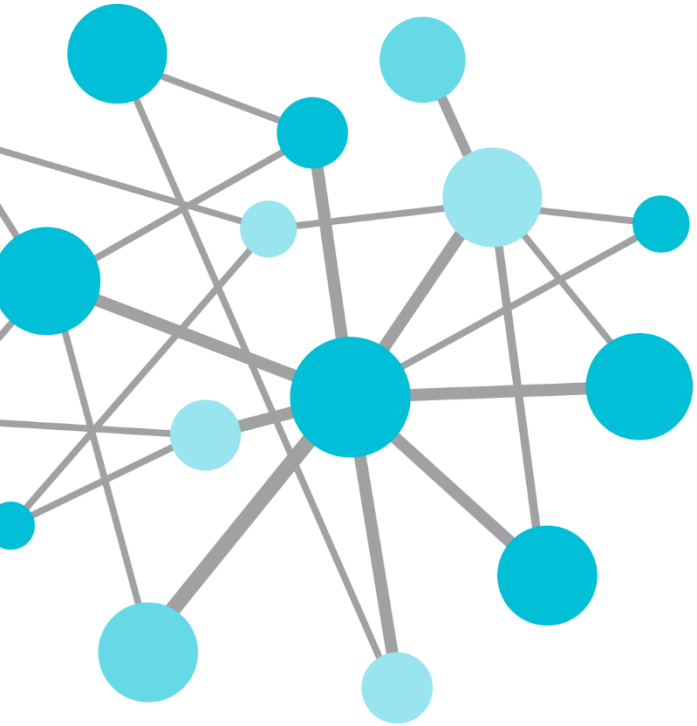


Improving Operational Performance - Tank Level Management System

Presented by **Chad Roach – Production Foreman**
Jorge Wong – Lead System Analysts

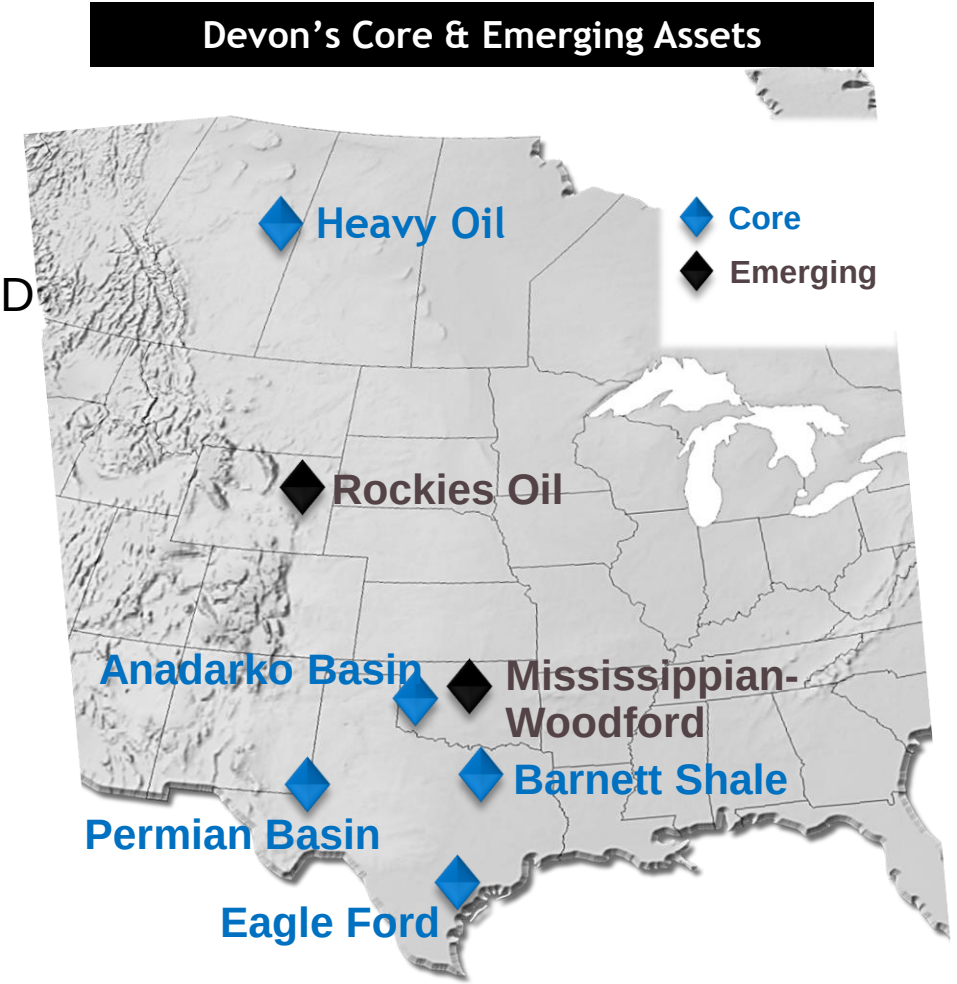
devon

About Devon Energy

- A leading independent oil and gas exploration and production company. Operations are focused onshore in the United States and Canada
- The company's portfolio of oil and gas properties provides stable, environmentally responsible production and a platform for future growth
- Headquartered in Oklahoma City, Devon is a Fortune 500 company

