



## **C&J Energy Services – QHSE Overview**

### West Virginia Commission on Oil & Natural Gas Industry Safety

Presented by:  
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C&J Energy Services



# Corporate Responsibility

HEALTH & SAFETY   TECHNOLOGY   ACCOUNTABILITY   ENVIRONMENT   COMMITMENT   TRAINING

C&J Energy Services is dedicated to being a good citizen to our customers, our workforce, our communities and our planet. This is not just a corporate directive, but rather a responsibility that every C&J employee takes very personally.

## COMPANY WIDE, WE ARE COMMITTED TO:

- Safeguard the health and well-being of our employees, contractors and communities
- Minimize the impact of our operations on the environment
- Continuously improve our quality, safety and environmental performance
- Exceed customer expectations
- Comply with government regulations
- Communicate our quality, safety and environmental performance to our stakeholders
- Deliver service excellence



Josh Comstock  
Founder, Chairman and  
Chief Executive Officer



Don Gawick  
Chief Operating Officer



Jim Prestidge  
Chief Strategy Officer



John Srock  
Vice President QHSE

EXCELLENCE DELIVERED.



# Agenda

- QHSE Management System (4-6)
  - QHSE MS Integrated System Structure
  - C&J Safety Principal & Improvement Plan
- Standard Operational Competencies (7)
- Training & Mentoring (8-11)
  - New Hire & Refresher Training
  - Short Service Mentor Process
- Driver Training & Competence Assurance (12-16)
  - Driver Training, Driving Simulators, In-Vehicle Monitoring
  - Auditing/Testing on Regulations, Vehicle Handling & Road Conditions
- Well Site Safety (17-21)
  - Well Control
  - Secondary Containment Purpose & Requirements
  - HP Iron Testing
  - Flow Line Restraint (FRS) System
  - Sand Dust Collection System
  - Chemicals
  - Water
  - Roads & Highways



# QHSE MS Integrated System Structure



Traditional QHSE Program



Integrated QHSE Program – Programs are integrated into 8 MS Elements



# QHSE Management System (QHSE MS)

- **OHSAS 18001:2007**, Occupational Health and Safety Assessment Series provides a framework for effectively managing Occupational Health & Safety responsibilities so that they can be integrated into overall business operations. This standard and the management system it supports, assists with the achievement of continuously improving H&S performance and compliance with legislation.
- **ISO 14001:2004**, Environment Management Standard provides a framework for managing environmental responsibilities alongside other business requirements to achieve both economic and environmental goals. Based on this standard an Environmental Management System strives to deliver improving levels of environmental protection.
- **ISO 9001:2008**, Quality Management Standard focuses upon business controls and improvements and is as relevant to QHSE as any other function. In being the mainstay of an integrated management system it provides an approach that ensures consistent and continuously improving Quality, Health, Safety, and Environmental performance.
- **API Q1:2007**, Quality Management Standard. This standard outlines the requirements for a quality system that facilitates the consistent and reliable manufacture of API products.
- **OGP: 210**, Management System Model describes a management system for establishing and implementing company policy and objectives on quality, health, safety and the environment (QHSE). They cover relevant QHSE issues in a single document applicable to E&P activities worldwide and are sufficiently generic to be adaptable to different companies and their cultures while working within the framework of statutory requirements and international standards.



