

united energy

Creating Revolutionary Solutions

Who Are We



Our corporate culture is based on revolutionary scientific research and development. We are committed to creating the most effective, cost efficient and environmentally friendly chemical and technological alternatives for the oil and gas industry.



Technology Mission

- To formulate and develop world leading, high performance flow assurance products for production, transport and storage in the petroleum industry.
- To eliminate the use of highly toxic and hazardous base products.
- To establish technology transfer relationships to offer value added, market leading solutions to end users.
- To strive to obtain and maintain technology-of-choice status.
- To increase profits by decreasing costs.

An Industry Problem - Paraffin and Asphaltene



- An oil well will encounter paraffin and/or asphaltene problems during its production life span.
- Paraffin and asphaltene deposition can choke the formation and well bore and gradually decrease its production.
- It is possible to render a well uneconomical to operate due to problems with paraffin and asphaltene.
- Paraffin, once close to the surface at lower temperatures, causes blockage and pressure problems in oil pipelines
- Oil Sludge with paraffin and asphaltene accumulates over time in storage tanks resulting in lost production and expensive maintenance

Typical Conditions caused by Paraffin and Asphaltene



Paraffin and asphaltene do not remain soluble in crude oil so sludge deposits occur throughout the entire oil production systems. Several adverse conditions accelerate this process..

- **Paraffin/Asphaltene cooling resulting in larger sludge deposits**
 - *Cooling due to temperature changes as the oil moves up to the surface* this allows oil to become viscous, congeal or reach its cloud point. This is typical of crude oil with high pour points or cloud points, and for low gravity heavy crude.
 - *Cooling due to gas separation* where gas forces oil through the formation causing pressure differential. For example gas lift well production and gas separation as a result of shearing through down-hole pumps.
 - *Cooling from introduction of cold fluids* into the well such as acids or fracturing fluids can cause formation cool down which in turn may bring the oil temperature down below its cloud point. This condition allows paraffin to deposit in the formation causing a skinning effect or perhaps emulsion blockage
- **High temperatures that cause flashing or vaporization of the oil volatiles** which results in oil volume loss leaving the oil richer in paraffin wax content. This is a typical result of extensive hot oil treatments, steam and fire floods.
- **Formation of Solids** such as, salt, iron sulfide and scale can greatly increase or accelerate paraffin and crude separation. In wells this can cause tubing restrictions and rod stacking. The wax crystals adhere to the solids forming a complex matrix of sludge throughout the wells, pipelines, and tanks.



Today's Focus



United Energy's Wax and Asphaltene Breakers

- What They Do
- Where They Are Applied



Wax and Asphaltene Breakers

■ What They Do.

- ✓ Turn 'sludge' deposits into a fluid state for removal by conventional pumping methods.
- ✓ Remove wax and asphaltene deposits from porous and non-porous surfaces.
- ✓ Leave a barrier coating to prevent further deposition of soils.

Wax and Asphaltene Breakers



Where They Are Applied

- ✓ Crude Oil Storage Tanks
- ✓ Down-hole Wells
- ✓ Pipelines
- ✓ Pumping and Processing Equipment
- ✓ Heat Exchangers

Mechanisms Of Action

- WETTING
- SOLVATION
- PENETRATION
- DISPERSION
- CLEANING

WETTING

- Addition of wetting agents allows solvents to coat soil particles more effectively
- Helps to match the surface energy of the cleaner with that of the soils
- Increases oleophilic characteristics of the solvent system
- Displaces any water present

SOLVATION

- ✓ Preferentially dissolves a portion of the sludge
- ✓ Helps to dissolve and remove the protective layer of neutral resins and asphaltenes
- ✓ Creates interstitial spaces for solvent to further penetrate

PENETRATION

- ✓ Once “Pathways” have been created in the sludge / matrix / solvent blend the product penetrates the sludge mass and coats the insolubles
- ✓ When particles are suspended in a solvent matrix essentially two phases are created;
 - ✓ a continuous phase and a
 - ✓ suspended phase

DISPERSION

- ✓ Insoluble particles break up and disperse in the solvent phase
- ✓ Solid particles become entrained in a form of colloidal dispersion
- ✓ Sludge mass becomes a flowable liquid that can then be pumped out and transferred

CLEANING

- Products remove residual water and soils from all hard surfaces
- In the case of KH-30, a protective film is left on metal surfaces to prevent further adhesion of soils

United Energy Solutions K-LINE Products



Our K-LINE products are focused on Asphaltene, Paraffin, and Viscosity Reduction. K-LINE Products are environmentally friendly, non-combustible, and not regulated by D.O.T. The products are a proprietary blend of specialty organic solvents and surfactants.

