Digitalization in the Oil and Gas Industry
Challenges & Opportunities

Workshop

15-16 November 2018, Visegrád

Society of Petroleum Engineers

BAKER HUGHES
a GE company

Lufkin Well Manager 2.0 Well Automatization and Preview

Presented by Stefan Hartl

Status quo

Trying to get a status from the well

Ideal Solution

No matter where you are, you are always up to date.

Why Automation?

Automation is used in most production industries to *Monitor, Stabilize*, and *Protect* machinery and equipment.

Automation is designed to keep equipment running with limited interaction from a human operator.

Automation used in our industry is primarily designed to protect the investment of the equipment used in the production of oil and gas, along with many other uses.

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What is a Pump Off Controller (POC)?

The Control Process of a POC/VSD

With a *Variable Speed Drive* (VSD) pump fillage is constantly monitored and speed is adjusted to match well inflow.

The VSD will normally run constantly, lowering the speed during low pump fillage and increasing it when pump fillage is maximum.

The Result is an increase in production

The Control Process of a POC

A *Pump Off Controller* (POC) is a device used primarily to detect incomplete pump fillage commonly referred to as *Pump Off*.

When pump off is detected the POC will stop the pumping unit for a predetermined amount of time or *Downtime*.

This downtime allows a fluid column to rise to an optimum level.

At the expiration of the downtime the POC will restart the pumping unit and begin the process again.

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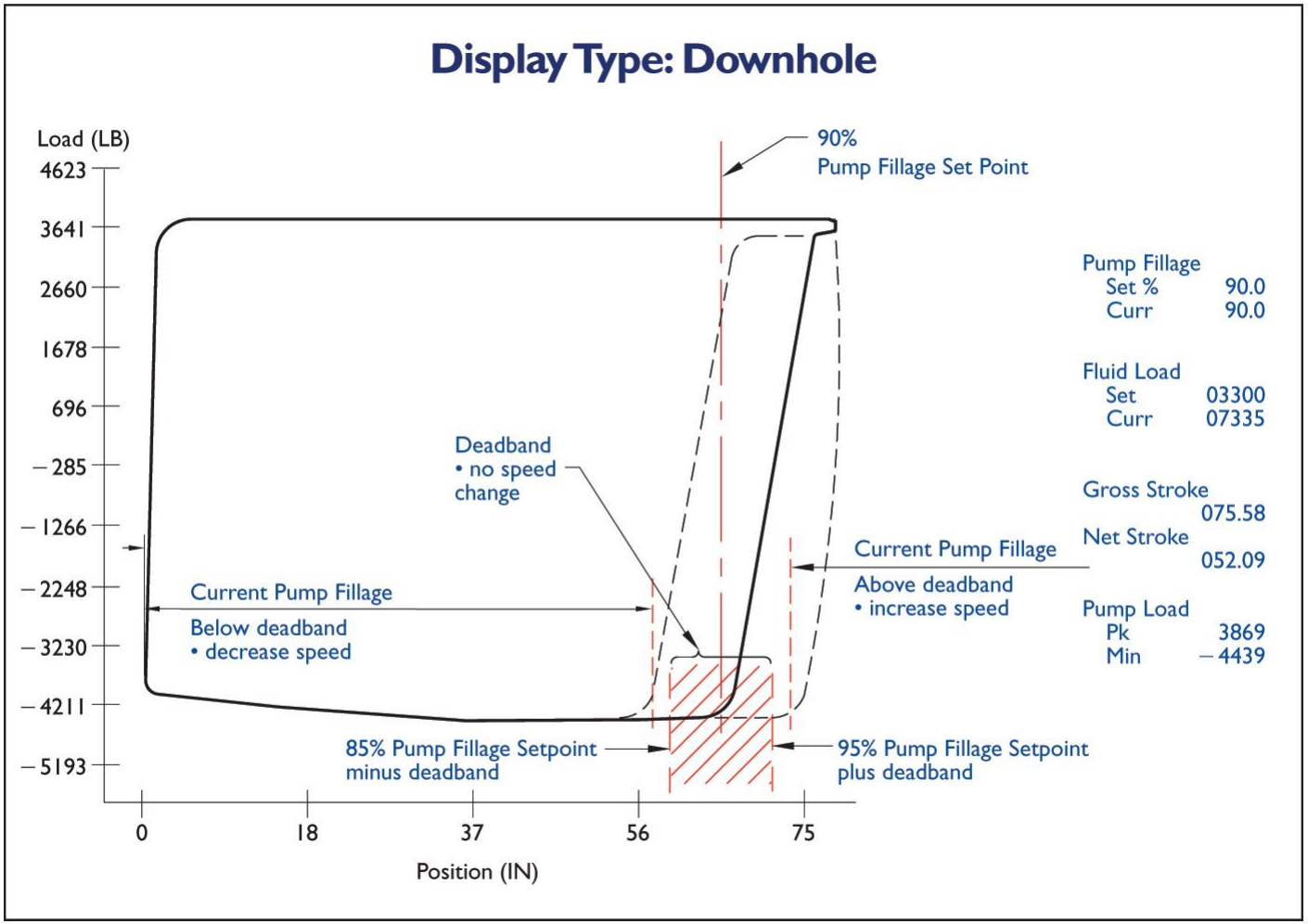
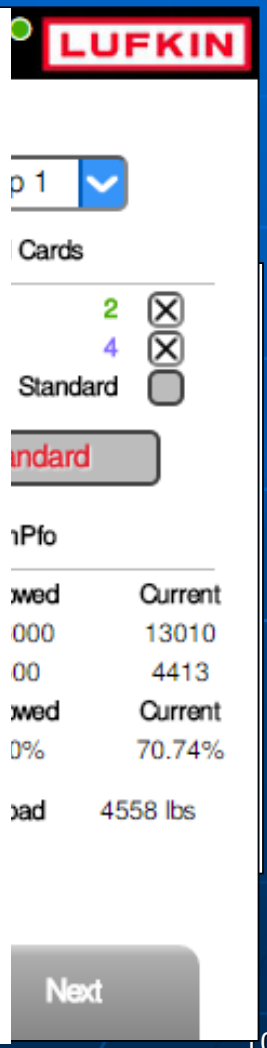
What is a Pump Off Controller (POC)?

