

## Core Competencies

Our success relies on finding the most effective chemical solutions to difficult problems.

Below are listed problem areas where we believe we have significant technical and/or commercial advantages.

### Production Wells

**Stimulation** – HCL is 100+ yrs old technology with a documented 32% failure rate. **HDC Mk II™** is an advanced mixture of chelating agents, catalysts, and reaction accelerators that dissolves CaCO<sub>3</sub>, **barite**, and other sulphate compounds. It is environmentally benign and safe to handle. Average increases in production with one major operator in Malaysia has been over 600%. It simply performs better than acid. We have several SPE papers written by operators about successful stimulation jobs, along with many case histories from all over the world.

**SCP, Pressured Annuli, leaking packers and casing, even grouting - Liquid Bridge Plug** is an epoxy resin that is immiscible in both oil and water. It can be weighted up with barite. As a result, we can deploy the product by gravity drop from the surface to rest upon the problem leakage, or traditionally pump it to the problem area. Liquid Bridge Plug can be both accelerated and retarded. It has 200 times the tensile strength, 4 times the compressive strength and 4 times the bonding strength of cement. Plus it is thinner and does not shrink as it sets up. It solves a wide variety of problems including many that cement cannot.

**Descaling** – **HDC Mk II™** dissolves barium sulphate, strontium sulphate, and CaCO<sub>3</sub> scales. **Pyrosol ES** is a very effective **iron sulphide scale dissolver**, the second most common scale. Acid dissolves FeO poorly and BaSO<sub>4</sub>/SrSO<sub>4</sub> not at all. Besides in wells, we have used the products to descale ESP's in situ, avoiding expensive replacement. We have found by simply analysing and defining the plugging compounds, we can dissolve the problem compounds in situ with just a mixing tank and pump, a quick, effective, and cost-effective operation. Our lab work determines the products required.

**Sand Control - SandBar**, a unique, patented sand agglomeration chemical that rapidly **coats solid particles** (sand and formation fines). **SandBar** changes or **alters the Zeta Potential** of solid surface to an optimum range, hence providing an ionic bonds (cationic and anionic) between the particles and optimally aligning the sand particles. It also typically results in a higher permeability.

**Water or Gas Shut-off** – with **Liquid Bridge Plug** and/or **Poly Plug**, shut off treatments are a core business. Both products have multiple patents. We have many case histories from around the world on successful WSO work.

**Wax, Scale, and Corrosion Inhibition in Wells and Pipelines** – **PMI-107** is in a class of one, a multi-functional product for inhibiting scale, wax, and corrosion. It does this two ways. Firstly, by coating the metal surfaces preventing scale, wax, and corrosion from building up in the first place. Secondly, it is amphiphilic so interferes with wax precipitation and scale precipitation in both phases. **PMI-107** also keeps the phases, water and oil, separate, acting as a DRA, PPD, and promoting easy separation. A variant called **PMI-107FA** also includes a very unique and effective H<sub>2</sub>S scavenger.

# WellTech

**Wax, Asphaltene, and Scale Dissolving in Wells and Pipelines** – we have a variety of wax, asphaltene, and scale solvers to select from. **Pyrosol ES, uniquely, is a very effective iron sulphide and iron sulphate dissolver.** **OrangeWorks, PowerPickle, and PMI-107** are effective wax and/or asphaltene solvers. **PentaFlow** has been used as a combination wax and CaCO<sub>3</sub> scale solver.

**PNA** – Plug and Abandon wells. **Liquid Bridge Plug** or **Ultra Set** are both stronger than cement and are good to use to set plugs with plugging and abandoning wells.

**Sealing leaking wellheads** – We have both types of wellhead sealants, temperature activated and differential pressure activated, **Well Bond and Well Bond II**, which enables us to seal control lines, leaking wellheads, and hanger voids.

We also have several candidates for IOR and EOR. Besides all the above, we have other areas of activity such as **treating sludges, cleaning out tanks, dissolving SRB's** which can inhibit production, **treating damaged injection wells.**

## **Drilling Applications**

**Differential Sticking in an SBM/OBM – Stuck pipe is the largest cause of NPT in drilling worldwide. Incredibly, there are no stuck pipe pills designed for SBM/OBM's. HDC Mk II™** was developed over 4 years in the UK specifically as a pipe release agent (PRA) for SBM/OBM's. It works in WBM's too. **HDC Mk II™** dissolves the filtercake, i.e., the barite in the filtercake along with any CaCO<sub>3</sub>, and also dehydrates and shrinks any clays. We have SPE papers and many successful jobs.

**Cement Spacer that stops losses – Ultra Spacer** performs as a spacer cleaning the casing and filtercake while also preventing losses to the formation thus ensuring a successful cement job. Surprisingly, it is unique in this application.

**ICS Drilling Fluids System** (formerly known as the Aphron System) - The Invasion Control System (ICS) is a unique, effective system used to prevent loss circulation and avoid differentially stuck pipe. It is stick proof AND stops all losses. We cannot emphasize the uniqueness of this system enough. It is water based containing KCL. It is completely solids free (unless barite added). The fluid loss is controlled by highly emulsified air bubbles. This allows the fluid to establish a tight seal across formations regardless of the overbalance in the annulus, allowing drillers to penetrate multiple pressure zones simultaneously without incurring fluid losses, stuck pipe, kicks or poor hole cleaning. We have gone as high as 9.0 ppg *overbalance* in a previously problematic well without any issues with losses or differential sticking.

**Casing Clean-up Chemicals – PowerPickle** and **PowerSurf** have been used in hundreds of wells as effective combination for wellbore clean-up.