KX-91 – is used for cleanup and stimulation of well bores. It works on all gravities of crude oils. In addition it is good for Tanks with sludge buildup and can be used for pipelines with asphaltene and paraffin blockage. It is a dispersant of low toxicity and performs exceptionally well under wide temperature and pressure differentials due to high flash (>215°F) and low freeze/pour point (-40°F).

KX-100 – Is a well stimulation product where contact time is limited. One of the most noticeable features is the ability to perform in extreme (-40°F to 215°F) temperature ranges. It is a dispersant and has low emulsifying tendencies with brine water with the retention of potent solvency.

KH-30 – used in continuous injection programs to disperse paraffin and asphaltene before creating new sludge deposits. It provides a thin oil barrier film on various metal surfaces and exhibits good compatibility with most commonly used oil field materials of construction.

VR-10210-1– is used for viscosity reduction within flow lines, pipelines and well heads and is completely compatible with our K-LINE of products.

KX-105DSA-5 – our unique degreaser which is a strong multi-functional chemical cleaning compound designed to dissolve and remove tough heavy organic and sludge deposits. It has strong wetting, penetrating, dispersing, and solvating properties. Hence it is safe for use in Oil field cleaning applications.

United Energy Solutions K-LINE Products – Cont.

United Energy has other products performing various functions. All United Energy products are environmentally friendly and are completely compatible across all our product lines.

KX-104PDC - designed to reduce pour point, gel point, or cloud point of crude oil and improve cold flow property and the ability to pump oil.

KX-106-1 Water Based Degreaser – is a liquid alkaline cleaner containing corrosion inhibitors and heavy duty surfactants that make it highly effective on the toughest of soils, including exhaust carbon, hydraulic oils, boot prints, and solid film lube.

KX-404EB LINE – is specifically formulated to destabilize both oil-in-water and water-in-oil type emulsions with low dosage treatments and minimal contact time. Due to variable nature of emulsions, samples are lab tested to choose the best product for the job.

CI-98 - Corrosion Inhibitor is formulated around an oil-soluble, water-dispersible filming amine designed to be used in sour gas and producing oil wells. It is a liquid compound which has been formulated to give a very tenacious film with an extended persistency without undesirable “gunking” on the down-hole tubulars.

SI-18 - is a broad based spectrum, high calcium tolerant water soluble scale inhibitor which has been formulated to inhibit the formation and disposition of calcium carbonate scale in oil field brines. It will complex well with the calcium cations impeding crystal growth and subsequent scale formation and deposition.

United Energy Solutions K-LINE Products

Cont.

- *Our K-LINE products are focused on Asphaltene, Paraffin, and Viscosity Reduction. K-LINE Products are environmentally friendly, non-combustible, and not regulated by D.O.T. The products are a proprietary blend of specialty organic solvents and surfactants*
- **SR-3** – A heavy duty rust, corrosion and scale remover which works on ferrous and non-ferrous metals. It removes scale due to salts of iron, calcium, magnesium manganese, lead, copper, zinc, aluminum and tin.
- **FOAMER LD-2** – Is designed to remove water in gas producing wells or in wells where air can be pumped down hole. Foam comes to the surface removing the water problem.
- **FOAMER LD-6** – Is similar to LD-2, but is used in treatments where the temperatures are below 32°F (0°C).
- **HSS #1** – Hydrogen Sulfide and Organic Sulfide Scavenger. This product is used in wells where mercaptans and hydrogen sulfide are produced along with significant levels of carbon dioxide.
- **HSS #2** – Hydrogen Sulfide and Organic Sulfide Scavenger. This product is used in wells with little or no carbon dioxide to remove hydrogen sulfide and mercaptans.

