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# Meeting Production Challenges with Smarter Operations

Presented by **Muneer Mohammed Al Balushi**

دليل للنفط ش.م.م.  
DALEEL PETROLEUM L.L.C.

Name: Muneer Al Balushi  
Country: Oman, Muscat  
Role: Automation & RTO Lead



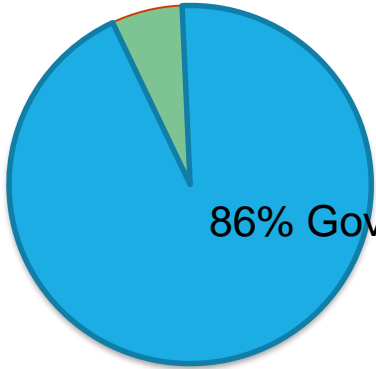


# Company: Daleel Petroleum L.L.C

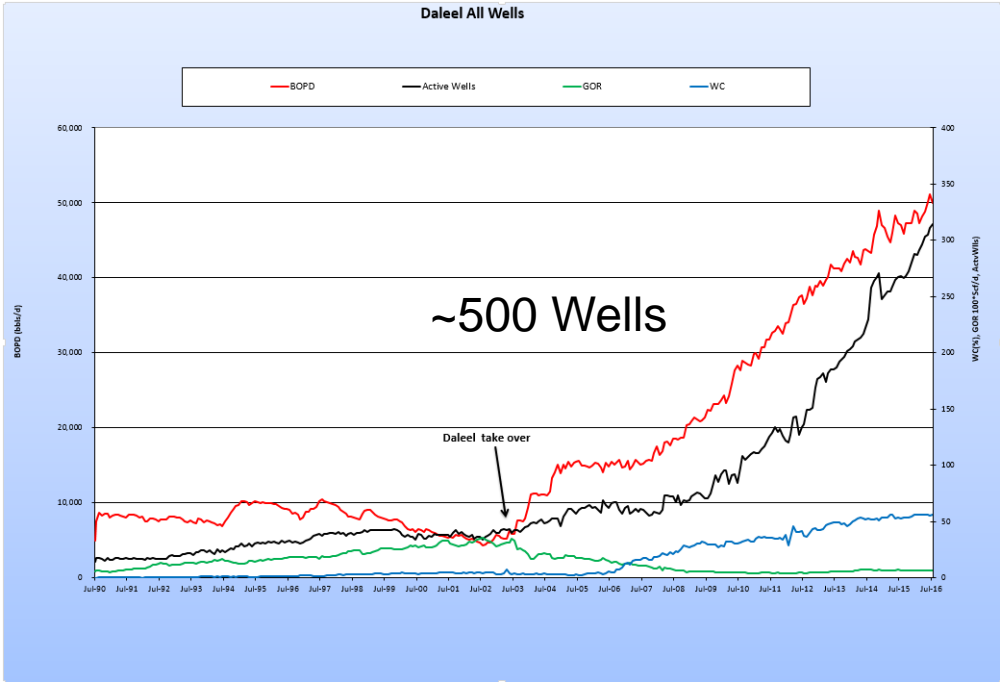
“Local Oil and Gas exploration and production company”