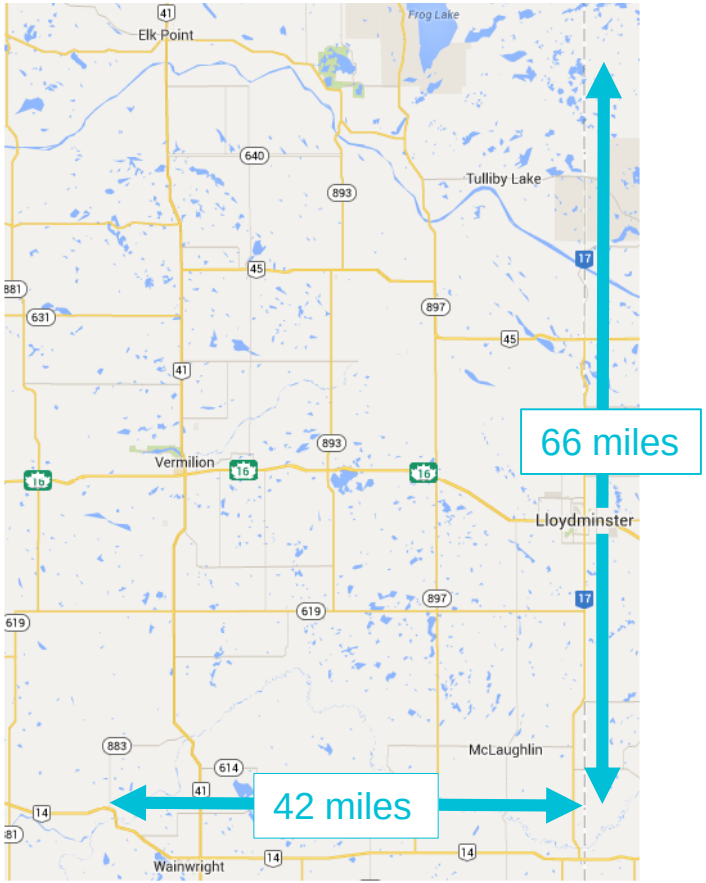
Devon Today

- Proved reserves: 2.6 billion BOE
- Q1 2014 net production: 563 MBOED
  - Oil & NGLs >50% of production mix
  - Expect multi-year oil growth >20%
- Deep inventory of oil opportunities
  - Top-tier Eagle Ford development
  - Strong Permian Basin position
  - World-class SAGD oil projects
  - Upside potential in emerging plays
- Midstream business valued at >$7.5 billion
- Enterprise Value: ≈$40 billion



Devon Lloydminster

- 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



What is Heavy Oil?

Material	Viscosity (centipoises)	
Water @ 70° F	1 - 5	
Blood or Kerosene	10	
Anti - Freeze or Ethylene Glycol	15	
Motor Oil SAE 10 or Corn Syrup	50 - 100	
Motor Oil SAE 30 or Maple Syrup	150 - 200	
Motor Oil SAE 40 or Castor Oil	250 - 500	
Motor Oil SAE 60 or Glycerin	1,000 - 2,000	
Karo Corn Syrup or Honey	2,000 - 3,000	
Blackstrap Molasses	5,000 - 10,000	Lloydminster District Heavy Oil Range
Hershey Chocolate Syrup	10,000 - 25,000	
Heinz Ketchup or French's Mustard	50,000 - 70,000	
Tomato Paste or Peanut Butter	150,000 - 200,000	

DECISION SUPPORT CENTER (DSC)