SPIN OFF PRODUCTS AND DEVELOPMENTS

Unique characteristics of products have led to development of new spin-off products

- KH-30 has been especially versatile and has led to marketing in other product areas
- KH-30 has been marketed under the name “Liquid Hammer” for use in asphalt plants
- It is used in heat exchangers
- Used to clean conveyer belts
- Used to clean and coat the beds of asphalt trucks as a release agent

What We Do For Our Customers

- ▶ Well Production Improvement
- ▶ Down Hole Stimulation
- ▶ Down Hole Paraffin/Asphaltene Clean-Up
- ▶ Well Down Hole Stimulation/Clean-UP
- ▶ Heavy Crude Oil Flow Enhancement
- ▶ Oil Pipeline Services
- ▶ Oil Pipeline Flow Enhancement
- ▶ Oil Pipeline Reclamation

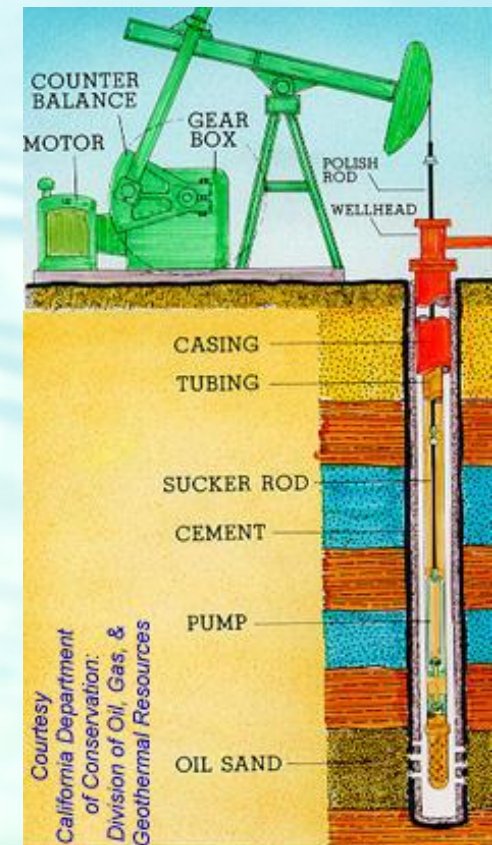
TANKS AND REFINERY CLEANING

- ▶ Turn sludge back to oil
- ▶ Eliminates mechanical cleaning
- ▶ Reduces time tank is out of service

Well Production Improvement

United Energy is able to solve well production issues with a variety of K-LINE chemicals and application methods. The typical well production improvement projects categories are listed below.

- Down-hole stimulations
- Down-hole Paraffin / Asphaltene Clean-up
- Heavy Crude oil flow enhancement



Wells - Down-Hole Stimulations

Our goal is to apply our K-LINE products into the well perforations to directly attack formation blockage by dispersing asphaltene and paraffin deposits allowing the well to utilize its natural feed-in abilities and resulting in increased production.

- **Application Methods** - Quite often we pump our chemical downhole and follow with light crude, condensate or diesel oil to ensure our K-LINE products reach the perforations.
 - Gas lift wells using tubing displacement
 - Plunger Lift wells using tubing displacement
 - Pumping wells using casing displacement and in the case of progressive cavity pumps without a check value using tubing displacement.
- **Application Quantities**
 - A stimulation treatment is approximately 2 to 10 drums depending on the depth of the well and the downhole configuration and well type. Depending on the Well Type and the amount of paraffin and asphaltene naturally flowing from the oil associated with the well we may recommend Continuous Injection to avoid the need for future stimulations.

Well - Down-hole Paraffin / Asphaltene Clean-up

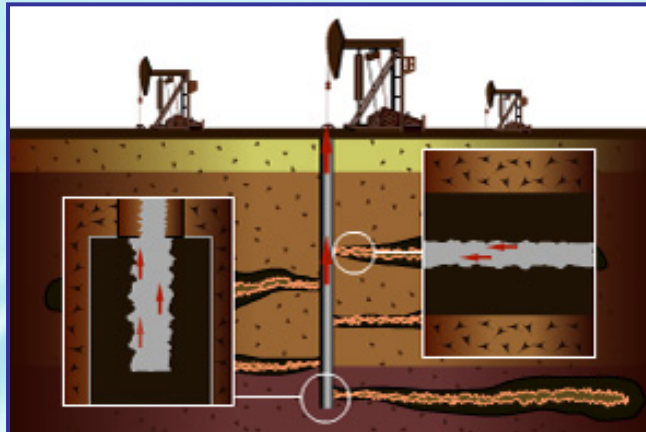
To solve operational problems such as tubing restrictions and rod stacking we address the problem by chemically dispersing the paraffin and asphaltene and then use the appropriate methods to avoid future paraffin and asphaltene buildup. We still strive to get the K-LINE chemical to the perforations and at the same time attack the operational problems.