14% 2 External Shareholders



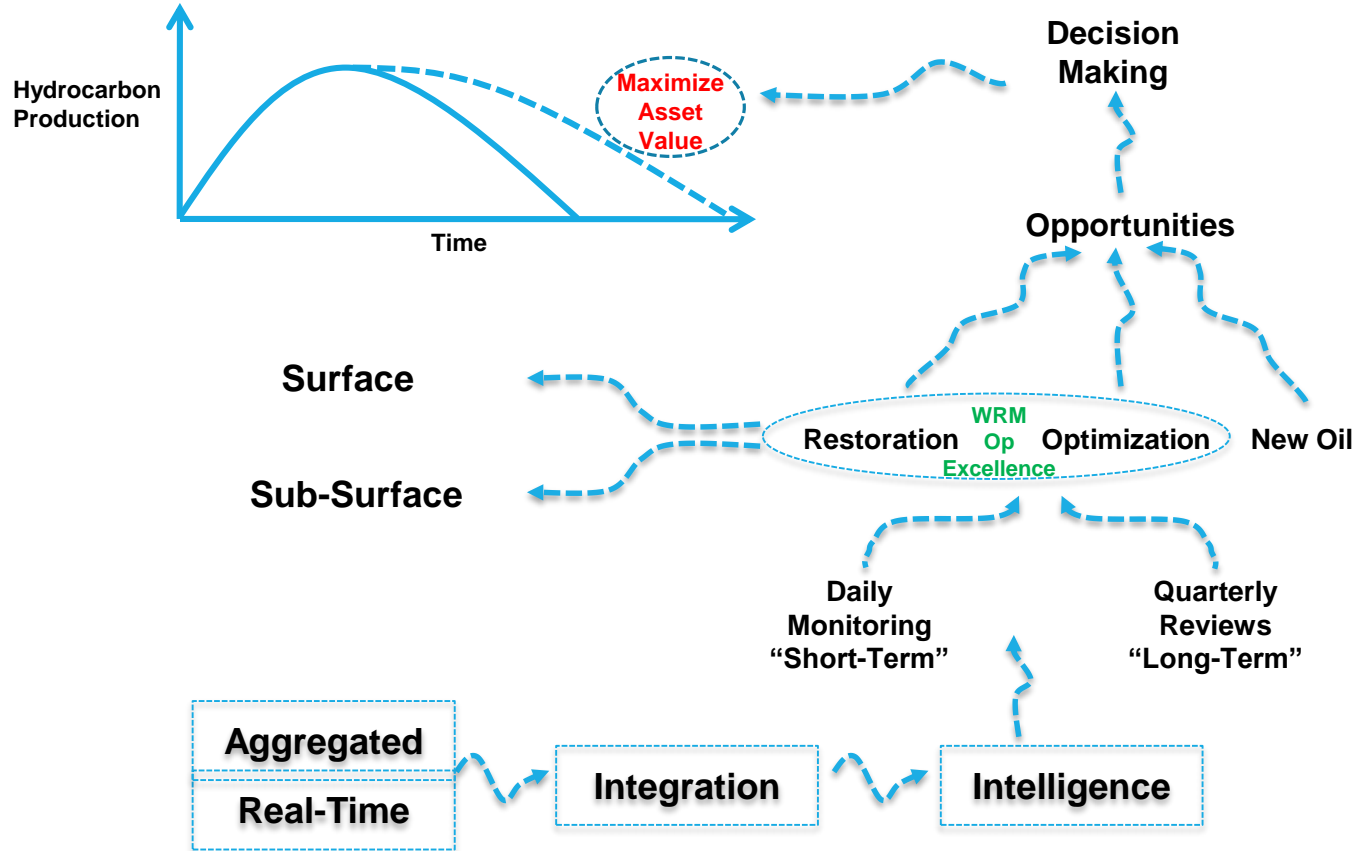
86% Government



# Agenda

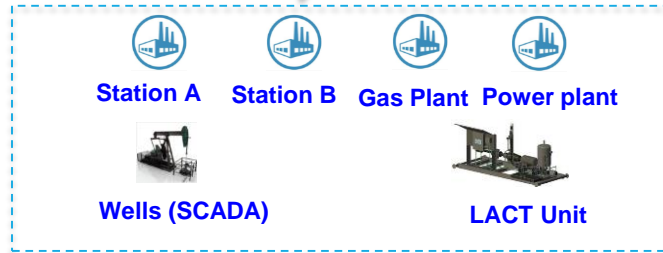
- Maximizing Oil & Gas Value (2 slides)
- Where we were! (2 slides)
- Strategy & Action Plan (4 slides)
- Where we are – “Smart Daleel Portal” (9 slides)
  - Overview
  - Interactive Production
  - Deferment
  - Facility
  - Exceptions
  - Well Test
- Benefits, Future!, Conclusion (3 slides)