The Control Process of a POC/VSD



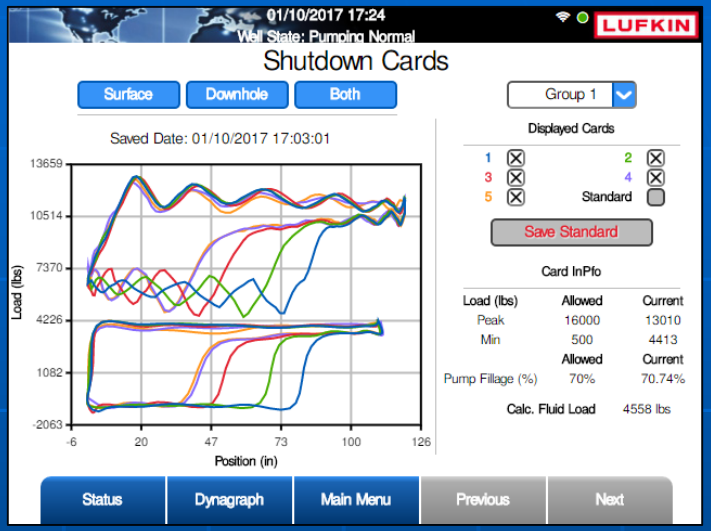
The Control Process of a POC

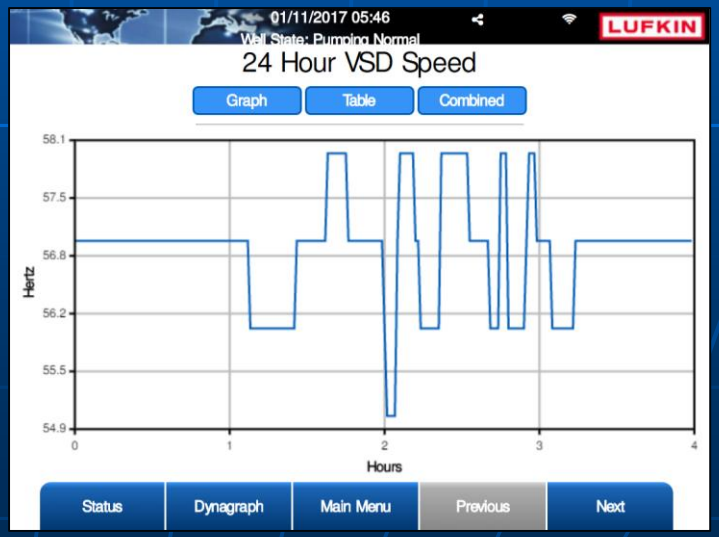


What Can a Rod Pump Controller (RPC) Do?

Protects Equipment

- Detect high and low loads
- Detect rod parts
- Detect bad pumps
  - Dynamometer Cards
- Detect belt slippage
- Detect low motor RPM
- Detect high torque
- Digital inputs used as safety devices
  - Vibration switch
  - Pressure switch
- Analogs inputs used as safety devices
  - Tank level transmitters
  - Well head pressure transmitters





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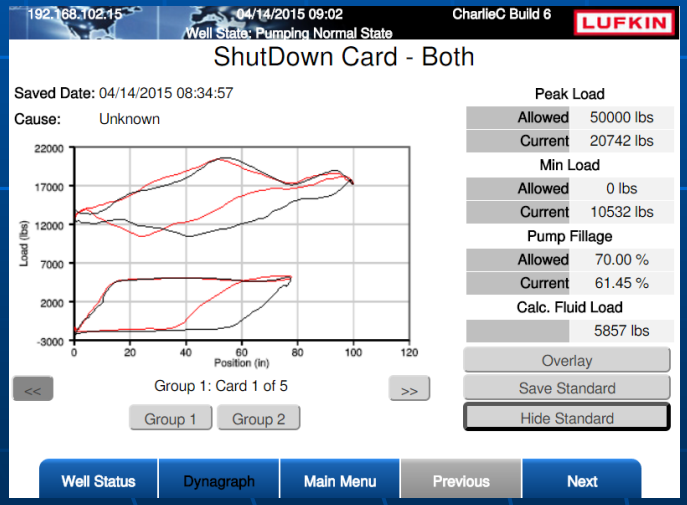
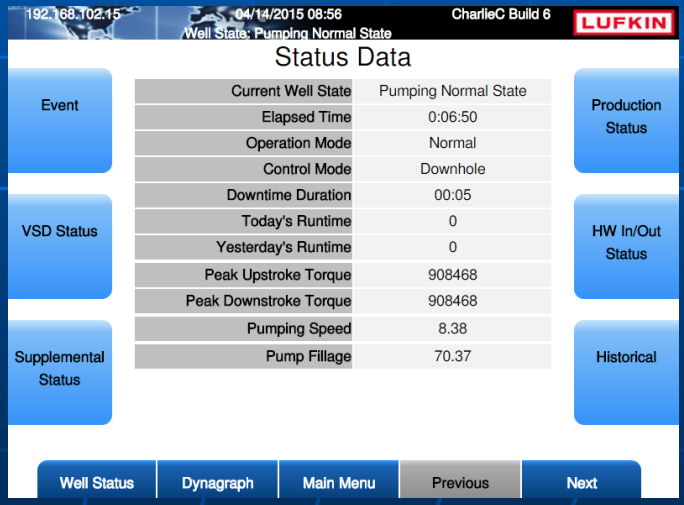
Automation Project Benefits

