Improving Operational Performance

Presented by **Jorge Wong – Lead Systems Analyst – Devon Energy**

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Agenda

- Overview of Devon Energy
- How we improved operational performance with the Tank Level Management System using the PI System
- What does Devon plan to do next with the PI System?

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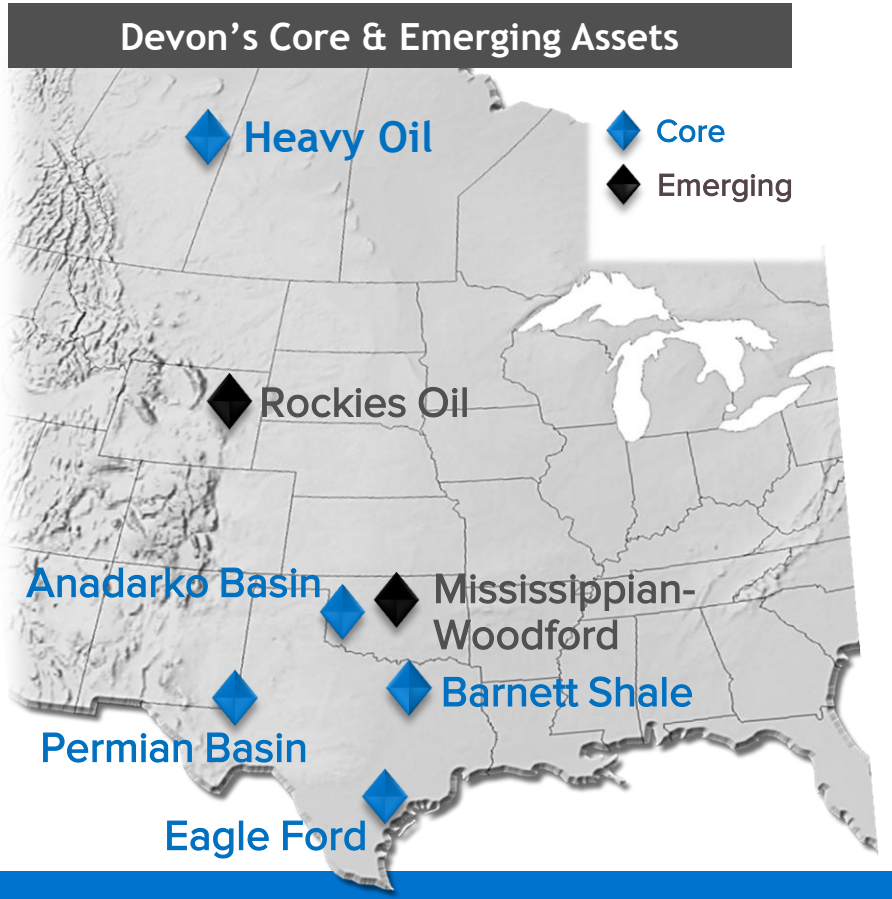
Devon Today

- Q4 2014 net production: 664 MBOED(1)
- Deep inventory of oil opportunities
  - Top-tier Eagle Ford development
  - High-quality Permian Basin position
  - World-class heavy oil projects
  - Upside potential in emerging plays
- Strong liquids-rich gas optionality
- EnLink ownership valued at ≈$8 billion
  - Additional midstream value in Access and Victoria Express pipelines



(1) Excludes divested assets.

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Lloydminster District

- Produce both Heavy Oil and Conventional Gas
  - 90% of our production mix comes from Heavy Oil
  - 300 oil wells, 10 SWD, 40 boosters
  - 100 gas wells, 11 Gas Facilities
  - All production is trucked (~200 loads/d)
  - Oil shipped to 3rd Party Facilities
- Decision Support Center Operating Philosophy
  - Implemented in Oct 2012
  - Implemented PI System tools in Feb 2013

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DECISION SUPPORT CENTER (DSC)

BRINGING THE INFORMATION TO OUR EXPERTS

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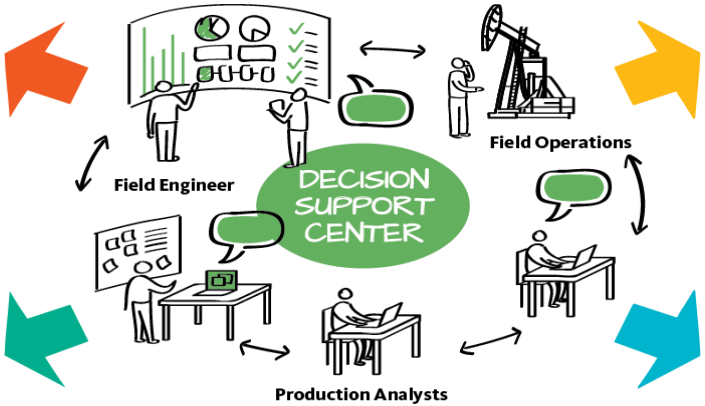
OUR GOALS