# Maximizing Oil & Gas Value



# Maximizing Oil & Gas Value

## Real-Time



12,000  
17,280,000  
518,400,000

data per minute  
data per day  
data per month

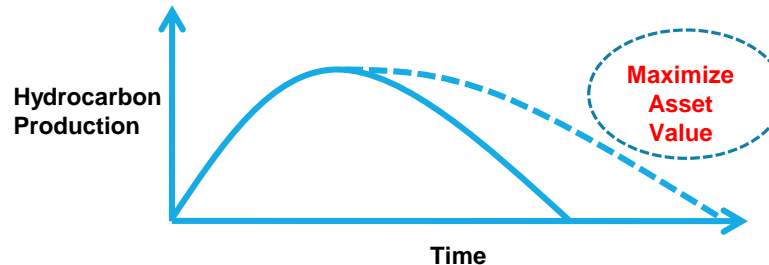


Petroleum Engineer

## Aggregated Data



1,000,000 + data per month  
15+ Applications/documents

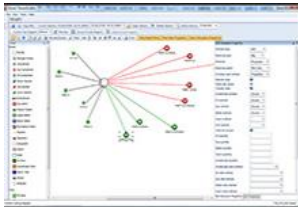


# Where we were!

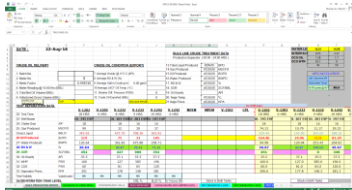


# Where we were!

MAIN OFFICE



Production APP  
Production, Test, allocation



Excel Report  
Production, Test

Manual Input

LACT Unit  
Meter

Power Plant  
DCS

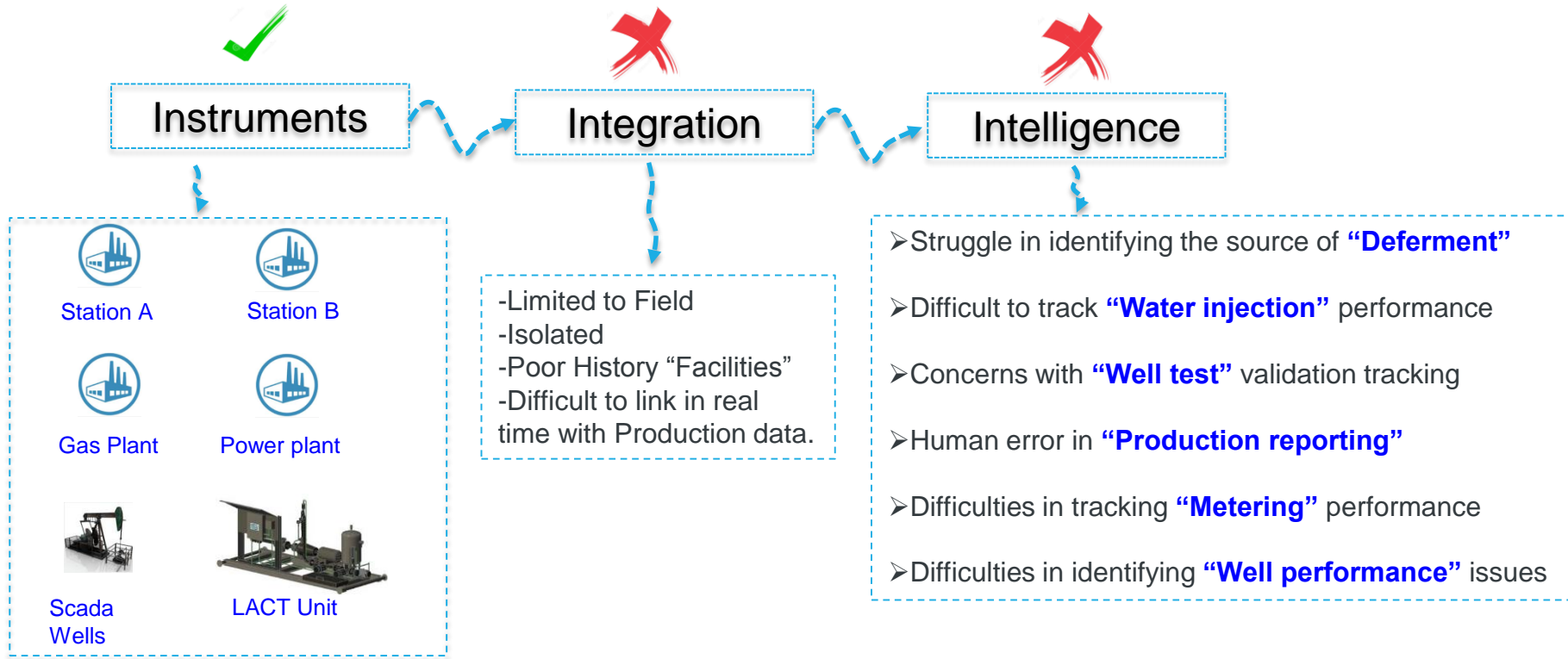
Station A  
DCS

Wells  
Scada

Station B  
DCS

Gas Plant  
DCS

# Where we were!



# Strategy & Action Plan

# Strategy & Action Plan

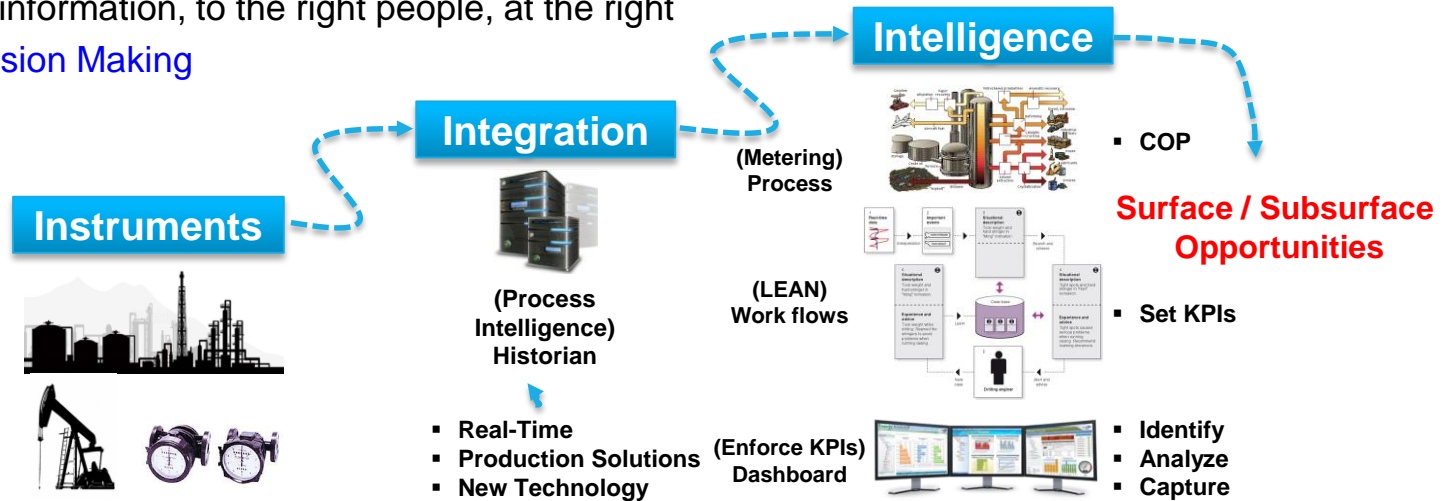
- **Definition: (Automation & RTO Team)**

Is a **Strategic Enabler** to enhance “**Well, Reservoir & Facility Management**” by identifying short/long term opportunities to maximize its asset value

- **Vision:**

Deliver demanded information, to the right people, at the right time for better **Decision Making**

- **Mission:**



# Strategy & Action Plan

Phase1 "2015"

## Integration

- Connect 5 automation systems using the PI System technology. (Station A, Station B, Power Plant, Gas Plant, Wells)
- Enable Daleel headquarter staff to monitor all field assets in real time.
- Histories of all surface asset data (stations)
- Provide easy tools to users to access Daleel Asset Data:
  - 1-Excel based add-on (PI DataLink)
  - 2-Graphical application (PI ProcessBook)
  - 3-Dashboard (quick overview of Production, Water Injection, Deferment, Well Test, Exceptions)

Phase2 (2016-2020)

## Intelligence

- Create customized Tools in an integrated portal:

### 1-Capture & View (Real-time & Aggregated data)

- Real-time data
- Test & allocation data **Completed**
- Water injection data

### 2-Filter & Alarm. (Process)

- Exceptions / Operating Envelope **2016 Plan**

### 3-Analyze. (Work Flows)

- E-Well Book
- Models VS Real-time
- Action plan

### 4-Build Opportunity list.

- (Optimization/Restoration/Integrity)
- Risk assessment
- Reporting

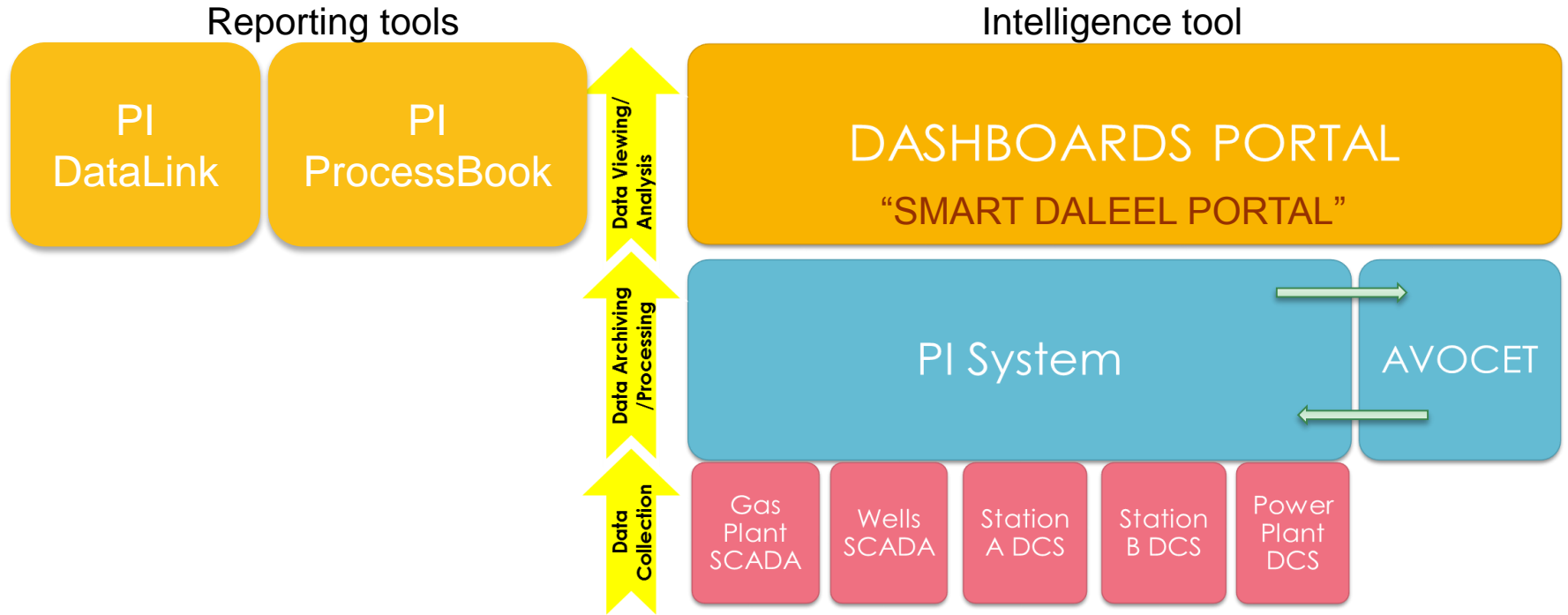
Phase3

## Lean

- Review processes & workflows to cut waste.