- **Down Hole Paraffin / Asphaltene Clean-up** - The K-LINE chemicals will disperse the crude deposits on the well tubing and equipment by breaking the adhesive nature not allowing the deposits to stick to one another or the surrounding environment. This will keep the well tubing free of friction
 - Gas lift wells - cleans and prolongs the life of the gas lift valves
 - Plunger Lift Wells - cleans and prolongs the life of the plunger
 - Pumping Wells - K-Line products will help keep the pump from overworking and reduce rod stacking
- **Application**

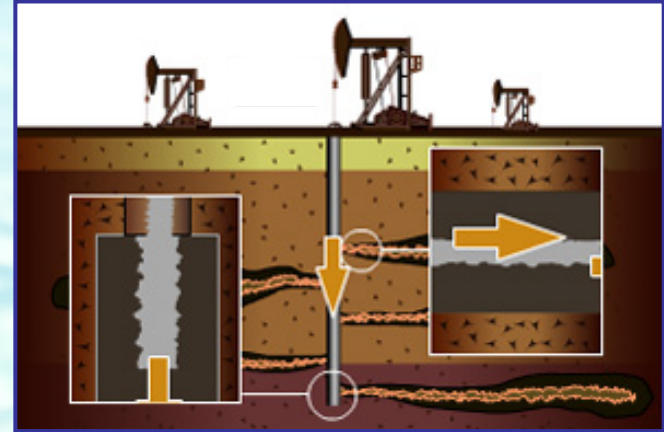
For this application K-LINE products can be used alone or in conjunction with a solvent to remove deposits from tubing and rods. Depending on the Well Type and the amount of paraffin and asphaltene naturally flowing from the oil associated with the well we may recommend Continuous Injection to avoid the need for future stimulations.

Well Down-Hole Stimulations/Cleanup

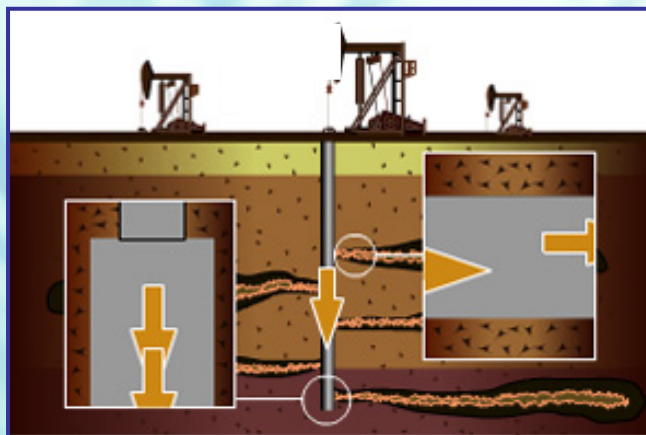
Below is a diagram depicting how the K-LINE treatment can clean the paraffin and asphaltene deposits for the entire well from the perforations to the well head.



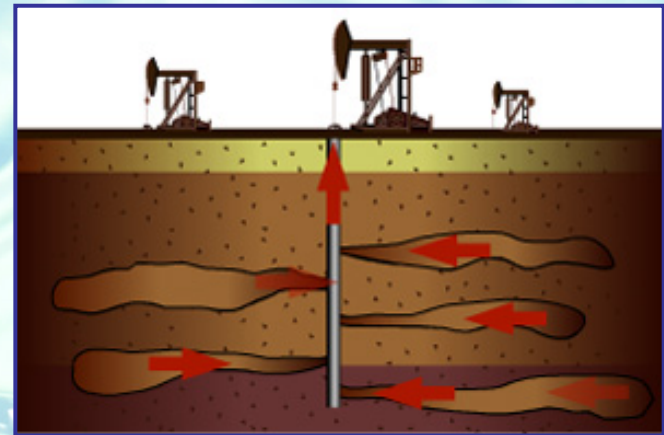
RESTRICTED PRODUCTION



K-LINE Product TREATMENT



DISPERSING BLOCKAGE



RESTORING FLOW
AND PROFIT



Heavy Crude Oil Flow Enhancement



In many cases low gravity crude oil requires additional flow enhancement within the well perforations, well equipment, the well head, and the flow lines. The emphasis is first on a stimulation and then a continuous injection program to improve the viscosity and relieve the pressure in the well, well head and flow lines.

■ Heavy Oil Flow Enhancement

The K_LINE products reduce friction and pressure by dispersing all crystals and repelling their adhesive nature therefore restoring laminar flow to the heavy crude. This allows the heavy crude to flow more freely and be produced and transported with greater ease.