Project	Power Usage	Failure Rate	Production
US Major	-20%	-20%	+4%
US Independent	-19%	-48%	+14%
US Major	-31%	-23%	+3%
US Independent	-39%	-25%	+17%





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Technical Architecture End to End system

Production Operations

Backup Environment

Production Environment

Field Vantage™

- Web/Application Server
- Historian/Database Server
- Message Queuing Servers
- Field Controller Servers
- Field/Event Gateways
- Predictive Analytics
- Optimization Analytics
- Knowledge/Case Mgmt.

Collaboration / Control Room

Desktop Client

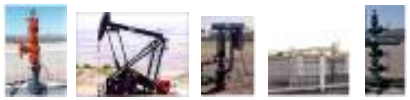
Laptop Client

Mobile Client

Field / Wellsite

Communications

RTU / Controller



Artificial Lift Systems

Sensors / Instrumentation

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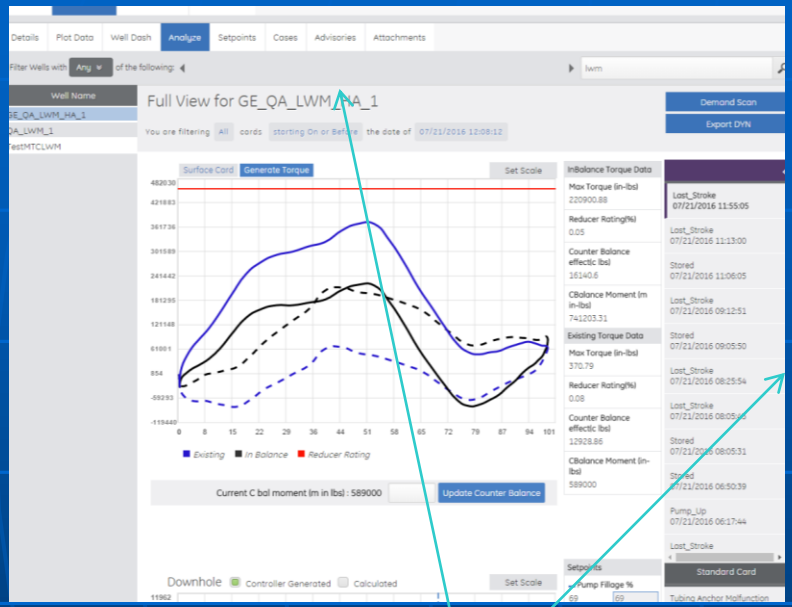
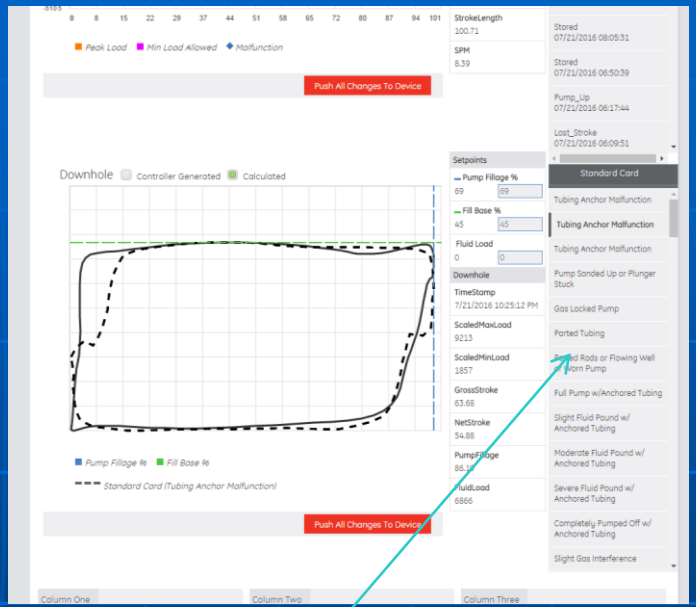
RLS Analyze View – interactive pump cards