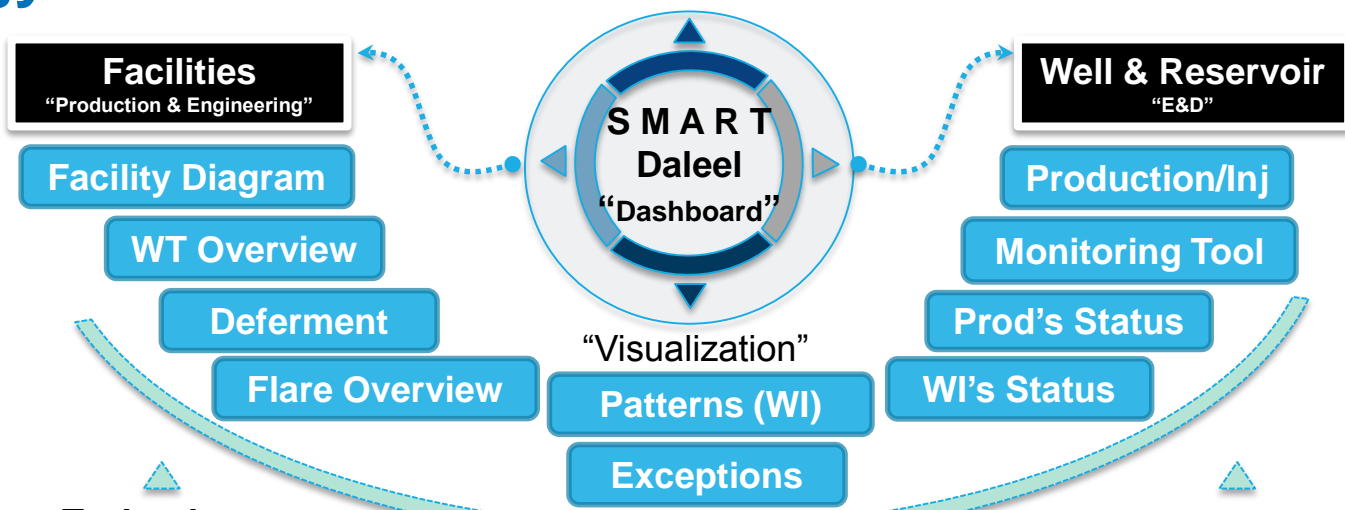


# Strategy & Action Plan

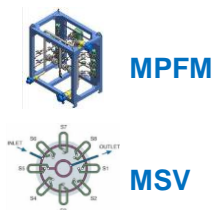




# Strategy & Action Plan



## Technology



## Engineering Tools

- |   |   |
|---|---|
| <p><b>Engineering</b></p> <ul style="list-style-type: none"> <li>▪ Surface hook-up</li> <li>▪ Facility &amp; pipelines</li> <li>▪ Construction</li> <li>▪ Projects</li> </ul> | <p><b>PE Tools (AVM/OFM)</b></p> <ul style="list-style-type: none"> <li>▪ Well Details</li> <li>▪ Allocation Details</li> <li>▪ Well Test Validation</li> <li>▪ Well Forecasting</li> <li>▪ Well Deferment</li> </ul> |
| <p><b>Lab-Ware</b></p> <ul style="list-style-type: none"> <li>▪ Well Samples</li> <li>▪ Fluid Analysis</li> <li>▪ H2S / Norm</li> <li>▪ Chemicals</li> </ul>                  | <p><b>EDM</b></p> <ul style="list-style-type: none"> <li>▪ Daily Activities</li> <li>▪ Well Schematics</li> <li>▪ Well Materials</li> <li>▪ Cost</li> </ul>   |

## Real Time Operations Integration

"Process Intelligence Historian"



Station A Station B Gas Plant Power Plant Wells



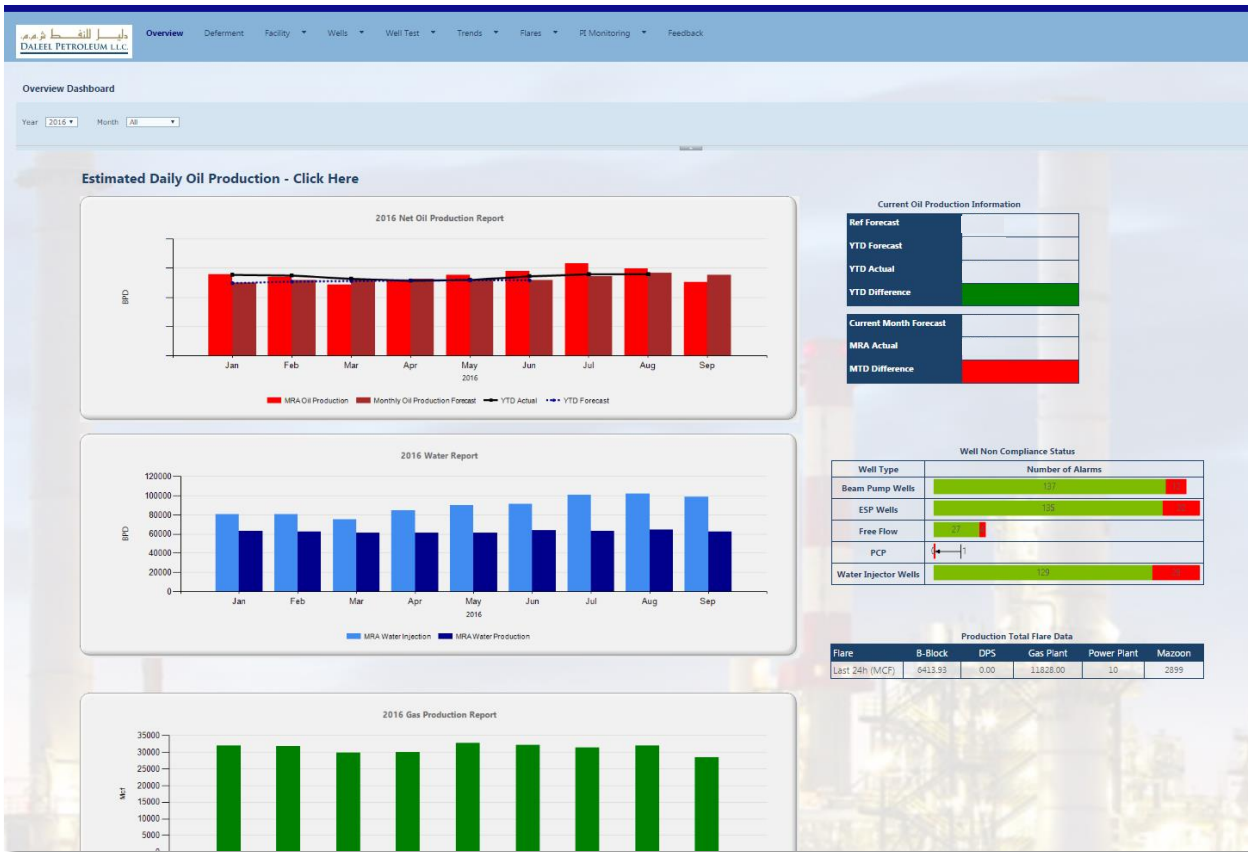
# Where we are now “Smart Daleel Portal”

