OVERVIEW
Identifying a single supplier who can reliably deliver proven capabilities for process services brings value to your projects by achieving significant and measurable schedule reductions and simplified contracting requirements.

Halliburton offers an unmatched track record for supply of such integrated services to world-class projects in all global regions and work environments. Halliburton’s services are managed, engineered and staffed with multi-skilled personnel to fully support projects driven by schedule and cost-control demands.

NEW CONSTRUCTION SERVICES
The construction of hydrocarbon processing facilities requires a number of support services that are not traditionally within the capability of the nominated fabrication contractor. These services include the following:

» Clean spool policy controlling the installation of spools during construction.
» High velocity flushing or high pressure jetting of internal process piping (if the above policy is not employed).
» Specialized chemical cleaning of internal process piping.
» Internal video inspection of rotating equipment post-installation.
» Hydrostatic and/or pneumatic testing of pipework to confirm its integrity.
» Flushing hydraulic systems to remove any debris that may impair the start-up and safe operation of the systems.
» Onsite machining operations, either pipe preparation prior to welding operations or flange face repair.
» Flange management including controlled tightening of interconnecting pipework.
» Onsite valve testing either on pressure relief valves or in-line critical shutoff valves.
» Prestartup leak test of the process systems at or near normal operating pressure to confirm system integrity prior to the introduction of hydrocarbons.
» Drying or conditioning of the system in preparation of the introduction of product.
» Rendering the internal atmosphere of the process system inert through the introduction of an inert gas, typically nitrogen, at or near to startup operations.
» Pipe freezing to enable temporary isolation of pipework when inline isolation valves are not available or unusable.

MAINTENANCE AND INSPECTION SERVICES
Existing hydrocarbon process facilities are periodically shut down to allow for the maintenance and inspection of equipment. During these shut-down periods, services such as the following are commonly required:

» Supplying and pumping of nitrogen to displace hydrocarbons from a system.
» Cleaning the internal surface of equipment to remove hydrocarbon or other deposits.
» Controlled disassembly of pipework.
» Internal video inspection of pipework or machinery.
» Controlled reassembly of pipework.
» Final system leak test prior to the reintroduction of hydrocarbons.

CLEAN SPOOL POLICY
This process provides for the inspection, removal of internal debris, and subsequent control monitoring of piping spool internals. The prevention of ingress of debris into a hydrocarbon piping system increases the efficiency of any subsequent inspection or cleaning requirements. With an auditable system of spool inspection and monitoring, the opportunity for achieving a safe, successful startup is greatly increased.

HIGH VELOCITY FLUSHING OR HIGH PRESSURE JETTING
If a clean spool policy has not been used by the fabricator then generally it is required to either high velocity flush or high
pressure jet the piping internal surface to remove any debris. Either technique will be employed depending on the pipework diameter to be cleaned or the equivalent flushing velocity to be achieved. To reduce water use and pumping equipment required, pipework in excess of 4 in. nominal bore would be high pressure jetted.

SPECIALIZED CHEMICAL CLEANING

Halliburton’s vast knowledge of chemical cleaning processes applies to virtually any alloy—from carbon and stainless steel to the most exotic alloys found in today’s complex process systems. From conventional degreasing to precision cleaning, Halliburton has the expertise to meet the requirement using industry standards such as Citrosolv™ cleaning service up to proprietary cleaning processes such as Halliburton’s own MagSolv™ service. Halliburton has the knowledge to select and apply effective cleaning processes that not only provide superior cleanliness, but also help minimize water use and subsequent fluid storage and handling concerns.

Halliburton’s proprietary chemicals, equipment, and processes assure that all cleaning operations are focused on safety, efficiency, speed, economy and versatility.

Halliburton continues to devote major research and development efforts toward formulating chemicals and designing equipment to address the specific needs of gas processing, refining and petrochemical equipment. The focus is on producing effective chemical processes while minimizing environmental impact.

Halliburton’s chemical cleaning services employ custom-formulated cleaning solvents, corrosion inhibitors and passivating agents for safe, effective cleaning of system internal surfaces and other applications where chemical cleaning is more effective or more economical than mechanical techniques such as hydro-jetting.

OIL FLUSHING

The removal of debris particles from hydraulic control systems is critical to their safe, reliable operation. Oil flushing techniques involve both high velocity, pressure-pulsed and flow-pulsed techniques to generate the turbulent flow characteristics required to achieve National Aerospace Standard (NAS) or International Standard Organization (ISO) cleanliness standards. Onsite analysis and particle counts of the flushing fluid provide confirmation that all systems meet or exceed specified cleanliness criteria.