Environment, Health and Safety

Detect issues faster and avoid dangerous situations

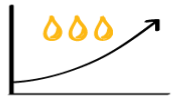
Working Smarter

Give people information to make better, faster decisions



Production

Increase production through predictive analysis and faster response



Operating Costs

Reduce operating expenses through managing by exception and collaboration

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Business Challenges

- Difficulty in managing fluid inventory inside tanks
  - Technology not great to monitor volumetric change
- Inconsistent prioritization of trucking schedules
  - 200+ Loads hauled per day
- Improvement in Tank Foam Overs and Spill Volumes
- Improvement in identifying Production Exceptions
  - Ineffective process/tools for identifying exceptions

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Prevention Tank Foam Overs

- Prevention of overflow and production outages
  - Monitor flow rates
- Foam is a low density phase which gas is entrained within a thin layer
- Eliminate potential issues

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Solution

- Required extra resources (Industrial Evolution)
- Enhanced our flow rate calculations in the PI System
- Real-time calculations to monitor the inventory fluctuations at the various wells
- Utilizes PI System tools to acquire, analyze and forecast tank volumes
- Proactively alerting operations when predefined events are detected
- System automatically generates and distributes reports

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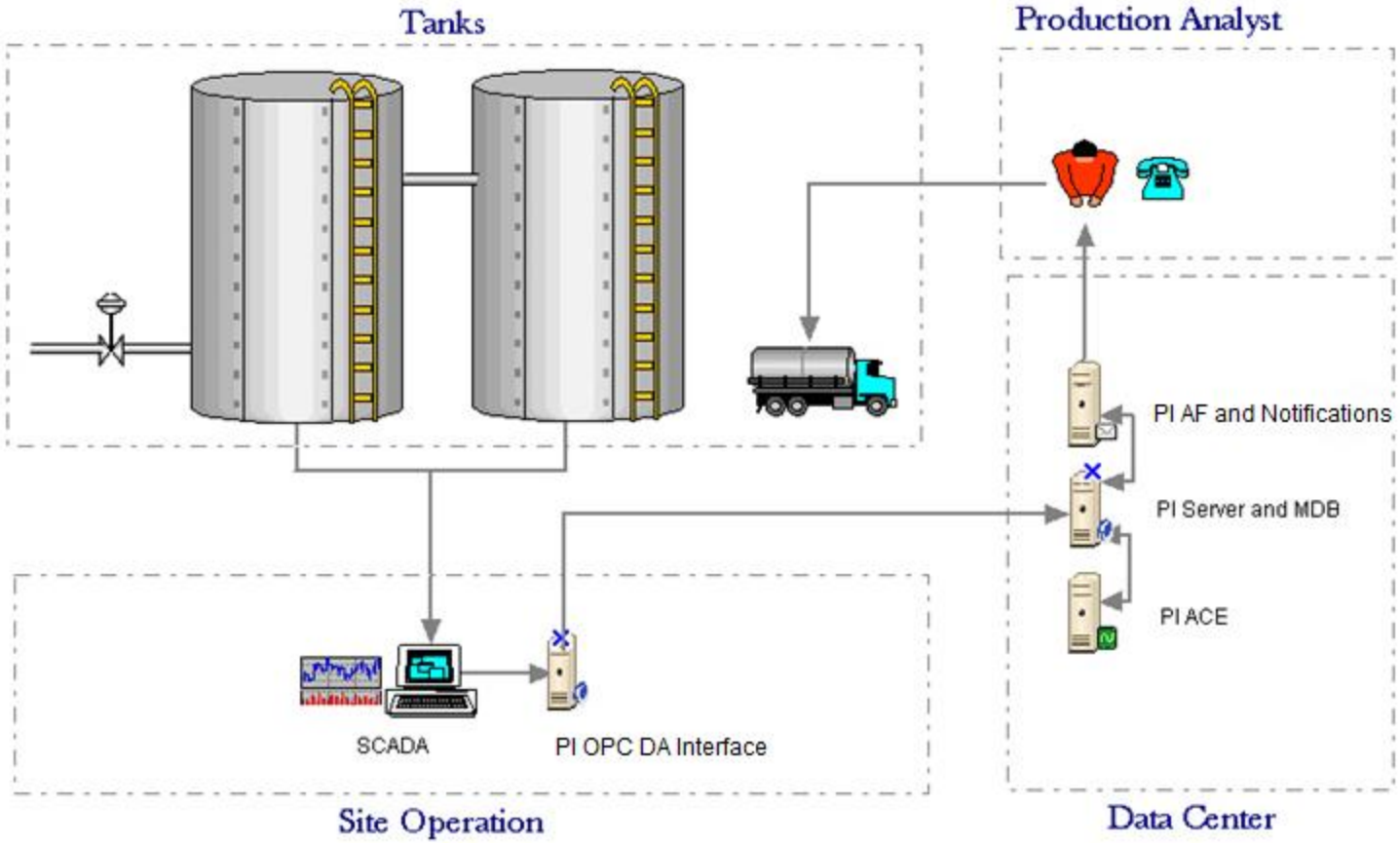
Solution Overview