Choose from Surface card or Gearbox Torque views

Actual Card with overlay of diagnostics card

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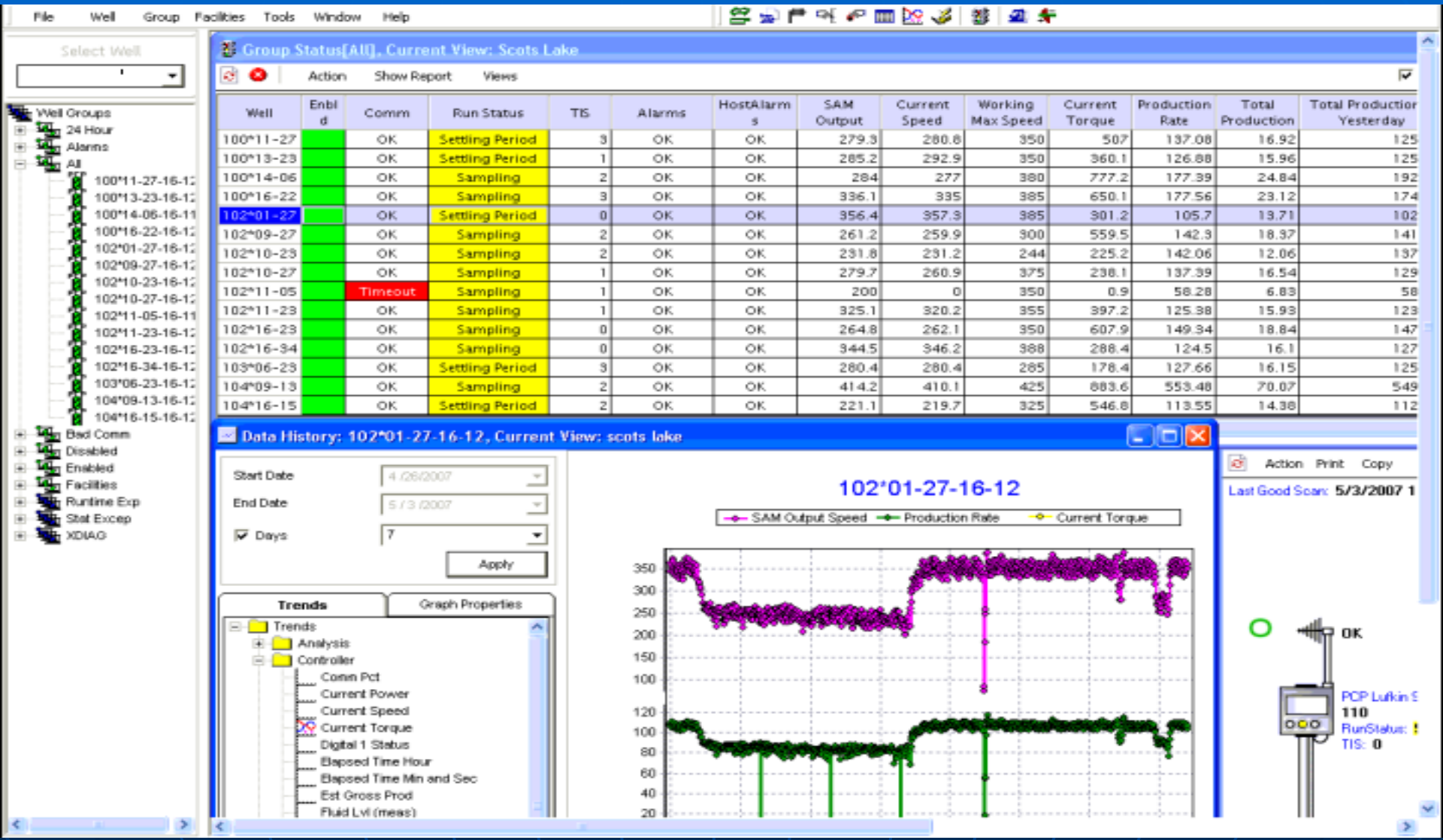
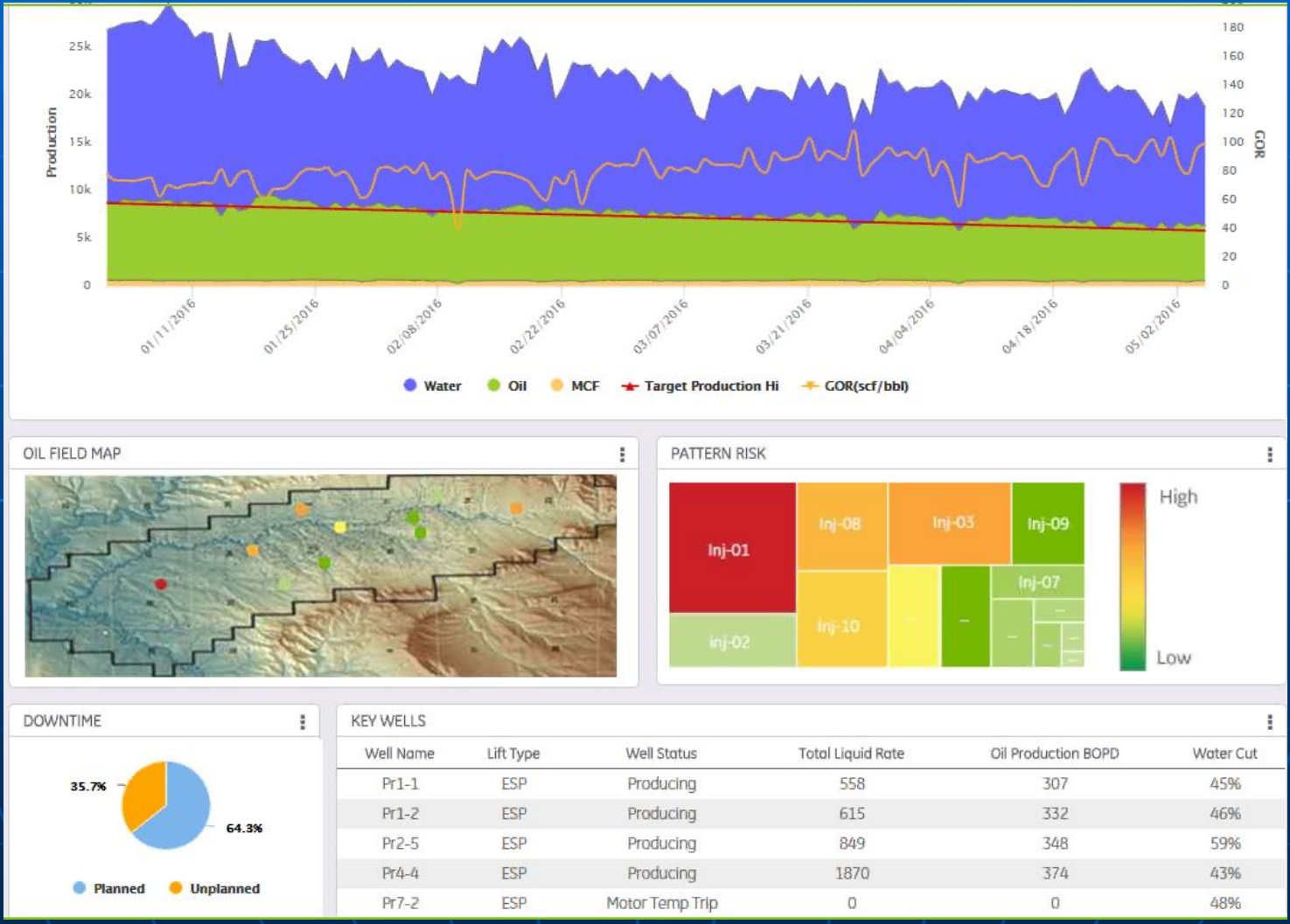
RLS Analyze View – interactive pump cards