# Smart Daleel Portal (Overview)

- Monthly/Daily Production Overview
- Production YTD/MTD
- Wells Compliance
- Daily Flare Data

## Components:

- SharePoint
- PI RDBMS Interface
- SSRS Report



# Smart Daleel Portal (Interaction Production)

## LACT Unit Reading

LACT Unit - 12 AM	LACT Unit Current - Volume	Time Value - Hours
50176	32436	15.283

Note: 1% is considered in LACT Unit reading

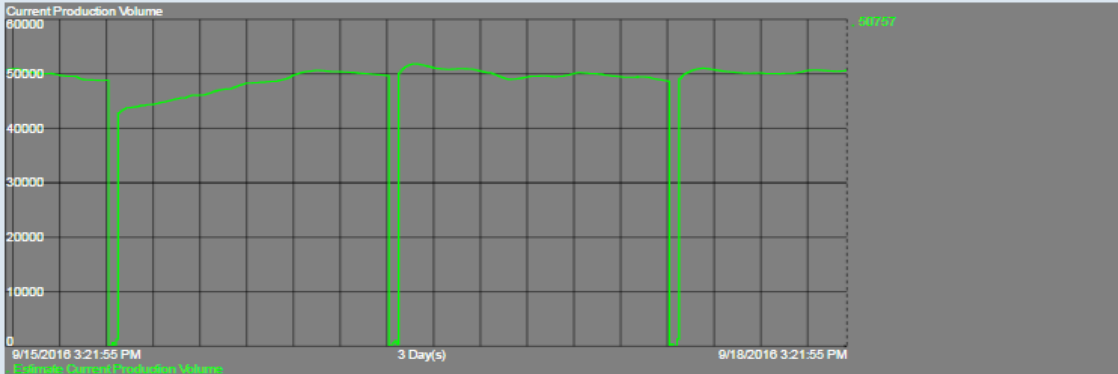
## Daily Current Production

(Yesterday 12 AM) Actual Production BBL/Day

LACT Unit Net Oil Standard (NSV) + Today Stock Tank Level - Yesterday Stock Tank Level

(Today's) Current Actual Production BBL/Day

Current Stock Tank Level + (LACT Unit Net Oil Standard (NSV)/Time Value)\*24 - Today Stock Tank Level



## Daily Current Production Including FWKO Tank

(Today's) Current Actual Production + FWKO BBL/Day

DPS T-1241 Oil Volume BBL/Day -161.51

T-1241 Oil Volume Today - T-1241 Oil Volume Yesterday

B Block T-1525 Oil Volume BBL/Day 33.310

T-1525 Oil Volume Today - T-1525 Oil Volume Yesterday

- Live Oil Export
- Yesterdays Production
- Interactive Daily Production
- Daily Flare Data

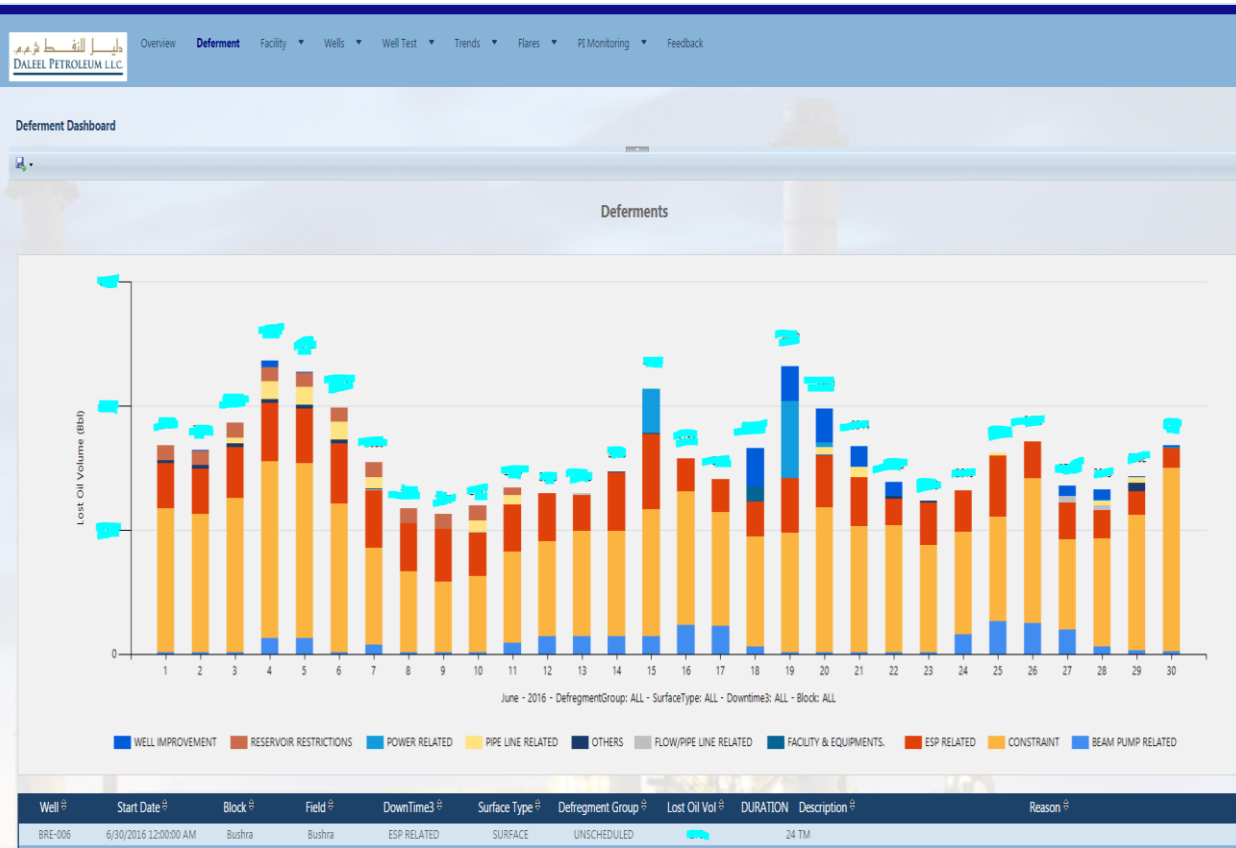
## Components:

- PI ProcessBook
- PI System performance equations

# Smart Daleel Portal (Deferment)

- Daily Deferment
- Deferment Details
- Interactive Daily Production
- Daily Flare Data

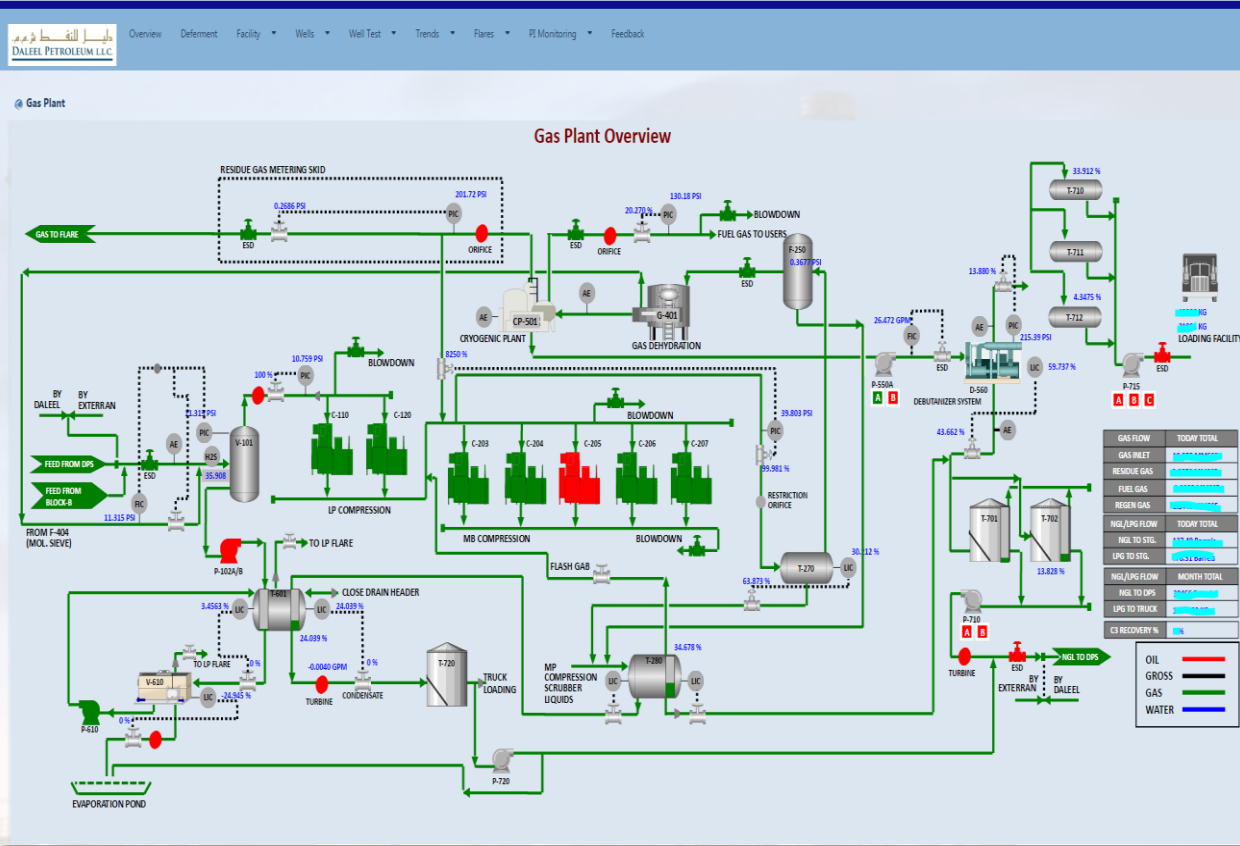
Components:  
 -Direct from DB  
 (aggregated Data)