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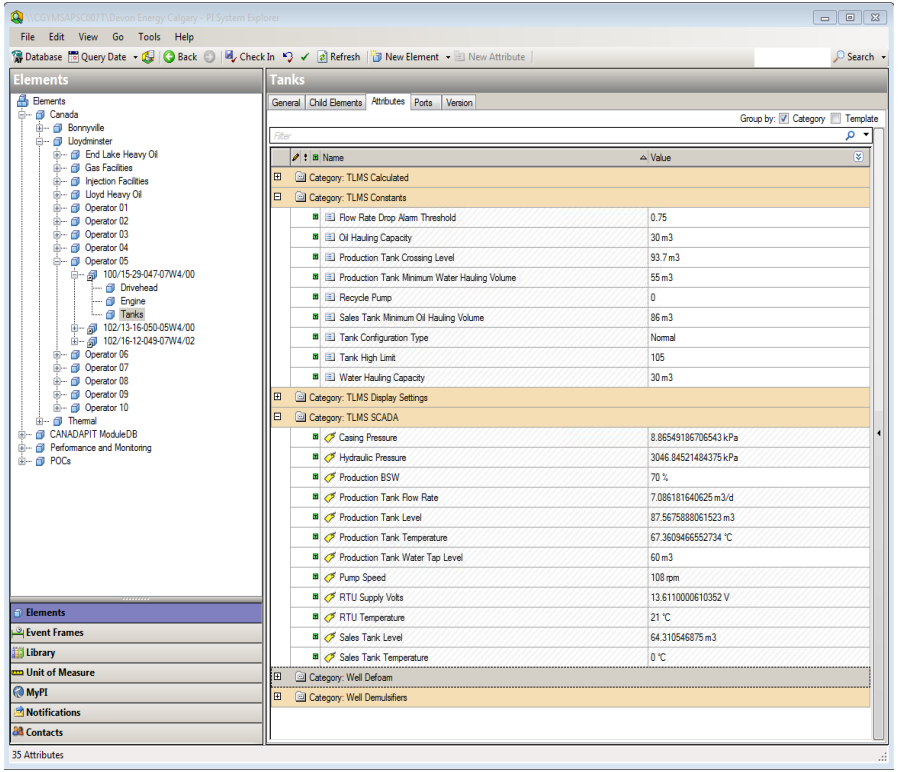
Asset Framework

- Build a representation of the asset model
- Simplify the process of adding a new assets by using templates



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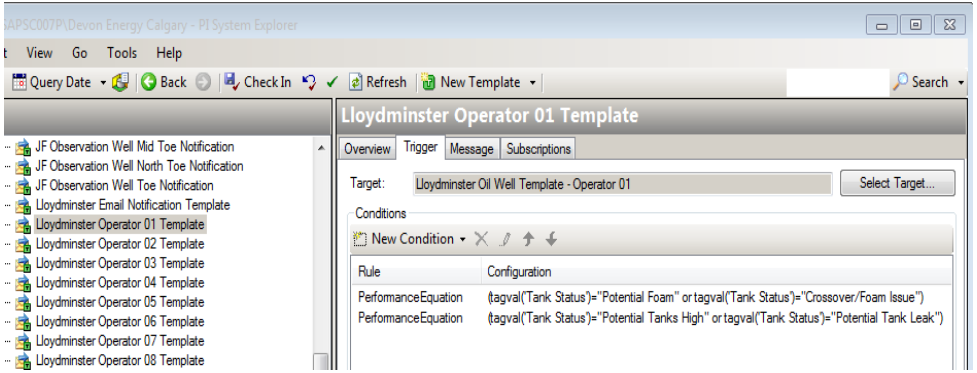
Notifications