# C&J Safety Principal & Improvement Plan

## C&J Safety Principal – Manage Entire Pyramid

Active Management of Hazards

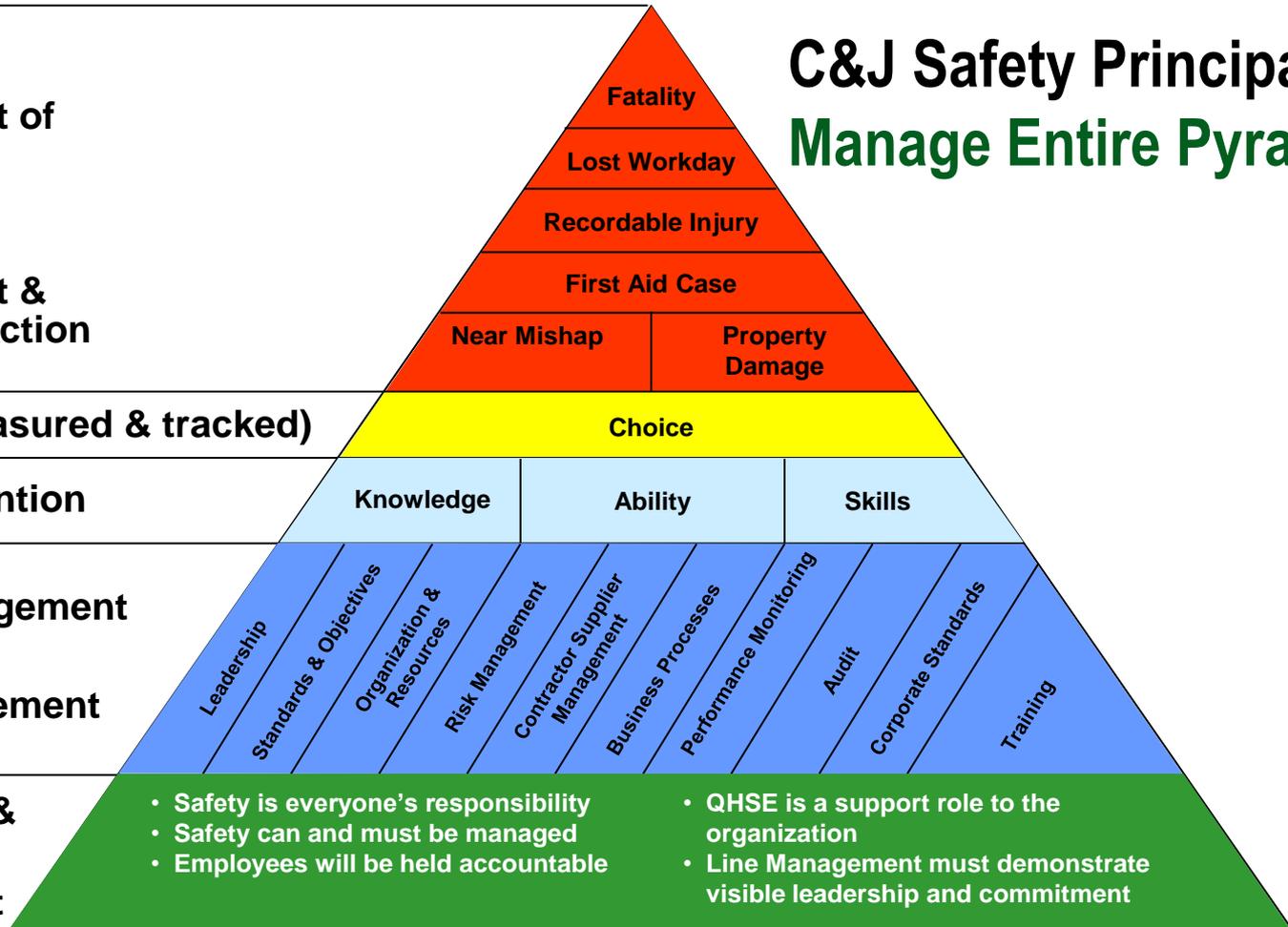
Incident Management & Corrective Action

Culture (measured & tracked)

Injury Prevention

QHSE Management System  
Risk Management

Leadership & Employee Engagement



- Safety is everyone's responsibility
- Safety can and must be managed
- Employees will be held accountable
- QHSE is a support role to the organization
- Line Management must demonstrate visible leadership and commitment



# Standard Operational Competencies

- Improve service, quality and proficiency
- Increase knowledge and value by reducing risk by operating in a quality-conscious, safety-driven environment
- Perform to and build upon benchmarked competencies
- Evaluation with skills-based checklists
- Tests on knowledge of processes, procedures and equipment
- Evaluation, auditing, and feedback is managed centrally through learning management system



# New Hire Training



SafeLandUSA™



- Compliance Training per Occupational Safety and Health Administration (**OSHA**)
- **PEC Safeland** is a core safety curriculum designed for the oil and gas industry based on OSHA requirements. Only valid within the US.
- **IADC Rig Pass** is equivalent to Safeland but is also accepted overseas.