# Smart Daleel Portal (Facility)

- Gas Plant Overview
- Daily NGL Production
- Daily Gas Export

Components:  
 -PI ProcessBook  
 -Graphic PI WebParts



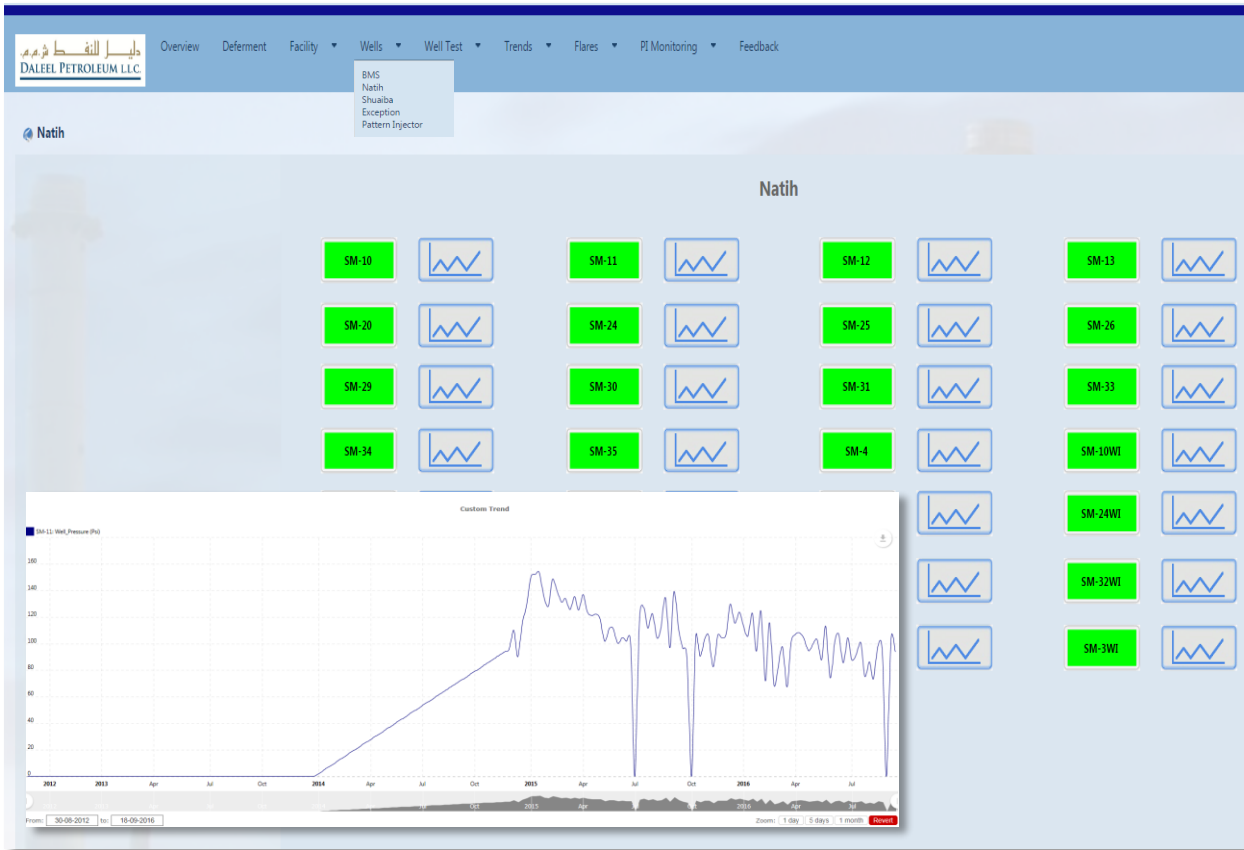


# Smart Daleel Portal (Exceptions “Tabs”)

- Field Manifold Health
- Exception Alarm
- Graph

## Components:

- PI ProcessBook
- Graphic PI WebParts
- Multi State Function
- Asset Analytics
- Event Frames



# Smart Daleel Portal (Exceptions “Tabs”)



- Field Wells Health
- Exception Alarm
- Graph

## Components:

- PI ProcessBook
- Graphic PI WebParts
- Multi State Function
- Asset Analytics
- Event Frames

# Smart Daleel Portal (Exceptions “Detailed”)

- Field Wells Health
- Exception Alarm
- Graph

Demo

Well	Area	Well Type	Alarm	Priority	Start Time	End Time	Duration	Last Valid Well Test (BPD)
DL-278	Daleel	Beam Pump Wells	POSITIVE WATTFUL KWH OVERRANGE	Medium	8/14/2016 2:42:33 PM		35 Days	
DL-202	Daleel	Beam Pump Wells	POSITIVE WATTFUL KWH OVERRANGE	Medium	8/14/2016 2:42:37 PM		35 Days	
DL-100	Daleel	Beam Pump Wells	POSITIVE WATTFUL KWH OVERRANGE	Medium	8/14/2016 2:42:45 PM		35 Days	
DL-104	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:42:58 PM		35 Days	
DL-219	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:44:30 PM		35 Days	
DL-244	Daleel	ESP Wells	TUBING PRESSURE OVERRANGE	Medium	8/14/2016 2:44:40 PM		35 Days	
DL-217	Daleel	Beam Pump Wells	CASING PRESSURE UNDERRANGE	High	8/14/2016 2:47:23 PM	8/16/2016 8:38:11 AM	1 Days	
DL-217	Daleel	Beam Pump Wells	TUBING PRESSURE UNDERRANGE	High	8/14/2016 2:47:23 PM	8/16/2016 8:38:11 AM	1 Days	
DL-211	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:47:28 PM		35 Days	
DL-202	Daleel	Beam Pump Wells	POSITIVE WATTFUL KWH OVERRANGE	Medium	8/14/2016 2:47:53 PM		35 Days	
DL-306	Daleel	Beam Pump Wells	TUBING PRESSURE UNDERRANGE	High	8/14/2016 2:48:05 PM		35 Days	
DL-203	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:05 PM		35 Days	
DL-207	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:05 PM		35 Days	
DL-154	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:05 PM		35 Days	
DL-038	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:05 PM		35 Days	
DL-059	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:05 PM		35 Days	
DL-230	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:05 PM		35 Days	
DL-173	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:05 PM		35 Days	
DL-183	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:05 PM		35 Days	
DL-270	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:08 PM		35 Days	
DL-133	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:48:08 PM		35 Days	
DL-187	Daleel	Beam Pump Wells	TUBING PRESSURE UNDERRANGE	High	8/14/2016 2:49:26 PM	8/16/2016 8:38:11 AM	1 Days	
DL-211	Daleel	ESP Wells	INTAKE PRESSURE UNDERRANGE	High	8/14/2016 2:49:48 PM	8/22/2016 8:55:32 AM	7 Days	
DL-202	Daleel	Beam Pump Wells	POSITIVE WATTFUL KWH OVERRANGE	Medium	8/14/2016 2:50:11 PM	8/16/2016 8:38:11 AM	1 Days	
DL-202	Daleel	Beam Pump Wells	CASING PRESSURE UNDERRANGE	High	8/14/2016 2:50:28 PM	8/16/2016 8:38:11 AM	1 Days	
DL-100	Daleel	Beam Pump Wells	POSITIVE WATTFUL KWH OVERRANGE	Medium	8/14/2016 2:50:35 PM	8/16/2016 8:38:11 AM	1 Days	
DL-244	Daleel	ESP Wells	TUBING PRESSURE OVERRANGE	Medium	8/14/2016 2:50:36 PM	8/14/2016 3:29:39 PM	00:39:03	

## Components:

- PI ProcessBook
- Graphic PI WebParts
- Multi State Function
- Asset Analytics
- Event Frames