Monitor for Tank Status Changes:

- Crossover/Foam Issue
- Potential Tank Foam
- Tank High
- Tank Leak



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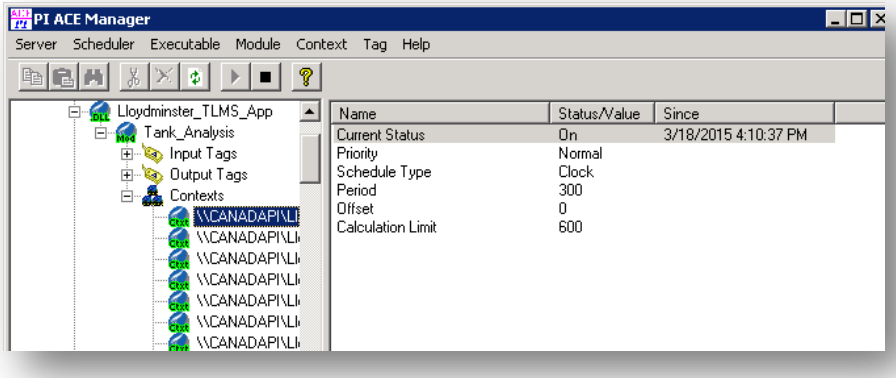
PI Advanced Computing Engine (PI ACE)

- Used to perform complex calculations such as:
  - Well and tank status, Flow rate and water level
- Allows for “templating” of the calculations
- Module Database is required for structuring the PI ACE application
- Calculations feed into a daily report, AF and Notifications



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PI ProcessBook

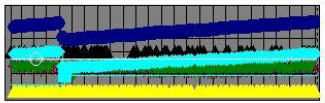
Location: 103/05-16-048-05W4/00 Yesterday Production Hour: 24 hour 9/30/2014 12:00:00 AM

Well Status: Running
Pump Speed: 142
Hydraulic Pressure: 8238
Tank Status: Normal

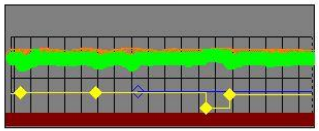
Well and Tank Status:

Estimate Flow Rate: 43.1 m3/d
Target Flow Rate: 42.6 m3/d
BS&W: 77.5 %
Cross Level: 132.5 m3

Tank Trends:

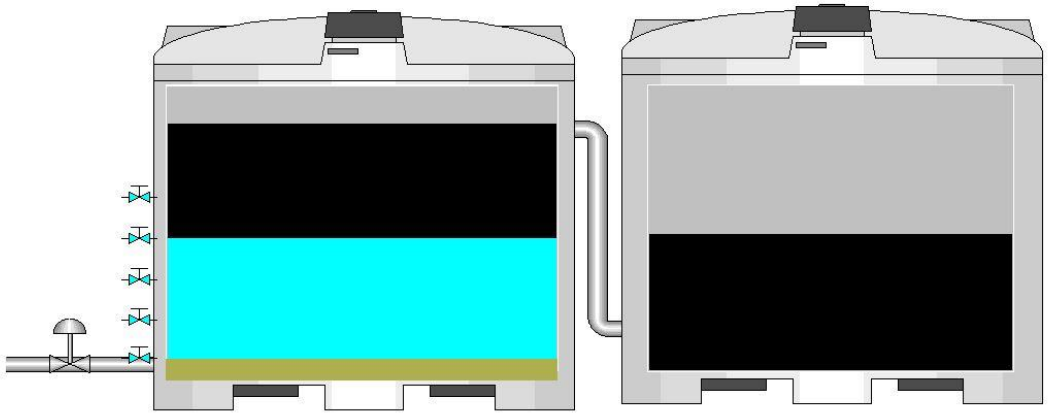


Burner Status :



Production Tank

Sales Tank



Tank Level: 131.0 m3
Water Level: 70.9 m3
Tap Level: 9/29/2014 1:12:04 PM 60.0 m3
latest water haul: 9/29/2014 3:23:56.49101 PM 30.9 m3
Next water haul in: 0.0 Hours

Tank Level: 73.6 m3
Latest oil haul: 9/28/2014 5:34:40.66101 PM 34.1 m3
Next oil haul in: 76.4 Hours