# Training Topics Covered by Safeland & Rigpass

Access to Medical Records	Back Safety	Behavioral Based Safety	Bloodborne Pathogens
Control of Hazardous Energy	DOT Hazardous Materials	Electrical Safety (Non-Qualified)	Emergency Response
Excavation and Trenching	Fire Safety	Hazard Communication	Hazard Identification
Hearing Conservation	Hydrogen Sulfide	Job Safety Analysis (JSA)	Occupational Health Hazards
Office Safety	Permit Required Confined Space	Personal Protective Equipment (PPE)	Respiratory Protection
Short Service Employees	Stop Work Authority	Elevated Work	Work Permits



# Refresher Training

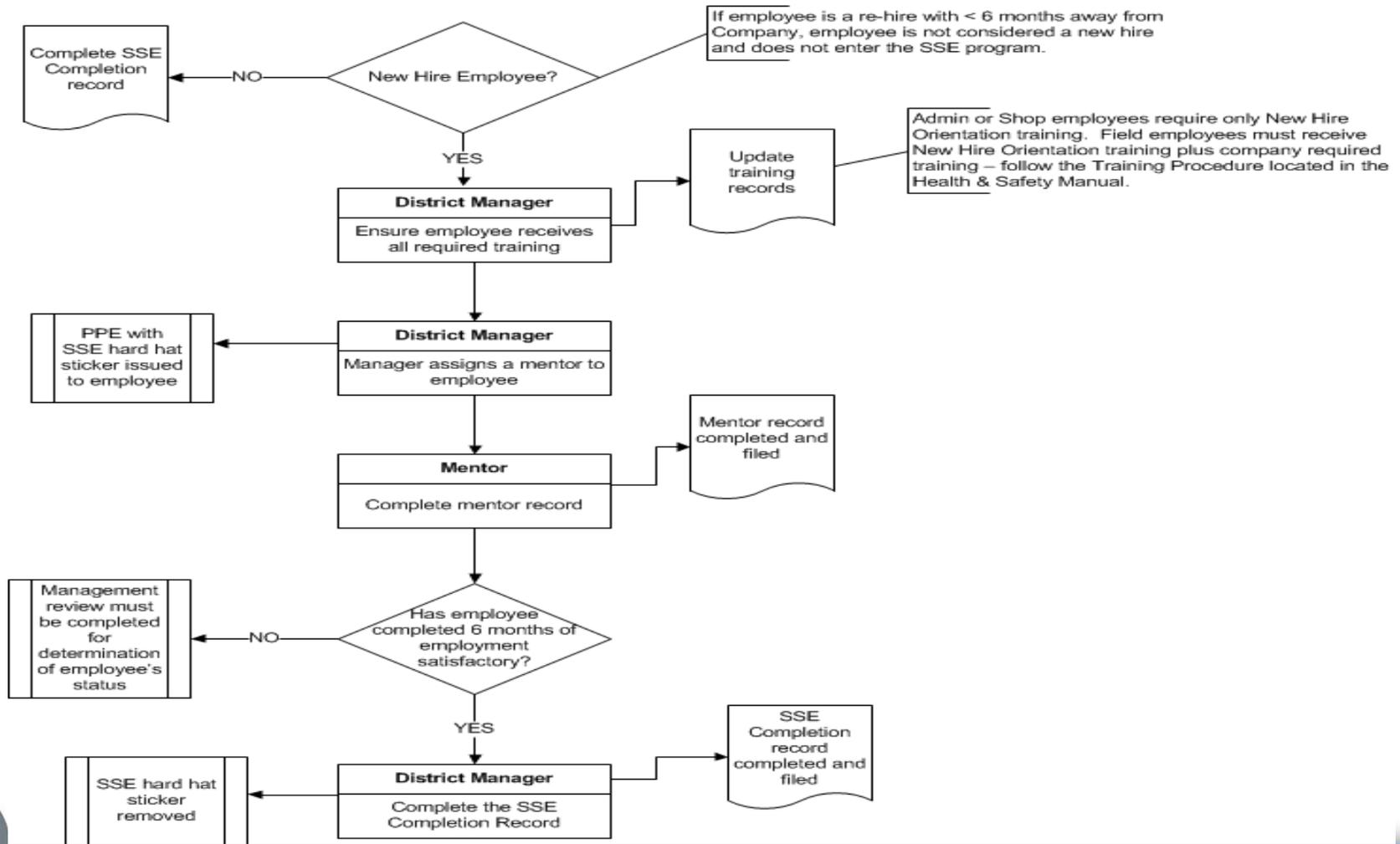
QHSE refresher training is:

- Compliant with OSHA guidelines for reoccurring training.
- Standardized and meets industry requirements.
- Updated to review new safe operations and regulations.
- Empowers everyone to put safety first and to initiate stop work authority when an unsafe condition is present.



