Artificial Lift R&D Council

2021 International Sucker Rod Pumping Virtual Workshop

February 8-12, 2021

Rod Pump Workovers – Improving Efficiencies

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Oilfield Vehicle Safety Data

- Oilfield workers are eight times more likely to be involved in a fatal vehicle accident while on the job
- Data drawn from the Bureau of Labor and Statistics indicate that fatal vehicle accidents account for 28 percent of all oilfield fatalities, making it the leading cause of death in the industry.
- More than half of these deadly accidents happen in a pickup truck
- Over 50 percent of vehicle accident-related oilfield fatalities were single-vehicle accidents, suggesting that worker fatigue could be a contributing factor — or the fact that many oilfield workers tend to be younger and more likely to take risks.

US Bureau of Labor and Statistics

Rod Pump Workover Location Goes from This

To This - in some wells many times a year

Workover Concerns

- Safety
  - Increased Traffic
  - Increased Activity
- Costs
  - Additional operating costs
    - Manpower
    - Equipment used/replaced during the workover

Unexpected Material Needs during Workover = Additional Concerns

- Safety
  - Increased Traffic
    - Delivery of material to location
    - Crowded location due to increased deliveries
    - Additional actions of spotting and unloading
- Rising Costs
  - Non-productive Time (NPT):
    - Wait time resulting from
      - Ordering
      - Load out time
      - Delivery time
  - Hot Shot charges for delivery of material

Additional Workover Concerns

- Safety
  - Increased Traffic
    - Delivery of material to location
    - Return from delivery

Additional Workover Concerns

- Safety
  - Increased Traffic on Location
    - Due to increased deliveries
  - Additional actions of spotting and unloading delivery vehicles

Additional Workover Concerns

- Rising Workover Costs
  - Non-productive Time (NPT):
    - Wait time resulting from
      - Ordering
      - Load out time
      - Delivery time
    - Delivery or Hot Shot charges for delivery of material

Workover Trailer

- Trailer that is stocked with all material that could potentially be used during a well workover.
- Items include (but not limited to)
  - Polish Rod, Sucker Rods (bare and guided), Pony Rods and couplings
  - Tubing, Pup Joints, TAC and couplings
  - Wellhead hookup components (BOP, Stuffing Box, Valves and fittings)
  - BHA components: Gas and solids mitigation tools
  - Pump

Workover Trailer Objectives

- Minimize/eliminate additional
  - Safety Concerns
    - Reduce
      - Unnecessary deliveries
      - Amount of traffic on location
      - Rig crew movement created by guiding/assisting vendors when on location
  - Costs
    - Reduce
      - Non Productive Time while waiting on material delivery
      - Hot Shot/Delivery charges

Workover Trailer

Workover Trailer

Workover Trailer

Workover Trailer

Workover Trailer

Workover Trailer

Workover Trailer

Workover Trailer Delivery Bill of Lading

Workover Trailer Delivery Check List/Inventory Sheet

Company Name:
Well Name:
Trailer Number:
Date:

BIN	PART#	QTY	ITEM DESCRIPTION	Picked By	QA/QC By
4.1					
4.2					
5.1					
5.2					
5.3					
5.4					
6.1					
6.2					
7.1					
8.1					
9.1					
9.2					
10.1					
10.2					
11					
12.1					
12.2					
12.3					
12.4					
12.5					
12.6					
12.7					
12.8					
13.1					
13.2					
14.1					
14.2					
15.1					
15.2					
16.1					
16.2					
17.1					
17.2					
17.3					
18					
19					
20.1					
20.2					
20.3					
20.4					
21.1					
21.2					
21.2					
21.3					
21.4					
22.1					
22.2					
23					
24.1					
24.3					

BIN	PART#	QTY	ITEM DESCRIPTION	Picked By	QA/QC By
25.1					
25.2					
25.3					
26.1					
26.2					
27					
28.1					
28.2					
29.1					
29.4					
30.1					
30.1					
30.1					
30.2					
30.3					
30.4					
TACBox					
TAC Box					
BOP Cabinet					
BOP Cabinet					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Bunks					
Seasonal					