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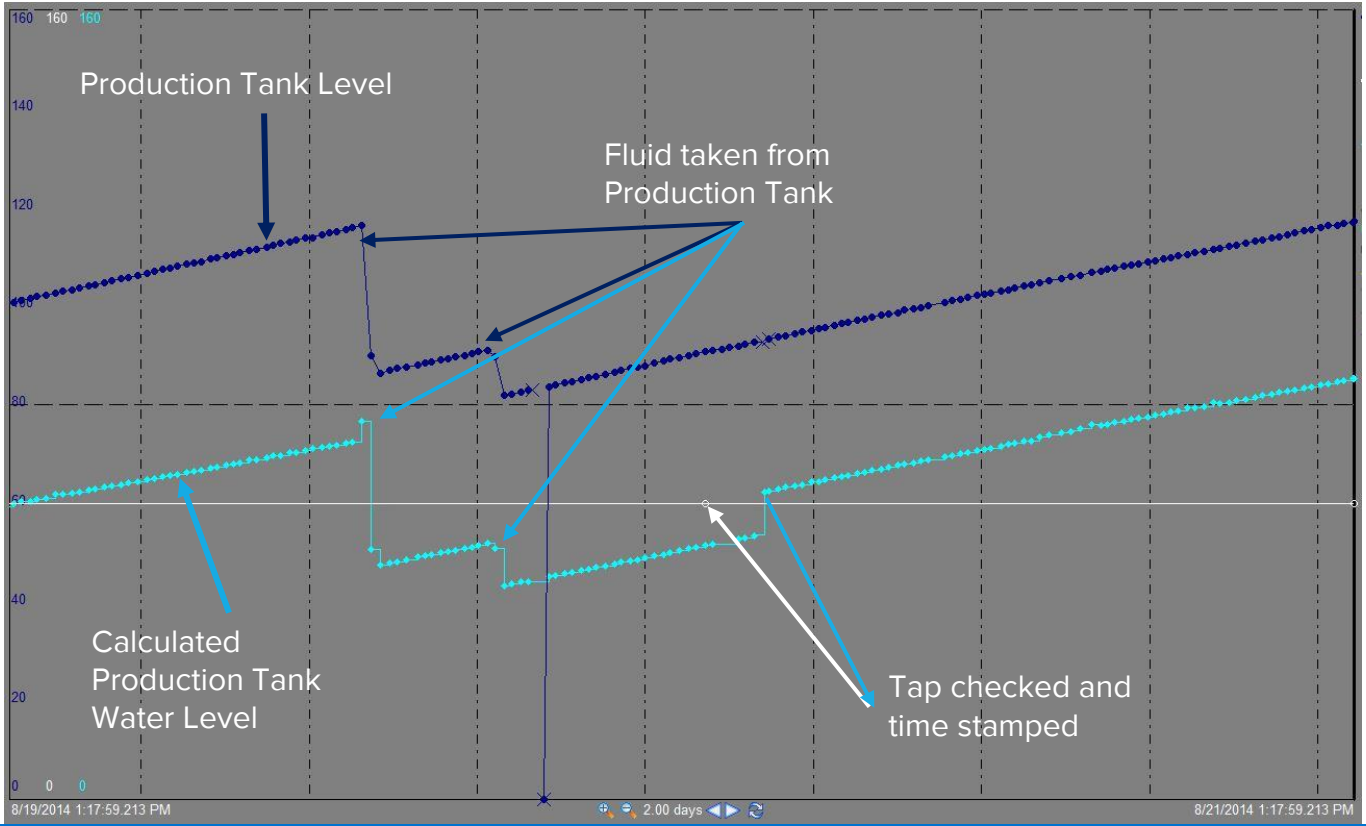
PI ProcessBook Trend Sample - Prod Tank