■ Applications for heavy crude

Continuous injection at the point where pressure builds as a follow-up to well stimulations. Based on the type of well many times scheduled batch treatments are required with the intention to maintain the improved production for longer time periods.

Oil Pipelines Flow Enhancements



Oil Pipeline Reclamation



Oil Pipeline Reclamation - Application

Oil Pipelines often times require reductions in paraffin deposits to achieve pressure reductions and require viscosity reduction. Our K-LINE products can disperse the pipeline deposits and our VR 10210 will work together with the K-LINE products to reduce viscosity.

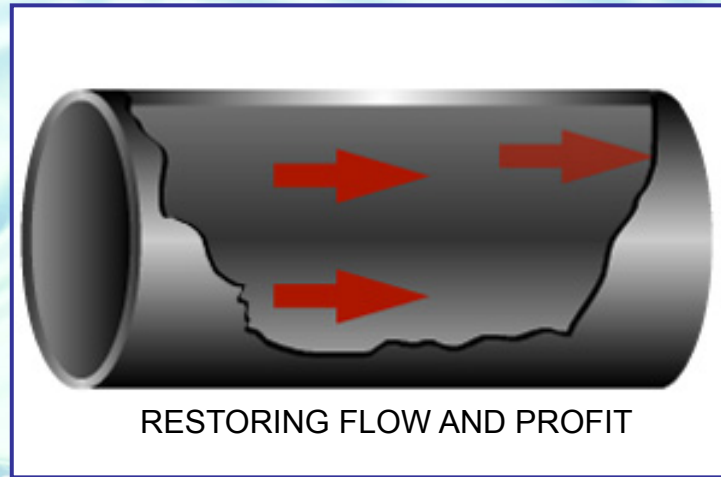
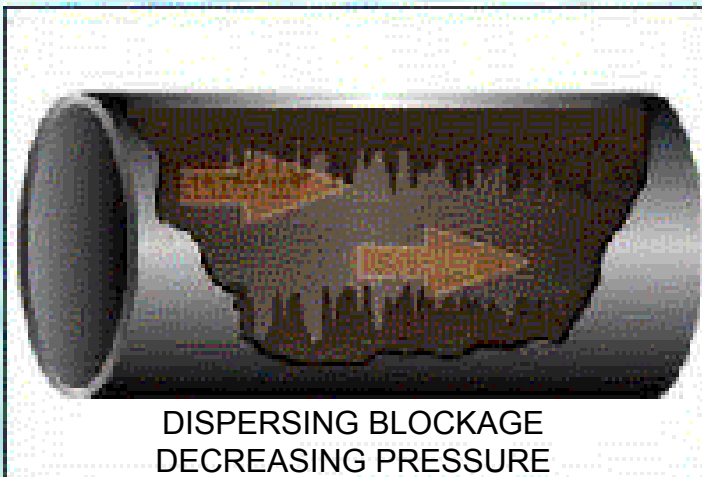
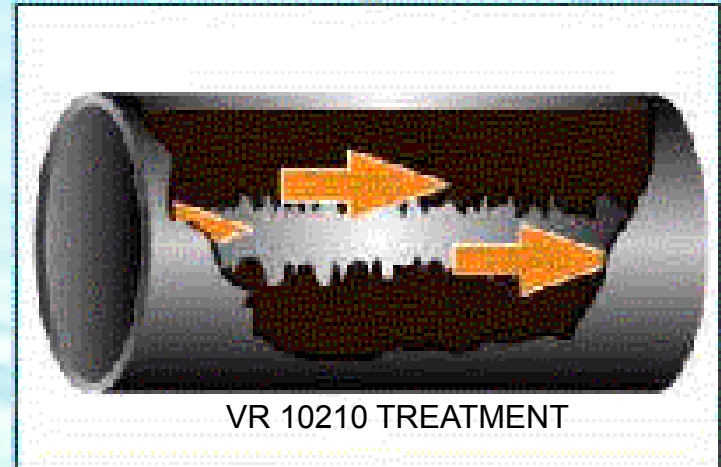
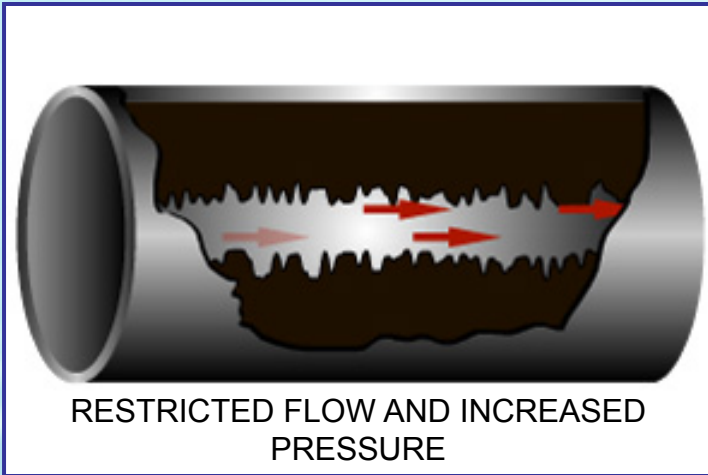
– **Application Techniques – Pigging**