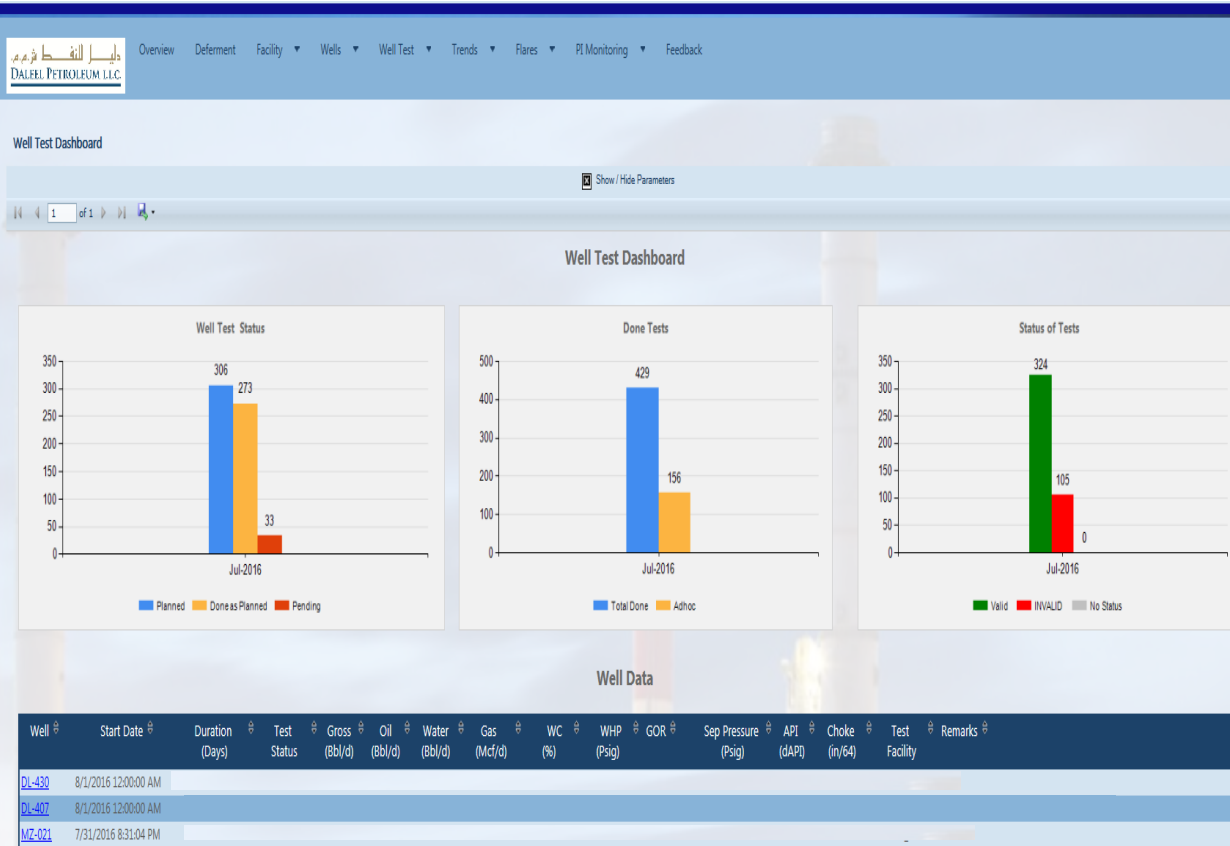
# Asset Framework (AF) – Exceptions

The screenshot displays the OSIsoft PI System Explorer interface. The left pane shows a hierarchical tree of assets, including Daleel, BMS, Wells, ESP, Flaring, Gas Plant, Pattern Injector, Power Plant, Stations, and Well Test Information. The central pane shows a list of assets, with 'DL-038' selected. The right-hand pane is titled 'DL-038' and shows the configuration for an 'Exception Status'. It includes a 'Name' field set to 'Exception Status', a 'Description' field, and a 'Categories' field. Below this, there is a table with columns for 'Name', 'Expression', 'Value at Evaluation', and 'Value'. The table contains several rows of exception rules, such as 'if not BadVal('MOTOR\_RUNNING\_STATUS') and 'MOTOR\_RUNNING\_STATUS' <> 'AVH Well Status' then 'Exception' else if not BadVal('CASING\_PRESSURE') and 'CASING\_PRESSURE' > 'CASING\_PRESSURE\_MAX\_VALUE' then 'Exception' else if not BadVal('INTAKE\_PRESSURE') and 'INTAKE\_PRESSURE' > 'INTAKE\_PRESSURE\_MAX\_VALUE' then 'Exception' else if not BadVal('INTAKE\_TEMPERATURE') and 'INTAKE\_TEMPERATURE' > 'INTAKE\_TEMPERATURE\_MAX\_VALUE' then 'Exception' else if not BadVal('MOTOR\_LOAD') and 'MOTOR\_LOAD' > 'MOTOR\_LOAD\_MAX\_VALUE' then 'Exception' else if not BadVal('MOTOR\_TEMPERATURE') and 'MOTOR\_TEMPERATURE' > 'MOTOR\_TEMPERATURE\_MAX\_VALUE' then 'Exception' else if not BadVal('OUTPUT\_CURRENT\_A') and 'OUTPUT\_CURRENT\_A' > 'OUTPUT\_CURRENT\_A\_MAX\_VALUE' then 'Exception' else if not BadVal('OUTPUT\_CURRENT\_B') and 'OUTPUT\_CURRENT\_B' > 'OUTPUT\_CURRENT\_B\_MAX\_VALUE' then 'Exception' else if not BadVal('OUTPUT\_CURRENT\_C') and 'OUTPUT\_CURRENT\_C' > 'OUTPUT\_CURRENT\_C\_MAX\_VALUE' then 'Exception' else if not BadVal('OUTPUT\_FREQUENCY') and 'OUTPUT\_FREQUENCY' > 'OUTPUT\_FREQUENCY\_MAX\_VALUE' then 'Exception' else if not BadVal('PUMP\_DISCHARGE\_PRESSURE') and 'PUMP\_DISCHARGE\_PRESSURE' > 'PUMP\_DISCHARGE\_PRESSURE\_MAX\_VALUE' then 'Exception' else if not BadVal('TUBING\_PRESSURE') and 'TUBING\_PRESSURE' > 'TUBING\_PRESSURE\_MAX\_VALUE' then 'Exception' else if not BadVal('VIBRATION\_X') and 'VIBRATION\_X' > 'VIBRATION\_X\_MAX\_VALUE' then 'Exception' else if not BadVal('VIBRATION\_Y') and 'VIBRATION\_Y' > 'VIBRATION\_Y\_MAX\_VALUE' then 'Exception' else if not BadVal('VIBRATION\_Z') and 'VIBRATION\_Z' > 'VIBRATION\_Z\_MAX\_VALUE' then 'Exception' else 'None'.

- AF Power!
- Event Frames

# Smart Daleel Portal (Well Test)

- Well Test KPI
- Daily Well Test view



Components:  
-SSRS Report

# Benefits

- Robust understanding of daily production.
- Improve water injector meter performance by 80%.
- Eliminated human errors by 90% - improved data quality.
- Improved well test validation by 100%.
- Allowed full access to well & facility history to all required engineers.



# Future!

Only 1½ years!

Phase1 "2015"

Integration

- Connect 5 automation systems using the PI System technology. (Station A, Station B, Power Plant, Gas Plant, Wells)
- Enable Daleel headquarter staff to monitor all field assets in real time.
- Histories of all surface asset data (stations)
- Provide easy tools to users to access Daleel Asset Data:

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Phase2 (2016-2020)

Intelligence

- Create customized Tools in an integrated portal:

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- Real-time data
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### 2-Filter & Alarm. (Process)

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### 3-Analyze. (Work Flows)

- E-Well Book
- Models VS Real-time
- Action plan

### 4-Build Opportunity list.

- (Optimization/Restoration/Integrity)
- Risk assessment
- Reporting

Phase3

Lean

- Review processes & workflows to cut waste.



# Conclusion

- **Real-Time Integration** is the key to achieve operation intelligence.
- **Real-Time Operational Intelligence** is the success factor for efficient production management.
- **Exception-based surveillance** Can be easily managed using PI AF tool.

## Contact Information

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Daleel Petroleum

## Questions

Please wait for the **microphone** before asking your questions



State your **name & company**

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谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado



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