Where is the journey going?

Demo Water Flood Analysis



Well Name	Lift Type	Well Status	Total Liquid Rate	Oil Production BOPD	Water Cut
Pr1-1	ESP	Producing	558	307	45%
Pr1-2	ESP	Producing	615	332	46%
Pr2-5	ESP	Producing	849	348	59%
Pr4-4	ESP	Producing	1870	374	43%
Pr7-2	ESP	Motor Temp Trip	0	0	48%

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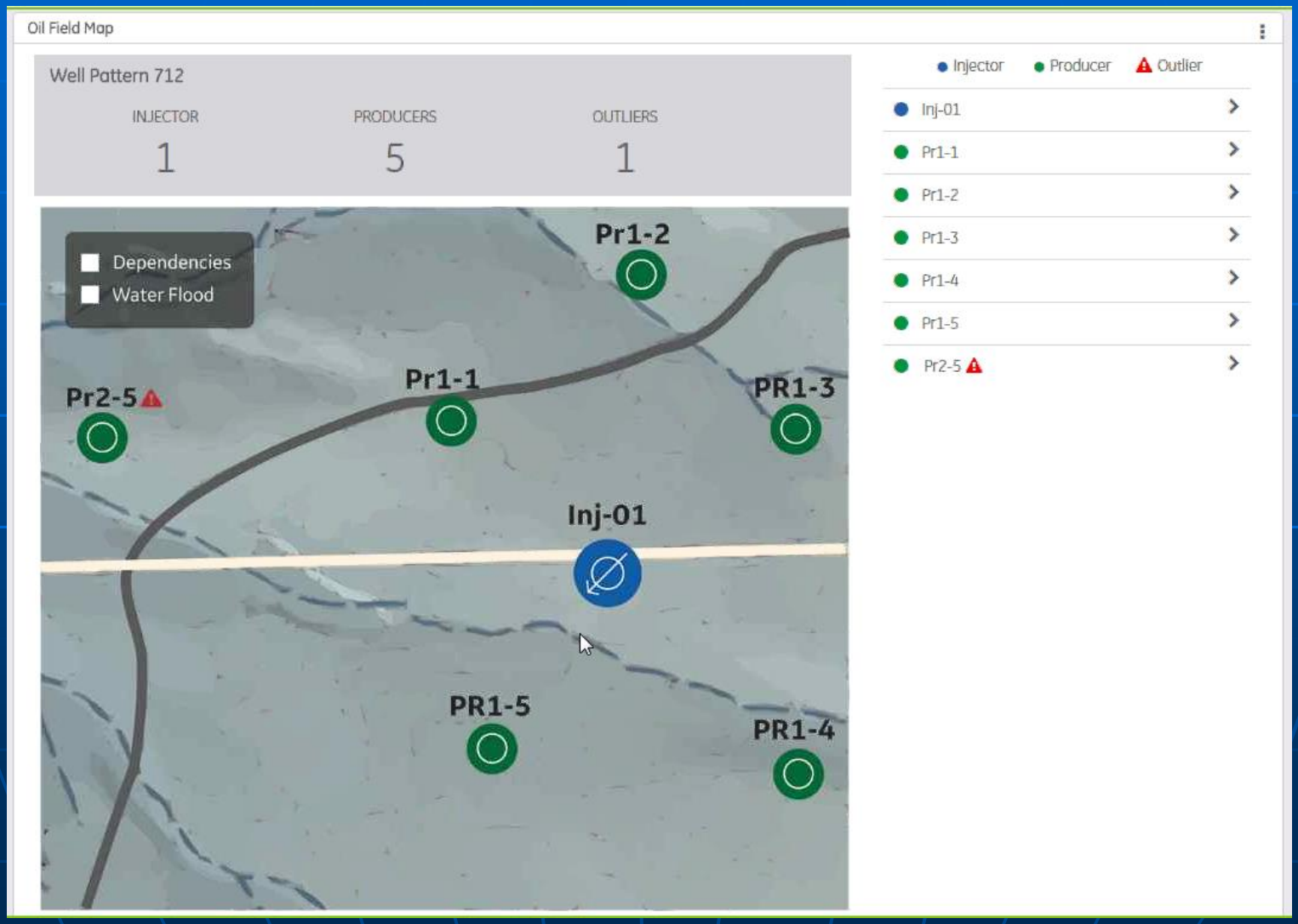