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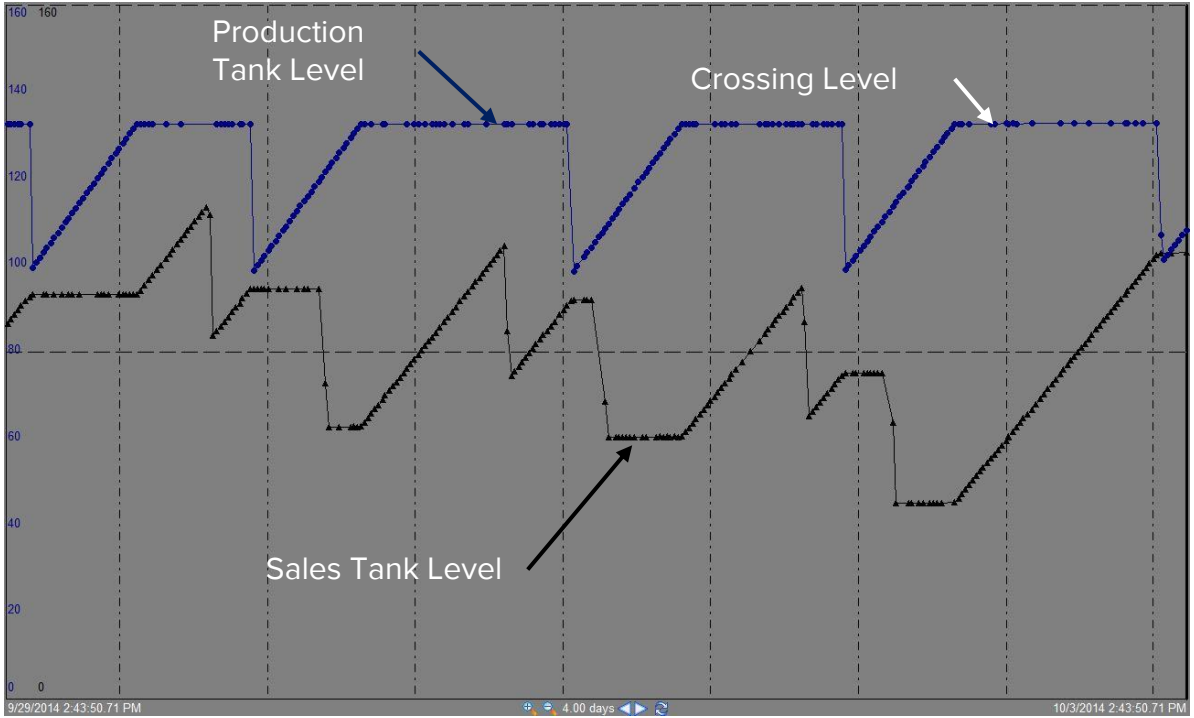
PI ProcessBook Trend - No Issues



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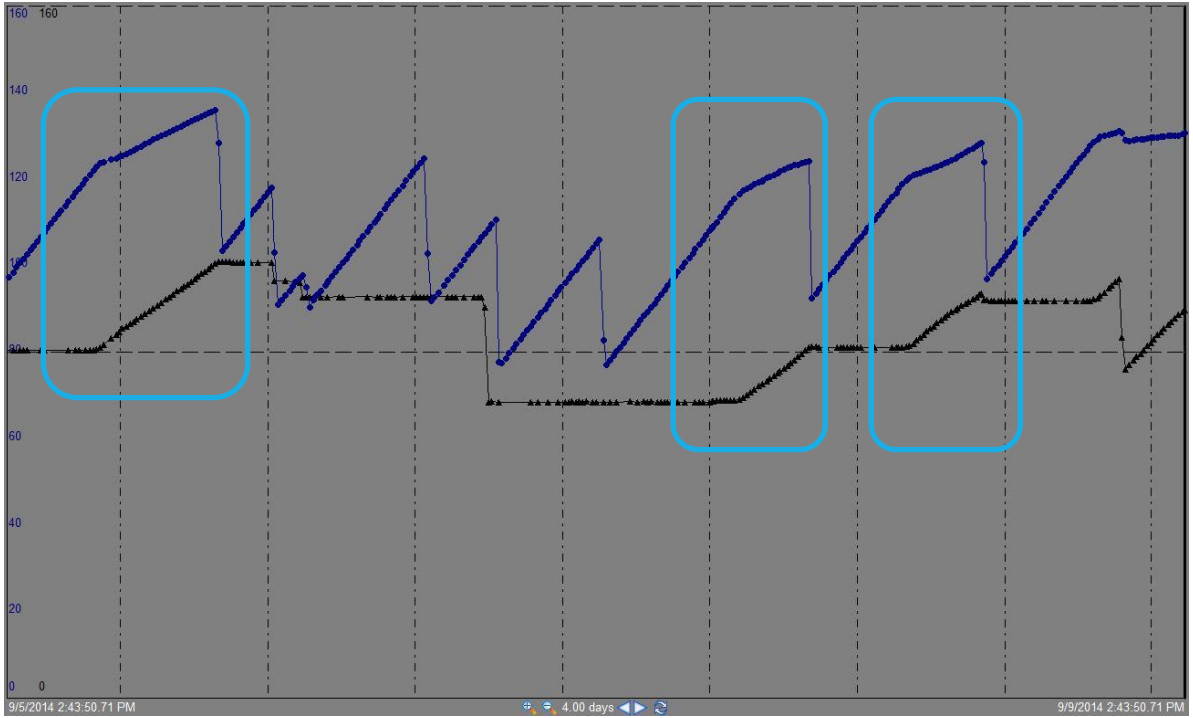
PI ProcessBook Trend – Potential Foam Over



