



MATRIX SERVICE

Minimizing Risk through Technical Innovation

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Introduction

Abstract —

“Discuss the minimization of risk to personnel and equipment through the use of technical innovation with respect to industrial services applications”. Authors – Lee Coll and Tom Niles

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Cleaning of Field Storage Tanks

**Reducing the Risks of Injury by
Reducing the Exposure to Personnel**

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Benefits of Today's Tank Cleaning Approach

- **Safety first!**
 - Reduced personnel exposure
 - Reduced confined space entry duration
 - Typically reduced manpower requirements
 - Typically reduced LELs when making entry
- **Environmental**
 - Maximize product recovery
 - Minimize waste quantities for disposal
 - Reduce environmental exposure
- **Financial**
 - Reduce time and cost



Key Components Offered with Technology

- **Reduced personnel exposure** – by keeping the cleaning process remote from project manpower, exposure to the process hazards are minimized.
- **Reduced confined space entry duration** – A more effective process application will minimize or eliminate hazards before confined space entry is considered.
- **Typically reduced manpower requirements** – elimination of *laborous* tasks with innovative process enhancements will reduce a staff made up of *laborers*. Let machines and chemistry do the hard work.
- **Typically reduced LELs when making entry** – specific decontamination processes drive down hazardous contaminants to permissible and safe exposure levels.



Applying Mechanical Advantage: Non entry tank cleaning technologies

- Matrix T300 hydraulic nozzles can be bolted to one or more existing shell manways
- Able to apply over 3,000 gpm at up to 300 psi per nozzle to impart the flow and pressure needed to fluidize tank bottoms (flow reduced in photo)

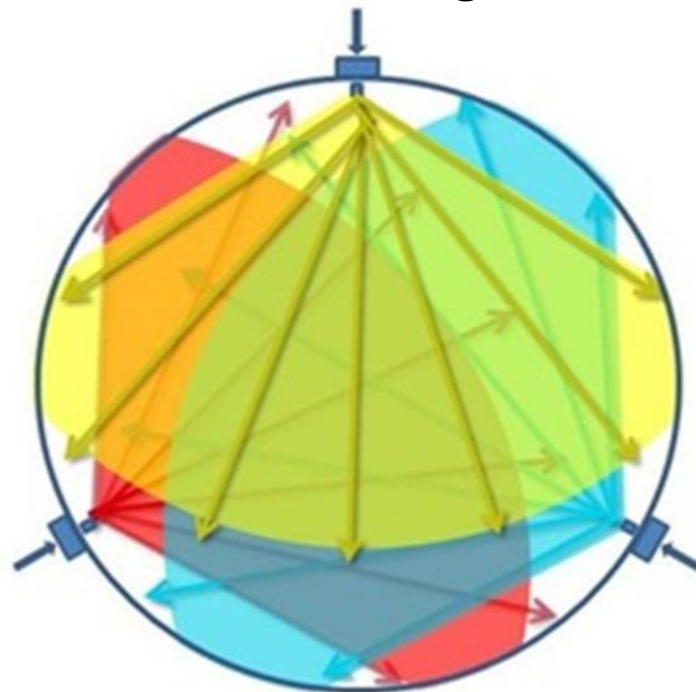


Applying Mechanical Advantage: Non entry tank cleaning technologies

- **Manway mounted nozzles**
(manway nozzles - up to 1,000 psig)

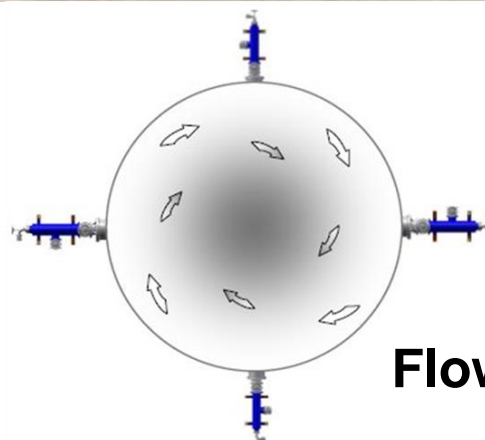


**Variable Sweep Pattern
– Total Coverage**



Applying Mechanical Advantage: Non entry tank cleaning technologies

Tank spin nozzle



Flow Pattern

Introduction of HG3000 Chemistry

- A proprietary fluidization agent used in removal of heavy hydrocarbons
- High flash point
- Hydrocarbon/polymer based
- Non-emulsifier
- Low/no foaming



- Compatible with unit processes
- No waste water issues
- Can be applied at ambient temperatures
- Applications
 - Tank Stripping/Cleaning
 - Exchanger cleaning
 - General equipment cleaning