Miscellaneous Items on Trailer

Item	Description	Verified	QA/QC
Paperwork			
Keys			
Pictures			
24" Bins			
Wheel Lock			
Spreader Bar			
T Bars			
Ladder			
Wheel Chocks			
Winch Bar			
Lock			
Take Pictures			

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Workover Trailer Return Checklist

Workover Trailer Return Check List/Inventory Sheet

Company Name:
Well Name:
Trailer Number:
Date:

BIN	PART#	QTY	ITEM DESCRIPTION	QTY Ret.	QTY Used
4.1					
4.2					
5.1					
5.2					
5.3					
5.4					
6.1					
6.2					
7.1					
8.1					
9.1					
9.2					
10.1					
10.2					
11					
12.1					
12.2					
12.3					
12.4					
12.5					
12.6					
12.7					
12.8					
13.1					
13.2					
14.1					
14.2					
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15.2					
16.1					
16.2					
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17.2					
17.3					
18					
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20.2					
20.3					
20.4					
21.1					
21.2					
21.2					
21.3					
21.4					
22.1					
22.2					
23					
24.1					
24.3					

BIN	PART#	QTY	ITEM DESCRIPTION	QTY Ret.	QTY Used
25.1					
25.2					
25.3					
26.1					
26.2					
27					
28.1					
28.2					
29.1					
29.4					
30.1					
30.1					
30.1					
30.2					
30.3					
30.4					
TAC Box					
TAC Box					
BOP Cabinet					
BOP Cabinet					
Bunks					
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T Bars			
Ladder			
Wheel Chocks			
Winch Bar			
Lock			
Take Pictures			

Workover Trailer Feedback Form

Vendor Name

WORK OVER TRAILER FEEDBACK FORM

NAME: **WORK ORDER #:**
WELL NAME: **TRAILER #:**

Defect Report

- WAS WO TRAILER DELIVERED ON TIME (per Delivery Request)? **Y / N**
- WAS MATERIAL MISSING ON WORK OVER TRAILER (INCORRECT BOL)? **Y / N**
- WAS MATERIAL DAMAGED ON WORK OVER TRAILER? **Y / N**
- DID THE WORK OVER TRAILER ARRIVE WITH DAMAGE? **Y / N**
- DID MATERIAL WAIT TIME CAUSE DELAYS DURING THE WORK OVER? **Y / N**

If YES, estimate amont of time lost due to wait time: **HRS**

- WAS PERSONAL TRUCK STOCK MATERIAL (ON HAND FROM CREW) USED FOR THIS JOB? **Y / N**

If YES, list material in comments below:

- WERE HOTSHOTS USED TO DELIVER MATERIAL? **Y / N**

If YES, how may hot shots were used?
From what supplier(s)?
List Material Delivered on Hot Shots:

- DO ADDITIONAL MATERIALS NEED TO BE STOCKED OR REMOVED? **Y / N**

If Yes, use table below:

ADD/REMOVE?	MATERIAL DESCRIPTION	QTY	UOM

PLEASE PROVIDE ANY ADDITIONAL FEEDBACK, SUGGESTIONS, ETC. BELOW:

Workover Trailer Feedback Form

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Sections:

- Customer Info
  - Location
  - CAD Information
- Material
  - Bill of Lading accuracy
  - Condition
- Trailer
  - Arrival time
  - Condition
- General
  - NPT due to material wait time
  - If so, how delivered – hot shot or vendor vehicle
  - Stock used from crew or company representative on location
  - Additional material needed to be stocked or removed with list of materials
- Comments/feedback about entire process

Workover Trailer Key Benefits

- Reduction of rig time by 8-12 hrs per work over.
- Reduction in number of hot shot deliveries by 3+ per work over.
- Reduction in number of suppliers by 75% per work over.
- Increased material availability on location; elimination in surplus left lying around location.
- Material is mapped out by usage during a work over, so that what is consumed first is the first piece of material accessible on the job site.
- Safety and human factors are built into the trailer to ensure that crews do not have to unnecessarily walk on the deck of the trailer in order to access material.