# Short Service Mentor Process

**START**



# Driver Training

- Designed in accordance with U.S. Department of Transportation regulations
- Students go through rigorous driving skills evaluation of backing, lease road driving, vehicle movement on location.
- All students also go through road test with certified mentor.



# Driver Training (*cont.*)

Additional programs for students with varying skill levels:

- Beginner 11-day course (120 hours) – for new employees who do not have a CDL.
- Refresher or remedial six-day course – completed by all employees, or as refresher for unsatisfactory IVMS scores, accidents, etc.



# Driving Simulators Utilized

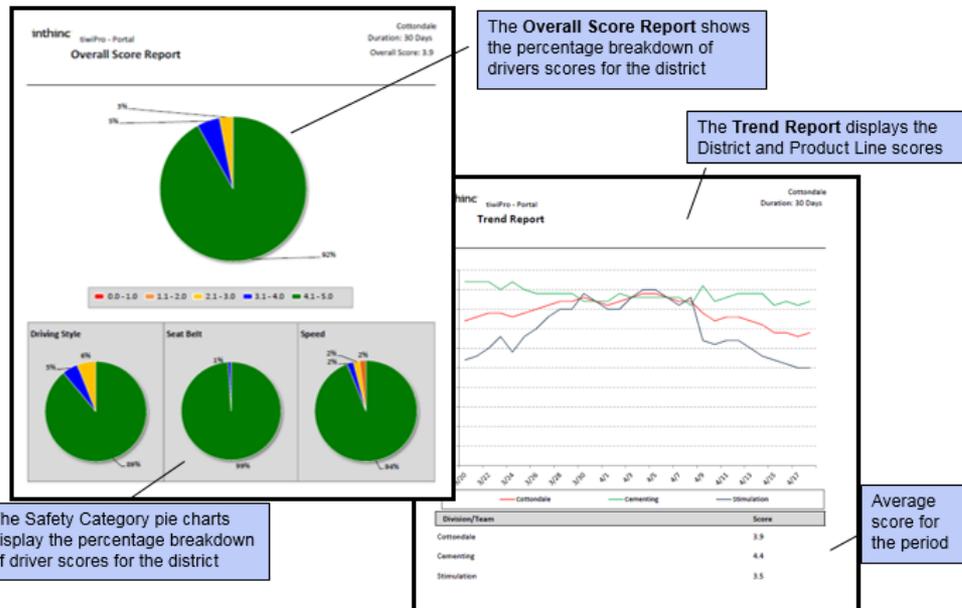
- Driver display is customized for specific vehicles.
- Simulates real-world driving conditions including blown tire, dropped tire, mountain driving, wildlife.



# In-Vehicle Monitoring

Continued monitoring through Inthinc monitoring system:

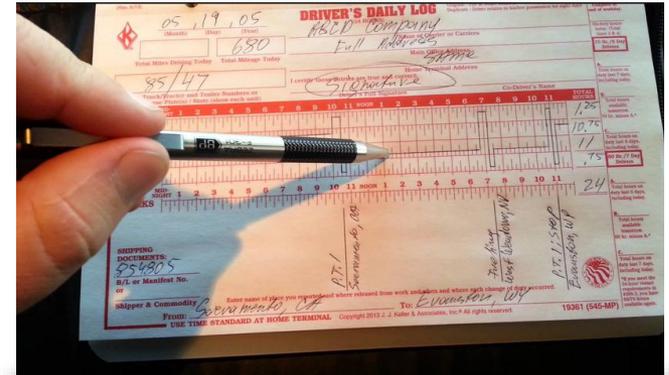
- Coaches drivers to ensure safety and efficiency on the road
- Sends real time data to monitor driver behavior (aggressive driving, speeding, seatbelt usage, etc.)