Additional Innovations to Reduce Risk During Industrial Cleaning Projects

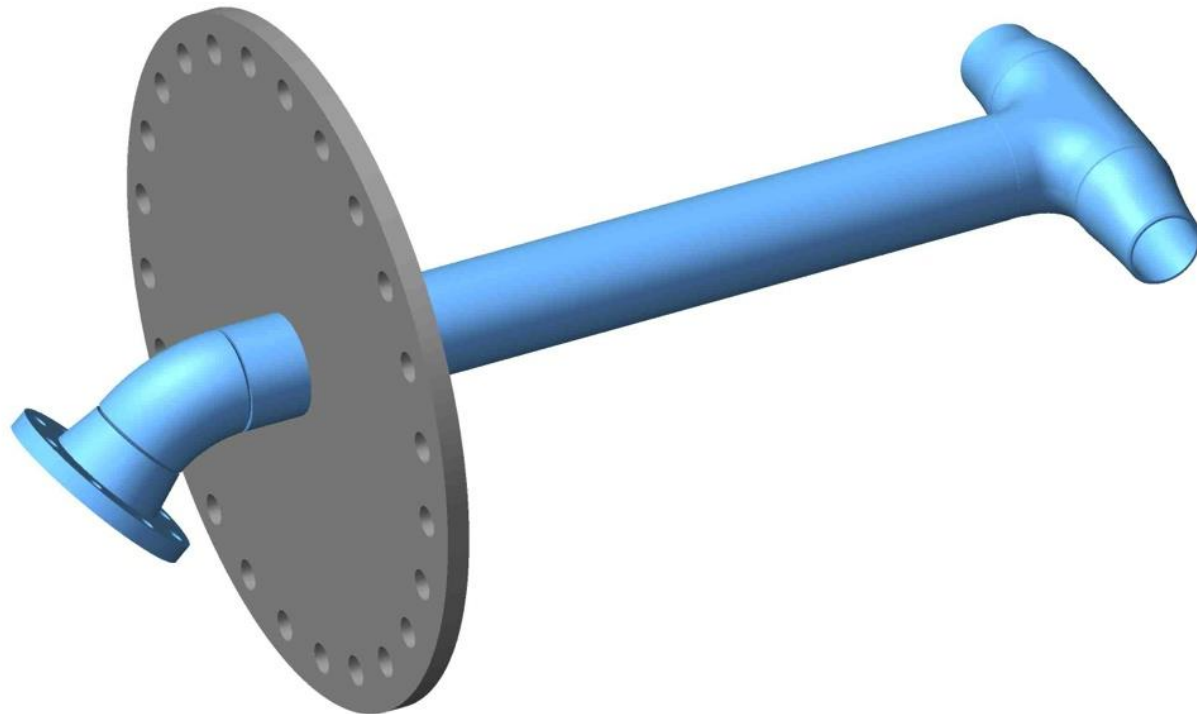
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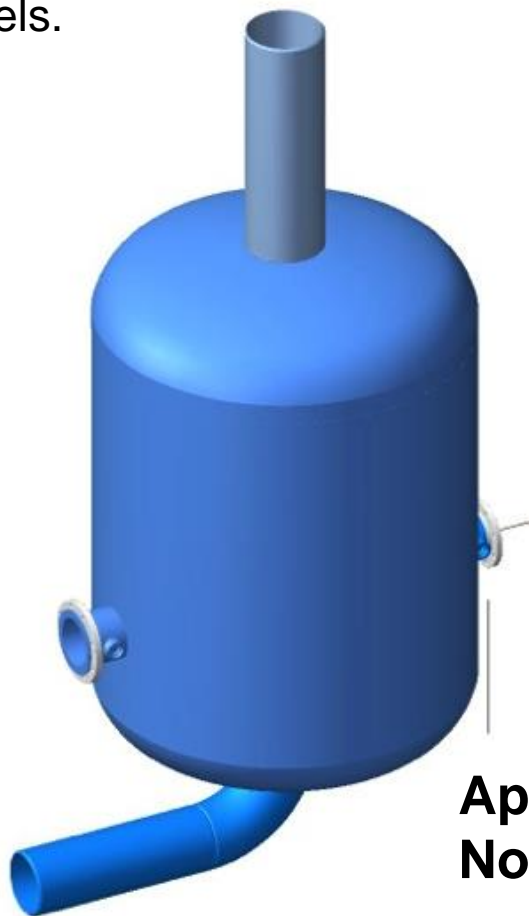
Simple Solutions for Effective Results

- **HF Alkylation Units** – specialty acid cooler manway adapters allow stagnant areas of acid cooler bundles to be fluidized. This eliminates the likelihood of acid coolers “sticking” during extraction from unsolubilized iron fluoride residuals.