ENERGY & INFRASTRUCTURE HESS CORPORATION

www.hess.com / Annual revenue: $6.6 billion (2015) / Headquarters: New York City / Employees: 3,100 / Specialty: Oil and gas exploration and production /
Jeff Archer, global warehouse and yard lead: "Our goal is to create a competitive advantage by finding ways to innovate and eliminate waste and inefficiency."

Proving *Ground*

Hess applies lean manufacturing to empower an army of problem-solvers to improve supply chain operations. *By Eric Slack*

Getting the needed material out of a strategically placed Material Supermart is as easy as ICEMANdigo for Hess.

Founded in 1933, Hess Corporation is a leading global independent energy company engaged in the exploration and production of crude oil and natural gas. Hess' portfolio is about evenly split between unconventionals and conventionals, U.S. and international, and onshore and offshore.

Extensive Reach

Hess' portfolio is focused in five strategic areas: the Bakken Shale Region of North Dakota, the Deepwater Gulf of Mexico, Valhall Field in offshore Norway and South Arne Field in offshore Denmark, offshore West Africa – Equatorial Guinea and offshore Malaysia in the Gulf of Thailand. These specific areas represent roughly 83 percent of reserves and 95 percent of production.

A world-class acreage position, technology advances and a lean manufacturing mindset have established Hess as a leading onshore shale oil and gas producer. Hess has premier acreage in the Bakken and the infrastructure to capture maximum value. It also has operated in the Permian Basin in Texas for more than 70 years.

"We've worked hard to implement key tools, processes and the right supplier partnerships in our onshore operations in the Bakken that drive out waste and add value," Senior Manager of GSC Materials and Logistics Chris Starcke says. "We drilled about 200 wells there in 2015. It is a long-term unconventional shale play that we approach similarly to a high-volume manufacturing environment."

Offshore, the company is a leading performer in drilling and project delivery, development and production. It pioneered subsea drilling techniques in Denmark and West Africa, and is the sixth-largest producer in the Gulf of Mexico. Additionally, it has been a selected operator by the Malaysian national oil company and Gulf of Mexico partners.

Hess is also engaged in exploration, employing a strategy aimed at delivering material, long-term value. Its focus is on proven and emerging oil-prone plays that leverage its offshore capabilities. Hess has deepwater exploration operations underway with Chevron in the Gulf of Mexico, with Esso in Guyana and in Nova Scotia with BP. Hess has also made multiple discoveries offshore Ghana, is a top leaseholder in the Gulf of Mexico and West Africa, and is completing exploration drilling off the coast of Malaysia.

Ongoing Journey

Supply chain leadership envisions a world where materials are available just-in-time wherever work happens. The team wants its

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Hess's global operations are based at the LEED-certified Hess Tower in downtown Houston.

HESS CORPORATION ENERGY & INFRASTRUCTURE

Mobile workover trailers at work sites carry needed parts to remote Hess well sites to keep operations on schedule.

this equipment on location and ready for the crew it has reduced hot shots to the rig by more than 50 percent and increased rig up-time dramatically."

Another Hess innovation on the supply chain side has been material supermarkets designed to provide quick access to materials that are frequently used. Material supermarkets are consignment inventories placed in strategic locations near common work sites or frequented routes that eliminate the need for trips to a warehouse. They are aimed at eliminating non-productive time related to unplanned work, which may be seasonal, unknown or unpredict-

An historic drop in the price of oil over the last several months has put considerable pressure on companies across the industry. Hess' focus on lean can help it weather the storm.

"Lean is all about the relentless pursuit of perfection," says Archer. "If we have that mindset and collaborate with trusted partners to continually attack waste and inefficiency, supply chain can play a major role in helping Hess be a company that performs well in any environment."

material in the right quantity and | uct, Hess has avoided the costly | use at the drop of a hat. By having | Supplier partnerships have been | fit both Hess and the supplier."

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"In the past, like most of the oil and gas industry, we have taken a reactive approach and waited to see what equipment was damaged in the well before ordering replacements. Now, with the use of the workover trailer, 80 percent of what we are ever going to need is already on location and ready for use at the drop of a hat. By having this equipment on location and ready for the crew, it has reduced hot shots to the rig by more than 50 percent and increased rig up-time dramatically."