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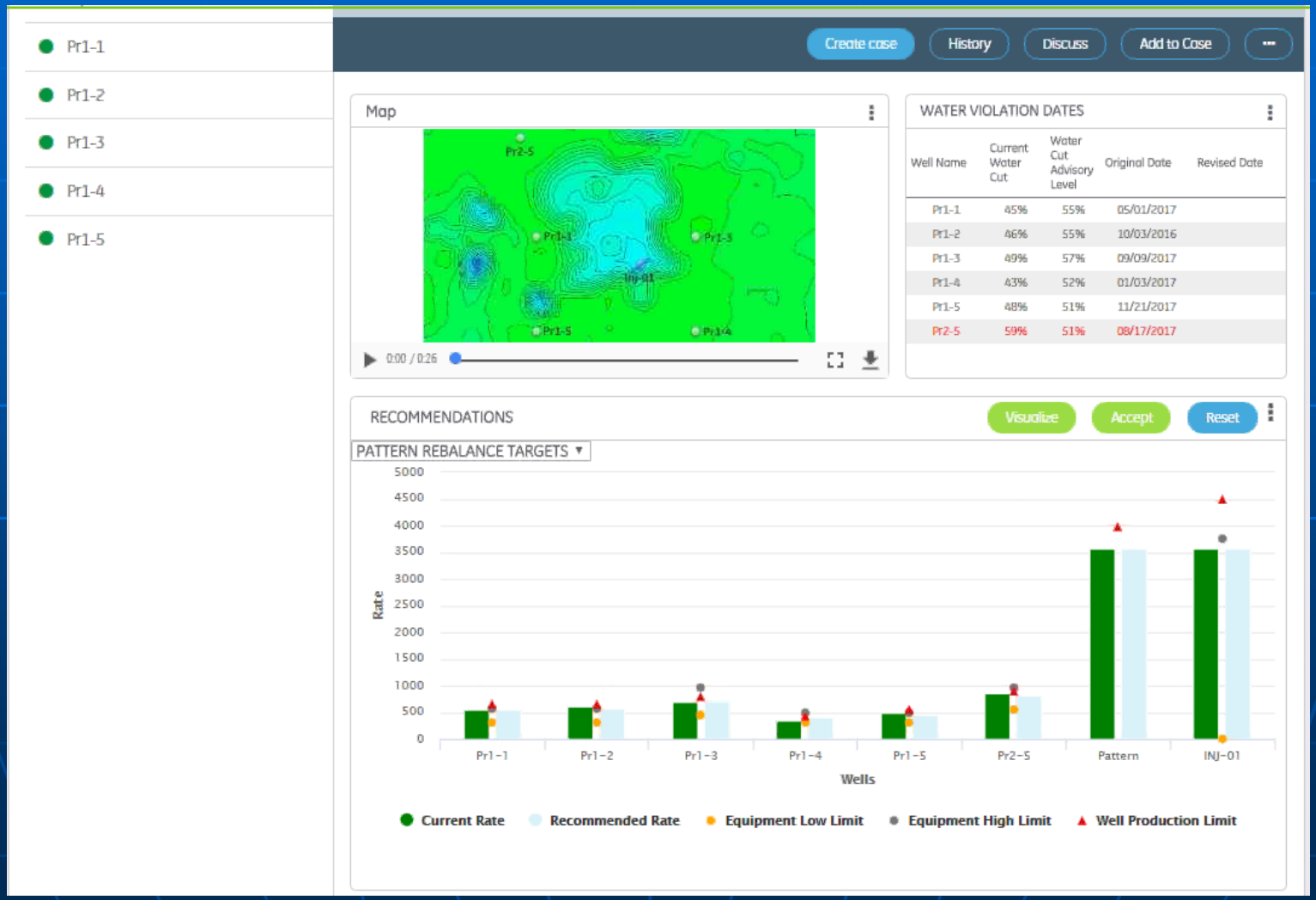