Keep Personnel Out of Hazardous Environments

- **Olefins Plants**– Remotely applied mechanical energy on Quench Tower and Settling Drums eliminate potential “mining operations.” Equally applicable to heavy oil units in refineries, styrene stilling vessels.



**Applying Mechanical Advantage:
Non entry vessel cleaning technologies**

Control the Process

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- **Air Cooled Condenser**– adequately sized ejectors to match steam flow assures rupture disc or PSV capacity not exceeded.

Combine Cleaning Processes for Best Results

Refinery Flare Systems–

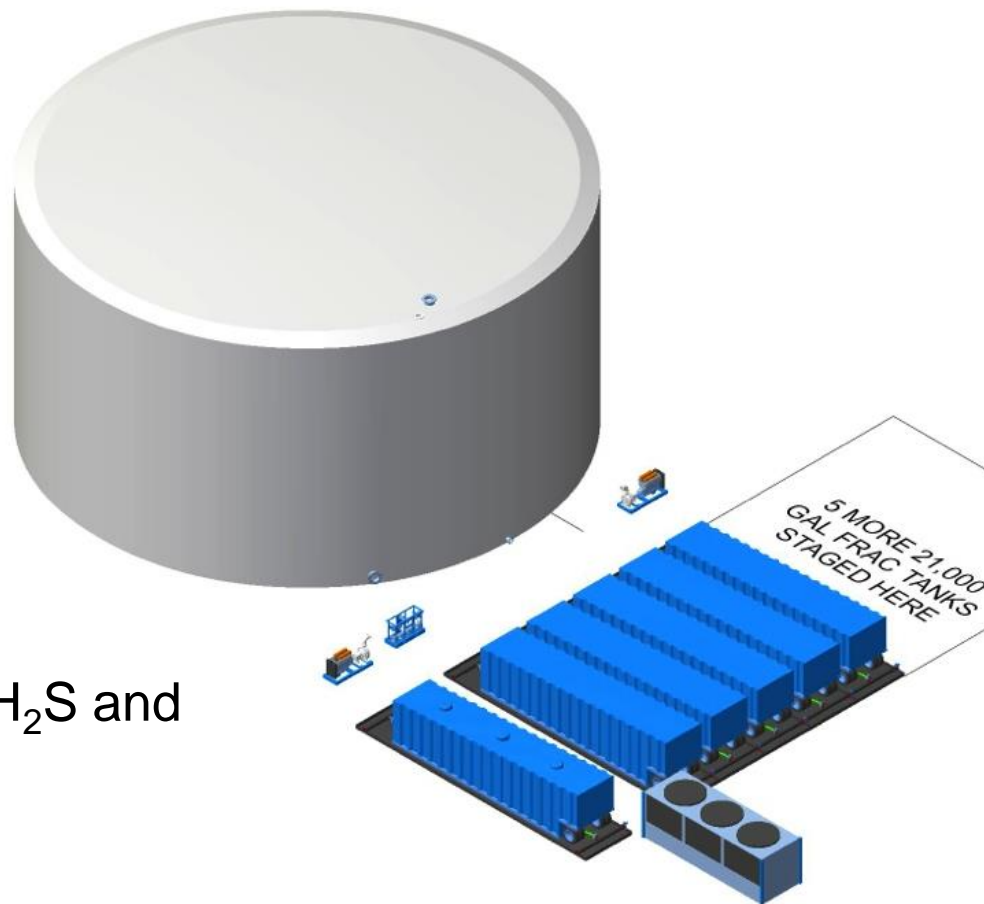
- Use vapor phase technology to apply the chemistry without having to fluid fill systems.
- Use circulation methods that minimize water requirements while exposing more contaminants to cleaning activities
- Treat deposits with cleaning systems that don't increase the hazard
- Combine knock-out drums with all adjacent piping systems



Engineer Away the Hazard

Neutralization of Reactive Materials

- Sulfuric Acid Tanks
- Sour Water Systems where H₂S and Iron Sulfide are present
- Butadiene Systems
- Reactive Metal (Sodium and Lithium) Systems



Kleen Energy LLC

February 7, 2010



- Catastrophic Explosion during “gas blows” to turbines
- 7 Fatalities

Do a Better Job - Differently

FastFroth™ Process: Piping System Flushing

- Use FastFroth™ method to fluidize contamination
- Replaces pigging of smaller systems
- Applicable to piping up to 36” diameter
- Eliminates hazards of gas blowing on fuel gas lines



- Thank you!

- Questions?

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