ONSITE MACHINING

It is sometimes a requirement to provide an accurate pipe-cut-and-weld preparation prior to the start of critical welding operations. The machining equipment supplied for this operation helps assure that the time required for a cut-and-prep operation is greatly reduced compared to the traditional hot-cut-and-grind-back method.

It is also common during the construction phase of a project that critical flange sealing faces may be damaged. With the use of flange facing machining equipment it is a relatively simple technique to repair the sealing face and to help achieve a leak-tight joint for future operations.

FLANGE MANAGEMENT SYSTEM

Flange management and controlled bolting are recognized, effective components of an overall system integrity program. These processes are used to help assure proper assembly and tightening of bolted joints during construction or any subsequent intervention activity. Halliburton strives to lead the industry in provision of flange management techniques through continual investment in field-proven, reliable equipment and comprehensive training of personnel. Process systems integrity problems result from a number of issues including incorrect joint assembly, improper tightening methods, ineffective flange tagging systems, and lack of a formal flange management system. The Halliburton flange management control system helps assure all flanges on a process system are identified and have been completed in a controlled manner that minimizes or eliminates such integrity issues.

HYDROSTATIC AND/OR PNEUMATIC TESTING

Prior to the introduction of hydrocarbons, hydrostatic or pneumatic testing is typically employed to confirm the integrity of pipework and vessels. For LNG/LPG facilities the presence of water or moisture poses a number of potential startup and operational concerns. Proper design and engineering of the overall program for hydrostatic testing and subsequent draining and dehydration of the system are critical to the safe startup and commissioning of the system. Halliburton’s knowledge of process systems and dehydration techniques significantly reduces the potential risks and complications commonly associated with system startup.
INTERNAL VIDEO INSPECTION

Internal video inspection is typically used to carry out either a pre-cleaning inspection to assess the suitability of a specific cleaning technique or post flushing/cleaning for verification of a successful operation.

ONSITE VALVE TESTING

During the latter stages of the construction phase of a project there is a requirement that all pressure relief valves (PRVs) are calibrated and certified prior to their final pipework installation. This task must be completed prior to any leak test or startup activities. It is beneficial to the constructor’s client that all process valves deemed as critical shutoff are tested to verify valve seat integrity prior to any startup operations.

DEHYDRATION AND DRYING

Efficient removal of water and moisture is critical to reliable startup and operation of your process systems. Halliburton’s significant experience in virtually all drying and dehydration methods will assist in selecting the method best suited to the application. From dehydrated nitrogen or air to often complex vacuum drying methodology, Halliburton’s experience can help guide the process through proper evaluation, design and execution. The result will be the most reliable and efficient drying program for the specific requirements.

PIPE FREEZING OPERATIONS

During the operation of a process system, occasionally amending or altering the configuration is required. This modification work is normally completed with the closure of upstream and downstream valves to assure that the area of pipework being modified is isolated from the rest of the system. If the pipework design does not allow for one or both valve isolations, a temporary isolation can be formed within the pipework. With the use of thermal pipe jackets and cryogenic liquid, pipe freezing allows this isolation to be achieved, controlled, monitored and removed within the pipework.

SYSTEM LEAK DETECTION

Identifying, quantifying and correcting process system leaks can be a drain on the project resources and schedule. Halliburton has the knowledge, expertise, and resources to deal with the most challenging leak detection program. From routine bubble-type leak identification to precision leak quantification methods such as helium leak detection, Halliburton brings world-class skills to reliably and effectively execute any leak detection program.

HELIUM LEAK DETECTION

Helium leak detection is a technique in which a process system is pressurized to a predetermined level with a trace concentration of helium (usually 1%) carried by nitrogen (99%) such that any leak paths from inside the system can be detected and quantified. Helium is ideal for this use due to its rare occurrence in the atmosphere and the ability to accurately detect and quantify its presence with specialized instruments such as mass spectrometers. Properly calibrated helium mass spectrometers are capable of detecting leaks as small as 0.001 cubic feet of gas per year.

Advantages of using helium leak detection:

- The system is tested at, or as close to, its working pressure with a gas closely simulating live conditions.
- Leaks are detected and quantified making it possible to monitor leaks over a period of time to determine any deterioration of the joint.
- The oxygen content is reduced which avoids the potential for explosive gas mixtures when hydrocarbons are introduced.
- Calibration of system instrumentation can be checked and operators can gain familiarity with the system during the leak test.
- Helps save lost production, time, and costs compared to repairing leaks after start-up.
- Helps assure that the health of personnel is not adversely affected by the escape of hazardous or poisonous liquids and gasses.
- Enhances the safe and extended operation of process plant and equipment.
- Helps assure the environment is not contaminated or polluted.

For more information, contact your local Halliburton representative, visit us on the web at www.halliburton.com or email pps@halliburton.com