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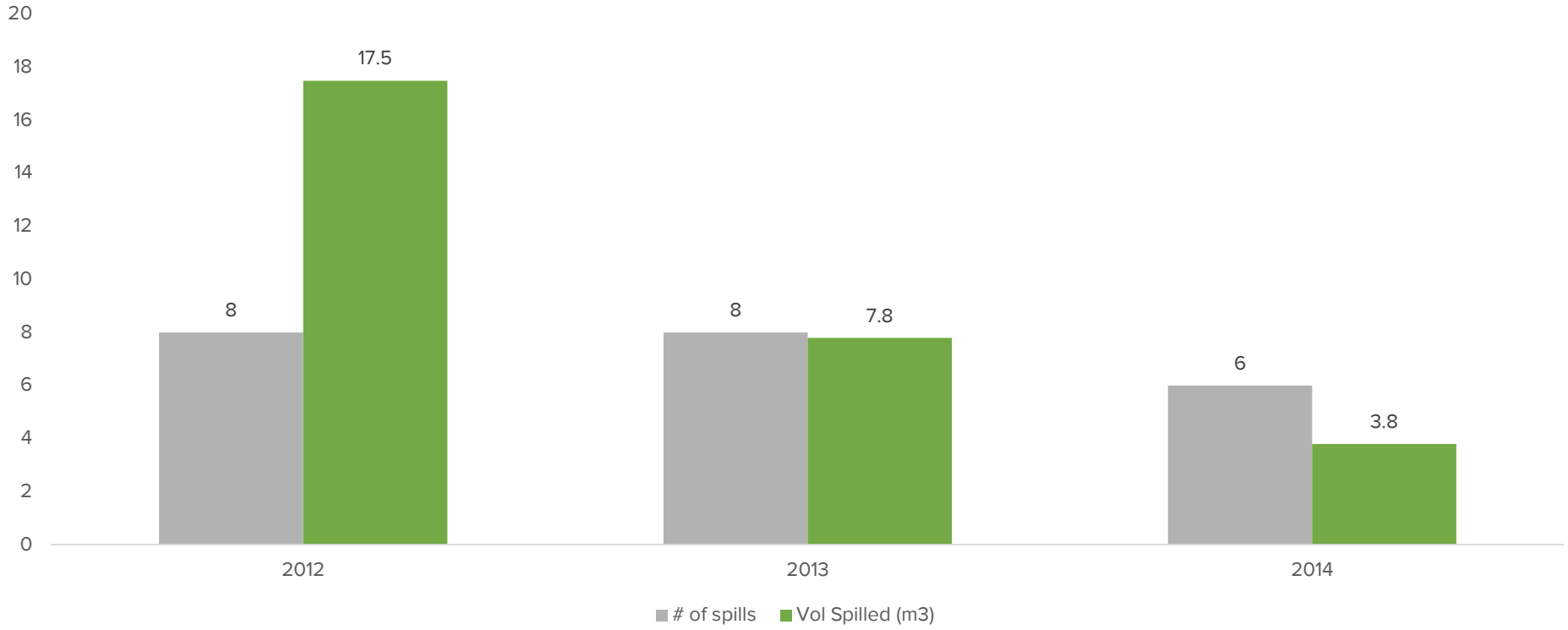
Notifications – Tank Foam Over History