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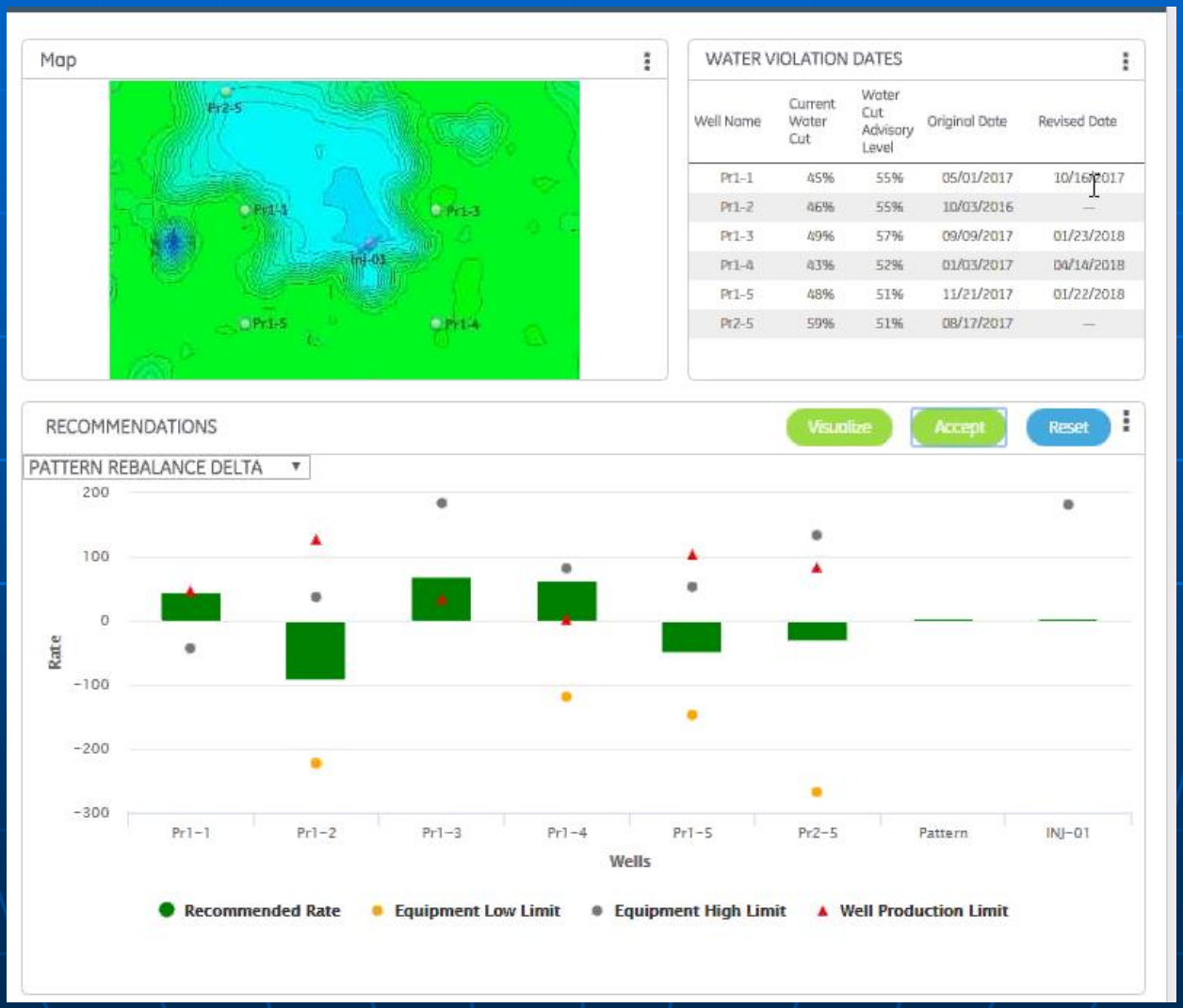

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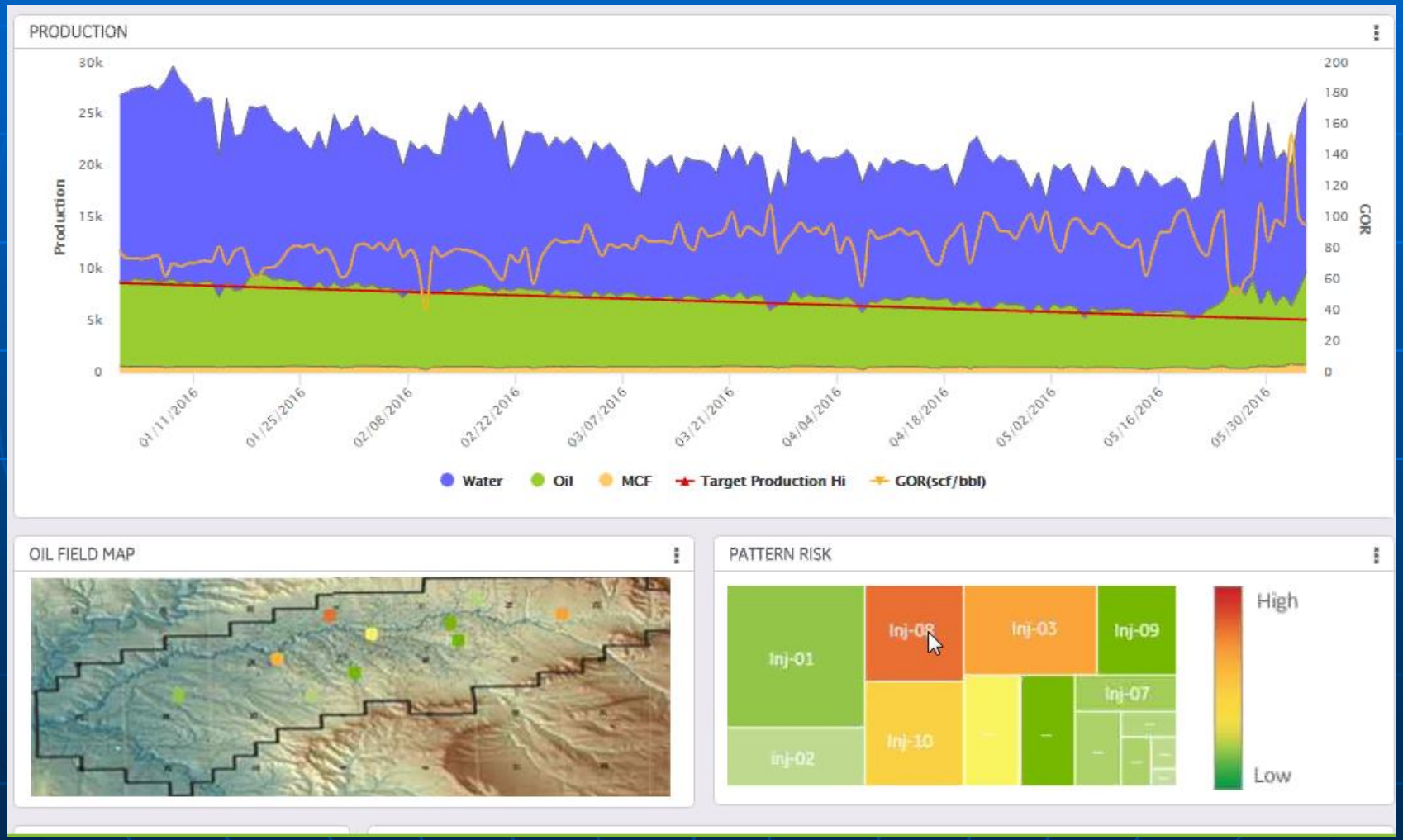

