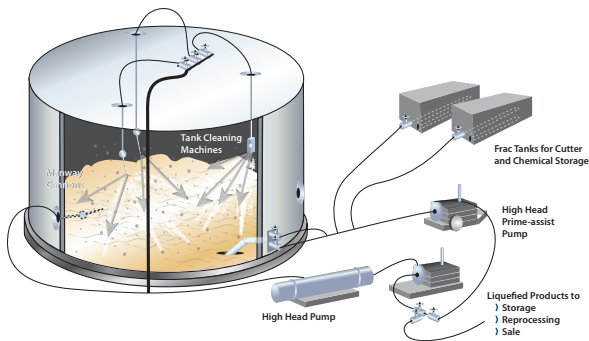
Flushing of hydraulic and lubrication oil systems is used to ensure that new rotating and hydraulic equipment will start up and operate as designed, significantly reducing the potential for premature failure.

Maintenance and downtime on equipment can be minimized by performing an effective system cleaning during commissioning and following periodic maintenance and repair services. Any facility that has a low tolerance for system failures will find this service to be a pillar in their preventative maintenance program. Contaminants such as water, rust, loose scale, weld slag, sand, dirt, and oils are removed from the system with a proper preoperational cleaning, reducing the wear, scoring, and damage bearings, control valves, instrumentation, and critical operating systems are subjected to.

APPLICATIONS WITHIN THE ENERGY INDUSTRY:

- > Cleaning of hydraulic control systems (e.g., systems controlling large isolation valves on coker drums and jacking systems for offshore equipment)
- > Rotating equipment lubrication oil system cleaning (e.g., steam turbines, large pumps, and gas turbine systems)

Tank Cleaning



FourQuest Energy delivers a tank cleaning methodology that's tailor-made to each vessel or tank - changing the industry standard as well as enhanced mechanical cleaning.

All sizes of tanks and storage vessels can be cleaned using our customized, engineered approach. With our expert knowledge in confined space and non-entry cleaning, FourQuest Energy ensures your tanks are safely cleaned on time and on budget. FourQuest Energy's proprietary tank cleaning process enables cleaning in a chemical closed-loop environment. First, we custom engineer a solution that liquefies the sludge deposits in your tank that would normally be removed mechanically. Then, we apply a selective chemical solution with a cutter stock and extract the contents using an engineered circulation process. Lastly, the tank is degassed and high-pressure washed chemically, resulting in a superior level of surface and air cleanliness. While manned entry is still required at the final stages, our non-entry technology significantly reduces the need for confined space entry, improving safety and lowering costs by minimizing manned entry tasks.

BENEFITS OF NON-ENTRY SUPPORTED TANK CLEANING

- **Slashing Disposal Costs:** With our chemical tank cleaning process, organic solids are dissolved inside the tank, letting you avoid expensive hazardous waste disposal expenses.
- **Shortened Cleaning Duration:** Faster scheduling means less down time so that your plant can get back to operational capacity.
- **Recycle Hydrocarbon Product:** Rather than creating waste for disposal, recycle it using our specialized solvent cutter. Take this opportunity to generate revenue rather than creating costs.
- **Environmental Performance:** Our advanced chemical tank cleaning process also minimizes waste, leaving only insoluble, non-hazardous materials for disposal.
- **Safety Performance:** Our chemical tank cleaning methodology reduces or eliminates the requirement of personnel to enter the tank; work is performed in a closed loop system.

Vacuum Services



FourQuest provides modern vacuum trucks which are suitable for your on-site, day-to-day operations such as fluid transfers, spill clean ups, rig work, septic services and all your vacuum needs.

All units are equipped with industry-leading advancements – back up cameras and alarm as an extra precaution. These industry leading units have exceptional vacuum recovery which gives them the capability of loading all industry products. This is to provide you, the client, with the most advanced, user-friendly equipment for any of your service work.

Our vacuum units are a tri-axle truck with a fully integrated combined pump and tank unit that is specifically designed for the oil and gas industry. This truck provides the easiest solution for the removal of any liquid or liquid and particle mixture from tanks and other equipment. It has a compact design, which offers a small on-site footprint, and in addition to its many safety features, it is designed to be easy, safe, and efficient to operate.

These diesel-powered vacuum trucks use liquid ring pumps to provide the vacuum. Liquid ring pumps typically operate at speeds up to 700 rpm, providing approximately 5,000 cfm airflow at high vacuum levels. The tank on the truck can hold 15,000 litres of liquid at temperatures ranging from -29°C to 93°C. When using these pumps, flammable vapours may accumulate on top of the product separator. Vacuum pump vapours are controlled through safe vapour recovery and venting methods. The truck also has an integrated emergency shut off system to avoid “dieseling,” which occurs when flammable vapours enter the air intake of the diesel engine.

Global Locations



> For details on our global offices, please visit our website at: fourquest.com/contact-us

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