- There should be an initial batch treatment of K-LINE products with a solvent blend or oil to penetrate and start to release and disperse the deposits in the pipeline
- Once the initial treatments are completed, the pig can be launched with the final treatment. A batch of KH-30 should be applied directly in front of the pig for a smooth operation.

– **Application Techniques – Continuous Injection**

- VR 10210 can also disperse deposits and aid in their removal where pigging cannot be applied
- Continuous Injection treatments are calculated for the diameter and length of the pipeline
- Continuous injections are usually initiated at high rates (600 to 2000 PPM) to relieve the pressure restrictions.
- After the initial treatment and the pipeline pressures are reduced, it may be possible to reduce the PPM used in the initial treatment.

Oil Pipeline Services



Tank Storage Clean up



In-line Chemical Tank Bottom Clean-up



Tank Bottom Remediation

Over a period of time, oil storage tanks can accumulate large amounts of paraffin or asphaltene sludge which hamper operations and cause compliance problems. If untreated, this can render a tank useless and/or cost phenomenal amounts of money to have the tank cleaned out and the contents disposed of properly.

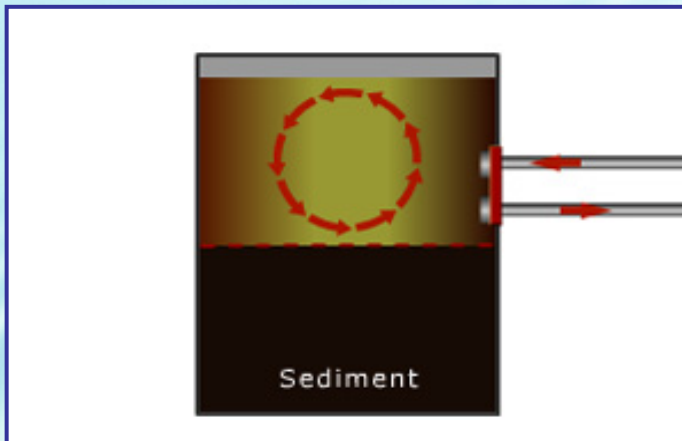
In-line Chemical Tank Bottom Clean-up

- Our K-LINE products will suspend the tank bottom sludge crystals in the oil allowing the crystals to flow freely into crude oil in a liquid state.
- You recover the lost oil that was previous sludge