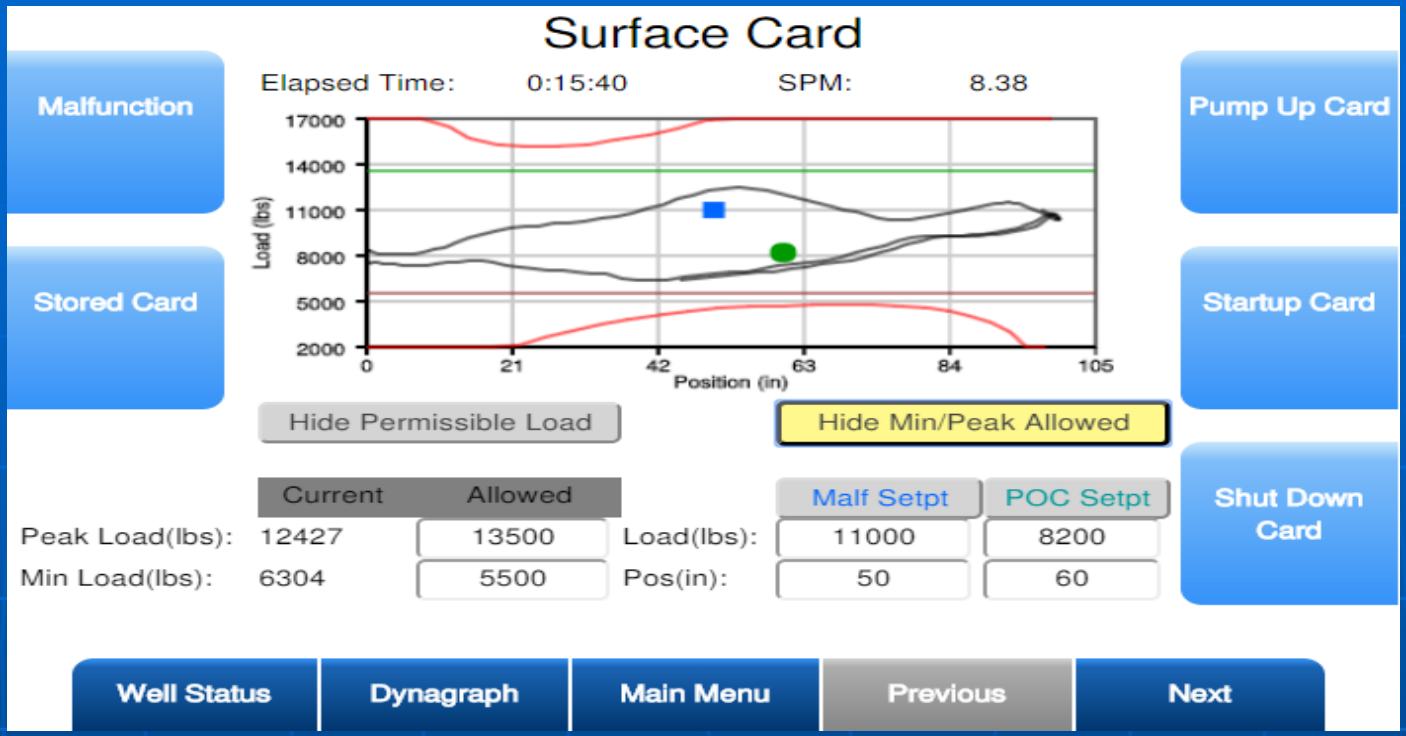

Questions?

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Uncontrolled Rod Float

Rod Float Mitigation

Production heavily limited due to decrease in SPM to protect surface equipment

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Controlled Rod Float

Rod Float Mitigation

Production increased while failures decreased due to speed control on rod separation

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