Cell Phone App for IOS & Android Creates Efficient Well Workovers

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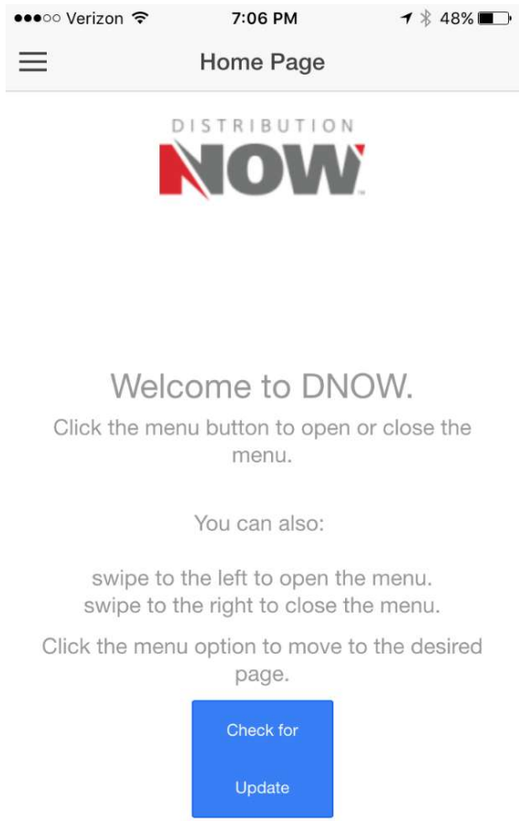

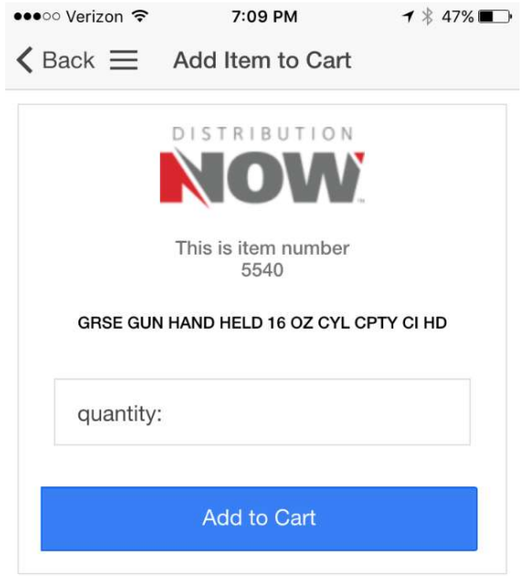

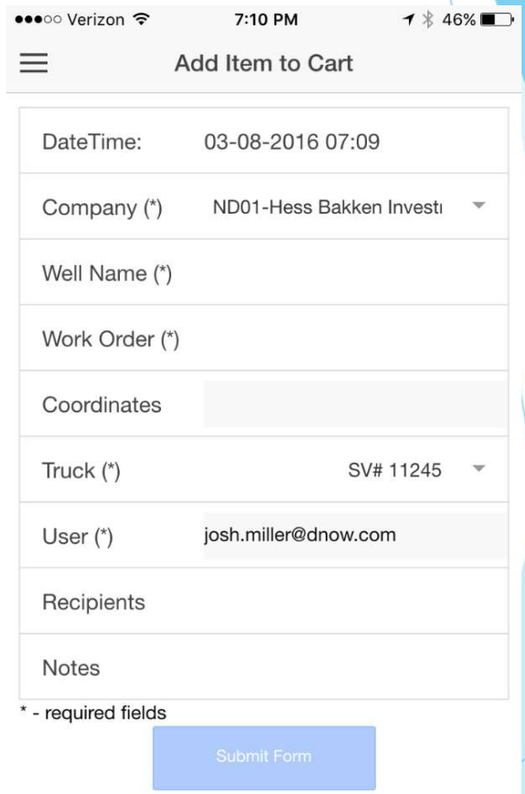

Thank You!

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Questions??

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