# Driving Competencies and Assurance

## **Regulations** - auditing/testing on:

- DOT logs
- Safe vehicle movement for C&J
- Hazmat knowledge (ERG, placards, MSDS, loadsheet)
- Performing pre-, post-trip procedures
- Cargo and securement
- Emergency procedures



## **Vehicle Handling** – auditing/testing on:

- Slowing by means other than braking (Jake-brake, snub braking, down shifting)
- Shifting (down/up, Double Clutch Method)
- Air brakes
- Alley dock backing
- Offset back R/L
- Parallel parking

## **Road Conditions** – auditing/testing on:

- General handling
- Safe movement
- Defensive driving techniques





C&J Energy Services

# PRODUCTION AND WORKOVER WELL CONTROL PROGRAM

Well Control methods for workover and, especially, for production differ from those used by drilling.



## 2005

We embarked on a well control strategy aimed specifically at workover and production.

Our manual contains **31** realistic scenarios.



### The Well Control Manual was created.

Our primary objective when working on a well is to prevent injury and environmental and property damage by not having any uncontrolled gas and fluid escape into the atmosphere. We strive to achieve this by knowing the well's history and MASP. We use weighted fluid, brine, calcium chloride and/or mud to control pressure in the well bore.

▼ Training is targeted at what a production worker does.



Well Control Specialists are designated in each region.

### Structured On-Site Drills Reinforce Learning

Scenarios include:

- Well is gassing
- Derrick worker is up in the derrick
- LEL alarm is sounding
- Crew chief is unable to land the donut



#### SCENARIO 4

The well surfaces fluid while the crew chief is installing the BOP stack.



#### JOB SCENARIO

You are converting a rod well to a well using an electric submersible pump (ESP). The tubing string is 6,000 feet long. This well is usually dead, and the hydro testers are scheduled for this afternoon around 3:30 p.m.

C&J Well Control Manual

Targeted Training for Workover and Production

Well Control Specialists

Structured On-site Drills to Reinforce Learning

FR Clothing and other PPE



# Temporary Well Site Secondary Containment Purpose

In order to protect our environment from chemical spills, accidental releases and unwanted regulatory controls, C&J Energy Services presently offers the service of renting and placing secondary containment pads underneath vehicles, equipment and chemical containers on these temporary well-site locations.



# Secondary Containment Requirements

**Secondary spill containment pads should be placed underneath vehicles, equipment and chemical containers in the following manner:**

1. Vehicles should be spotted in the area where they will be finally positioned and then moved forward:
2. Protective underlayment matting will be placed on top of the ground in the area where the vehicle tires will be sitting;
3. The actual secondary containment pad should be rolled out and placed over top of the underlayment matting (bermed edges should still be down).
4. Another layer of “over” layment matting should be placed over top of the secondary containment pad in the area where the vehicle’s tires will be placed.
  - a. The secondary containment pad will be “sandwiched” between two layers of underlayment matting.
5. The vehicle or equipment will then be moved over top of the secondary containment system with the tires on the matting.
6. Once in its final resting place, the perimeter berms should be picked up around all four sides of the containment pad.
7. Once all of the vehicles and equipment are placed in their final resting positions, the berms are set, and the hoses and iron are connected, C&J will ensure that all hoses will be bridged above the containment pad berms so that the berms are not laying down from the weight of the hoses.
8. ALL hoses, buckets, chemical pump connections, chemical transfers, and chemical containers should always be placed inside of secondary containment barriers.



# HP Iron Testing

The Company has established and will maintain an operating procedure for inspection, repair, testing and recertification of high-pressure iron (flow control and stimulation equipment) of company owned, rented, customer provided and third party high-pressure iron, such as, but not limited to flow, flow-line, and pump and treating iron.

All company owned, rented or used equipment shall have a LEVEL II and Mag-Particle inspection at each testing interval.

Periodic Inspections:

- All company owned, rented or used equipment shall have a LEVEL II & Mag-Particle inspection at each testing interval, as referenced in **FIGURE 1: LEVEL II INSPECTION REQUIREMENTS.**
- All high-pressure iron shall be periodically inspected by an authorized person or authorized manufacturer representative, using a company designated form(s).

LEVEL 2	
VISUAL INSPECTION	X
ULTRASONIC THICKNESS INSPECTION	X
MAGNETIC PARTICLE INSPECTION	X
REBUILD/REPAIR	X
HYDROSTATIC PRESSURE TEST	X
BANDING	X
PAINTING	X
INDICATION OF FAILURES	X
DOCUMENTATION & TRACEABILITY	X



# Flow Line Restraint (FRS) System

- Flow Line Restraint (FRS) Systems are used to assist in containing high-pressure piping and component's in the event of a rupture or excessive impulse during the pumping process.
- When there is a flow line failure the results can be catastrophic to both equipment and people, creating a need to reduce the amount of damage by means of a containment unit.
- While FSR's do not completely remove the risk, by containing the pieces during such an event, the restraints assist in lowering the risk.