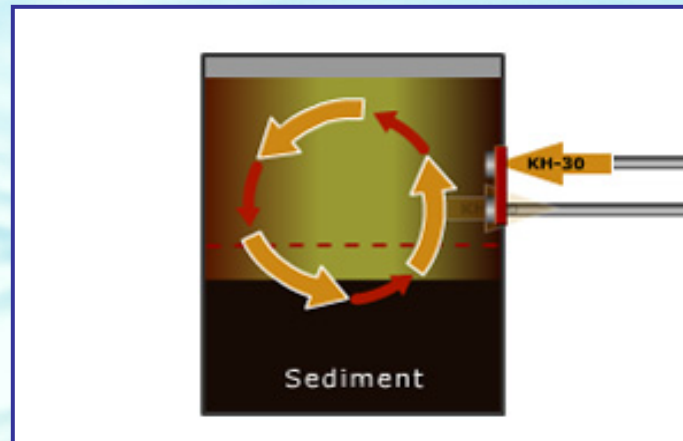
Tank Bottom Remediation



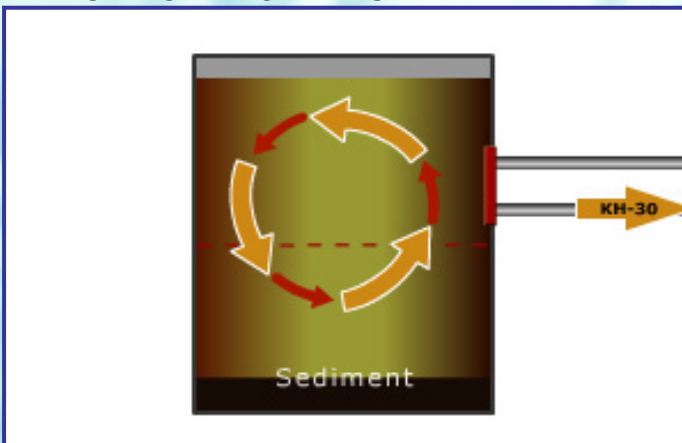
Below is a diagram depicting how the K-LINE treatment can eliminate the tank bottom sludge.



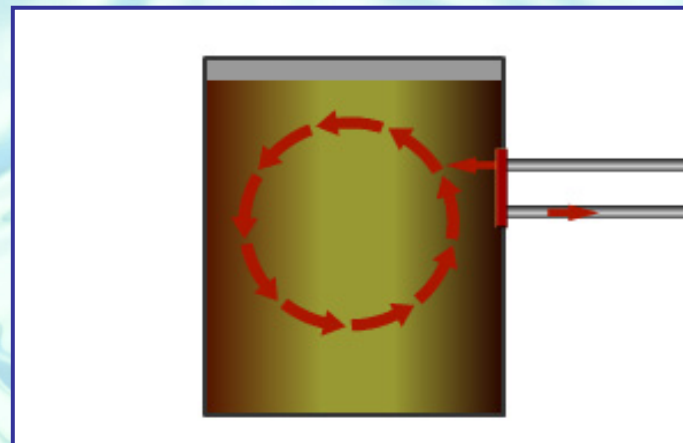
SEDIMENT CAUSES COMPLIANCE AND EFFICIENCY PROBLEMS



K-LINE PRODUCT TREATMENT



SEDIMENT DISPERSED



RESTORING FLOW AND PROFIT



Tank Bottom Application

Tank cleaning requires coordinated planning to reduce downtime and eliminate the sludge using the proper amount of K-LINE products. Heat, agitation, solvency and our K-Line of products all play an important role in removing all the tank sludge.

■ Key information for Determining Application Techniques

- Determine the composite make-up of the sludge on the Tank bottom via sample analysis
- Calculate the volume of the sludge build up in the tank
- Measure the chemical composite make-up of the oil and API gravity via sample analysis

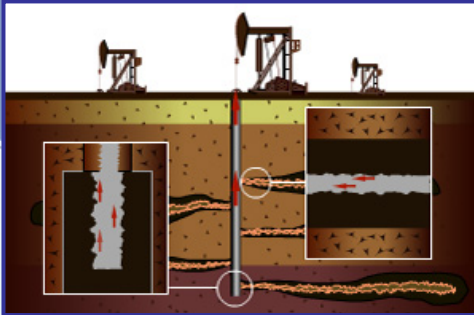
■ Application Techniques

- The tank needs cutter stock oil on top of the sludge to help prepare for the introduction and circulation of the K-LINE products.
- Agitation is necessary to circulate the the chemical mix of the K-LINE products and oil cutter stock for uniform contact of all the oil sludge. In many cases the circulation mechanism for agitation can be accomplished with the existing tank equipment.
- Heat can also be an important factor in the treatment. Heat will accelerate the process and lessen the time needed for agitation