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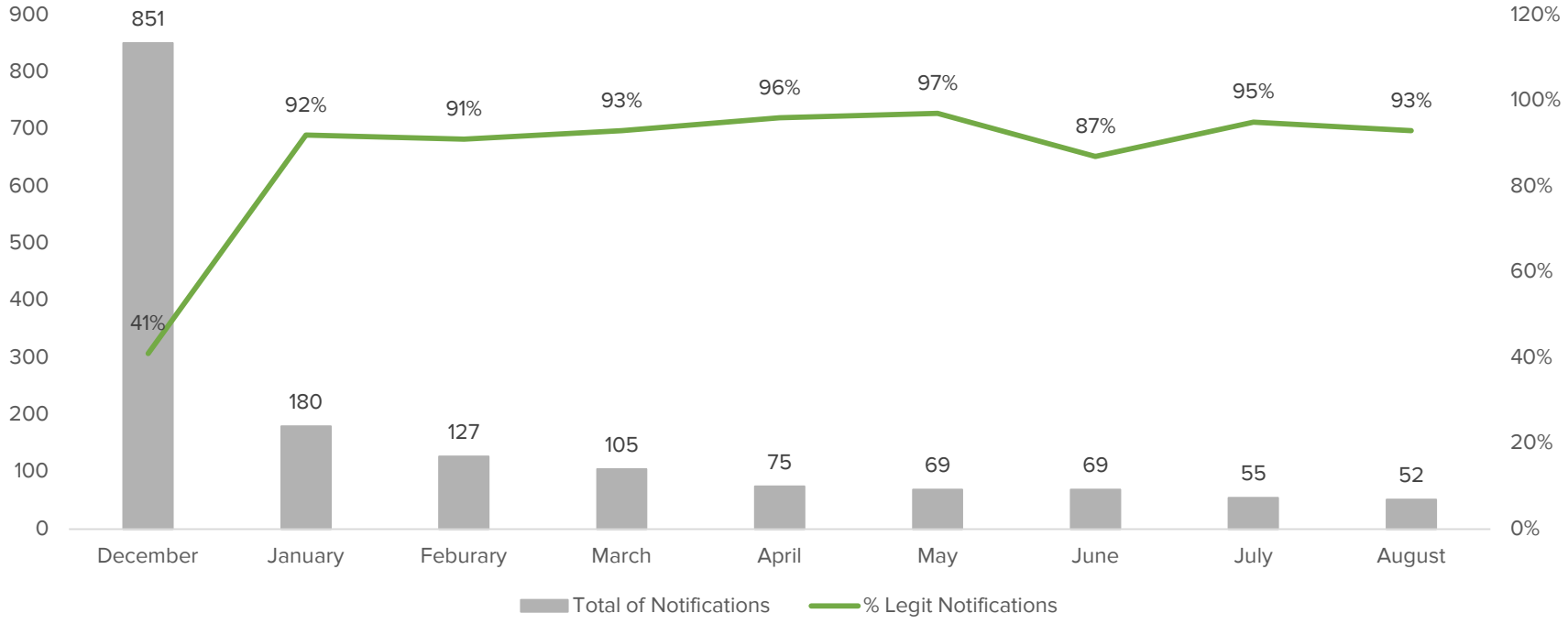
Notifications – Tank Foam Over Notifications



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Results and Benefits of TLMS

- The PI System allows our operations to manage by exception and allows us to focus on higher value tasks
- Improved decision making on Fluid Management
- Reduction in tank foam over volumes >50% year over year
- PI Client tools supporting our DSC Operating Philosophy resulted in 3% production increase and resulted in $2MM increased revenue
- Increased our Clean Oil KPI by 18% and an annual savings of $250,000

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Tank Level Management System

"Being able to assist operations by giving them the required data to influence better decisions making in our fluid management which is a crucial part in achieving our Clean Oil KPI. We seen a 18% increase which resulted in an annual savings of $250,000."

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Business Challenges

A. Difficulty managing fluid inventory inside tanks
B. Managing by exception
C. Inconsistent prioritization of trucking schedules

Solution(s)

A. Utilized system integrators (Industrial Evolution)
B. Utilize PI System Tools to manage fluid inventory
C. Reports to support fluid management best practices

Results and Benefits

A. Real time alerts
B. Proactive instead of reactive
C. Spill volume reduced >50% annually

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Future Plans for TLMS

- Take advantage of new AF version with analytic capabilities
- Apply the same concept to other districts
- Expanding the use of Notifications to support our operations in improving Managing by Exception
- Integrating with Trucking Logistics Work Flow
- Manual tap readings captured using Operator Toolkit

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What else is Devon doing with the PI System?

- Upgraded to the latest release of AF Server 2014 (Feb 2015)
- Upgraded to the latest suit of PI Client Tools 2014 (PI ProcessBook, PI DataLink, System Explorer)
- Leveraged Enterprise Agreement and had OSISoft assist with upgrade

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What else is Devon doing with the PI System?

- Building a custom application leveraging the PI Web API and AF SDK (Operator Toolkit)
- Manual Field Data Capture Tool
- Mobile capable, offline capable and easy to use
- Direct feedback to operators entering data
- Store captured data in the PI Server
- Easy to access all data for trending, analytics, etc.

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What else is Devon doing with the PI System?

- Leverage PI Cloud Services with a joint venture
- Expand PI Server production monitoring by using NOC Support team
- PI Integrator for ArcGIS – Integrations into ArcGIS

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Questions

Please wait for the microphone before asking your questions

State your
name & company

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THANK YOU

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