# SDCS™

## Silica Dust Collection System



**Winner of the 2013 Hart Energy Meritorious Award for Engineering Innovation**



# Frac Chemicals

## Chemicals

- “Green Chemistry”
  - Voluntary Disclosure (FRACFOCUS.ORG)
  - Spill / Risk Minimization



# Water

- Recycling  
Discharge / Disposal  
Issues  
100% Reuse
- Transparency .. Industry  
to Take Lead on Water  
Issues



## Cabot Gas Well Treated With 100% Reused Frac Fluid

Reuse benefits environment, saves water, precludes disposal

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In its shale-gas production operations in the eastern Marcellus Shale underlying Susquehanna County, Pennsylvania, Cabot Oil & Gas Corp. has fracture-stimulated a two-stage, 6,990-ft vertical well, using fracturing fluid consisting of 100% frac-fluid flowback. The flowback fluid was first processed using specific, fit-for-purpose water-treatment methods. Next, the fluid was engineered to meet the pumping-friction, downhole aqueous geochemically driven scaling and precipitation potential, and micro-biological challenges presented by shale-gas reservoirs stimulated using high-rate, high-volume hydraulic fracturing technology.

Flowback fluid used for the project was taken at random from Cabot tanks (Fig. 1). Cabot's goal going into the project was to conduct the pilot fluid reuse using 100% flowback fluid as the job; no fresh water to prepare carrier fluid for the final fluid. The treatment was placed with a total of 5,300 sacks of propping agent consisting of natural fine sand, 300 sacks of 100-mesh sand, and 5,000 sacks of 40/70 white sand placed over two intervals. Initial 30-day production from the well was among the highest within Cabot's development area in the eastern Marcellus to date.

### The solution - two major steps

Reuse of the flowback fluid without processing was not considered appropriate due to the geochemical content it had picked up from the reservoir during pumping and flowback sequences (Blauch et al. 2009). A key to this solution involved a science-based assessment of in situ geochemistry and formation compatibility of the waters and levels of specific cations and anions that needed to be selectively removed.

The flowback fluid was chemically of fair quality, with moderate iron and near-neutral pH. Dissolved constituents comprised high chlorides and hardness; sulfate levels were low. Microbiological content was moderate; divalent cations were a consideration (Table 1). Processing would feature (1) application of specific mobile water treatment processes according to specification; and (2) engineering of a fracturing fluid that can place proppant into producing intervals while preventing negative geochemical reactions.

The processing strategy addressed the main concerns that any operator might have when reusing water: scale, iron deposition, suspended solids, microorganisms that could form in the proppant pack, and good pH and other water attributes needed to achieve adequate friction reduction (FR). Steps taken are listed:

1. Adjust the flowback to a pH that is optimum for specific divalent ion and metals precipitation.
2. Use a divalent cation (Ba, Sr, Ca, etc.) additive to complex soluble ions and sediment the resulting particle.
3. Remove iron by converting Fe<sup>2+</sup> (soluble iron) to Fe<sup>3+</sup> oxide / hydroxide (particulate iron) mechanically and chemically; use sedimentation process for removal.
4. Perform a microbiological disinfection if needed.
5. Conduct a final filtration step to remove any remaining suspended solids and dead biomass.

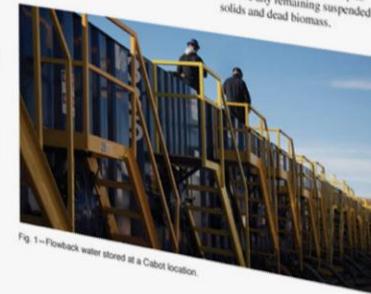


Fig. 1—Flowback water stored at a Cabot location.

# Roads & Highways

- Road Use
  - Traffic and local impact
    - Hours of Operations
    - Holidays
- Repairs
  - Minor Inconvenience with long term solutions
    - Positive results
- Bonding and the 10 Ton Road game
  - Monetary factors and commitment of operators to be accountable for road use





# In closing...

Comments? Questions?





# Thank you!!

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