United Energy Solutions Summary

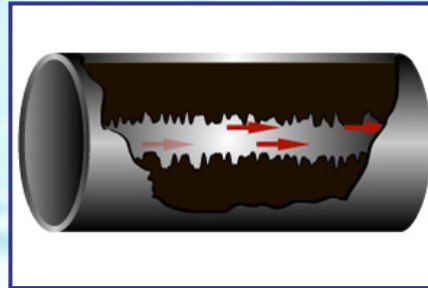
K-LINE

Wells



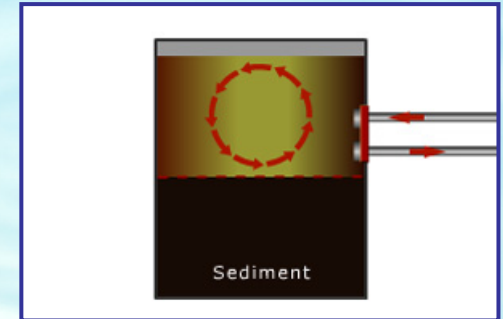
RESTRICTED PRODUCTION

Flow lines and pipelines



RESTRICTED FLOW AND INCREASED PRESSURE

Tanks



SLUDGE DEPOSITS

KX-91 / KX 100 / KH-30

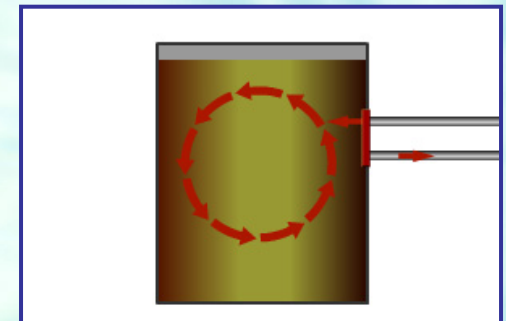
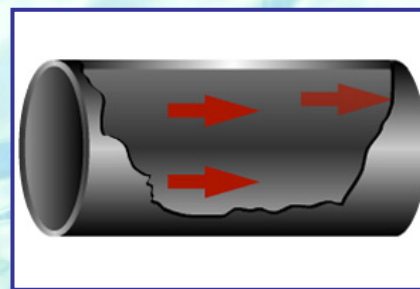
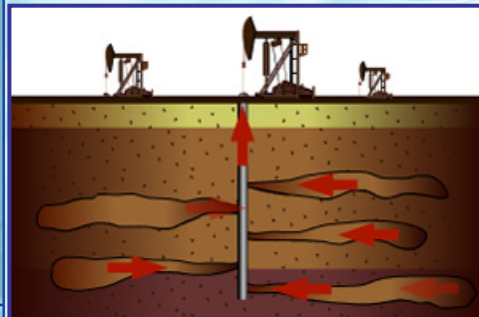
KH-30 / VR 10210

Several K-LINE products

Wells

Flow lines and pipelines

Tanks



\$\$ RESTORING FLOW AND PROFIT \$\$

Refinery Cleaning Products

The rigorous cleaning and maintenance needs of the Petroleum Refinery Industry demand specialized, highly effective products. We have a complete family of products just for the refinery industry's special needs. If you require products for producing, refining or transportation, we have the right solution.

We Offer Products For The Following Areas and Methods of Cleaning:

- **TANKS**
- **TRANSFER LINES**
- **PUMPS**
- **OIL/WATER SEPARATORS**
- **HEAT EXCHANGES**
- **OIL RIGS**
- **DESALTERS**
- **FIN FANS**
- **OIL SPILS**

Refinery Cleaning Products

Cont.

METHODS of Application:

- **WIPE ON** – Cleaning using rags, sponges or special applicators
- **PRESSURE** – Uses warm to hot water at high pressures to remove soils
- **STEAM CLEANERS** – Uses high pressure steam with detergent to remove soils.

REFINERY Specific Products:

KH-30, KX-100:

Are solvent based cleaners using plant derived solvent (KH-30) or organic based solvents (KX-100). These products can be applied by wipe-on methods or pressure washers.

Uses:

- Paraffin and Asphaltene Removal
- Heat Exchangers
- Oil Rigs
- Oil/Water Separators
- Tanks
- Transfer Lines
- Pumps

Refinery Cleaning Products Cont.



KX-106-1, QK-1600, QK-1655

May be used in steam cleaning or pressure washers

Uses:

- Oil Rigs
- Fin Fans
- Pumps
- Oil/Water Separators

▪ **KX-105-DSA-5**

May be used as a wipe-on cleaner or pressure washer cleaner

Uses:

- Oil Rigs
- Pumps
- Oil/Water Separators

HP-KX-EB LINE

Specialty line of emulsion breakers for various areas

Uses:

- Tanks
- Oil/Water Separators



Refinery Cleaning Products Cont.



SR-1, SR-3, CR-1

These acid based cleaners can be used for scale and rust removal prior to painting or applying protective coatings.

Uses:

- Tanks
- Pumps
- Oil Rigs
- Heat Exchangers
- Desalters

▪ **FR-15**

Specifically designed to handle oil spills on water or oil contaminated soil. Product disperses oil to allow more effective breakdown by bacteria.

CI-98, SI-18

These products are maintenance products which prevent the build-up of rust or scale.

Uses:

- Tanks
- Pumps
- Heat Exchangers
- Desalters
- Fin Fans



united energy

Creating Revolutionary Solutions

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