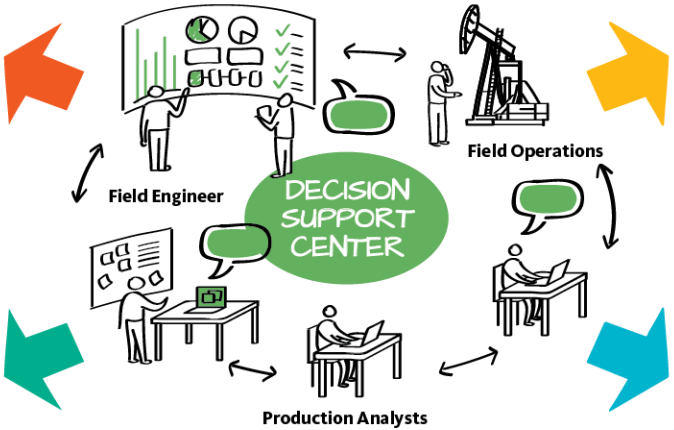
BRINGING THE INFORMATION TO OUR EXPERTS

devon

Environment, Health and Safety

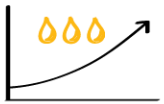
Detect issues faster and avoid dangerous situations

OUR GOALS



Production

Increase production through predictive analysis and faster response



Working Smarter

Give people information to make better, faster decisions

Operating Costs

Reduce operating expenses through managing by exception and collaboration

Business Opportunities

- Managing by Exception
- Decrease Operating Costs
- Increase Production Uplift
- Improve Environment, Health and Safety

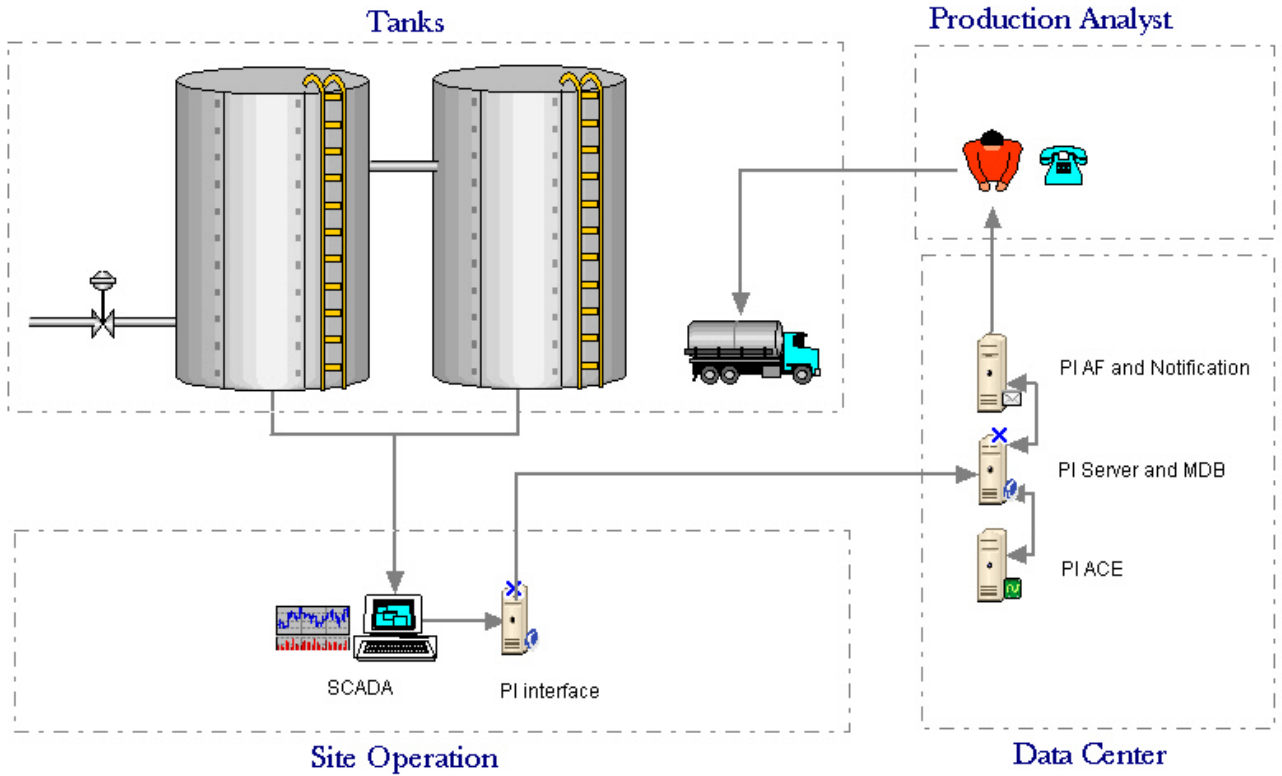
Business Challenges

- Difficulty in managing fluid inventory inside tanks
- Inconsistent prioritization of trucking schedules
- Improvement in Tank Foam Overs and Spill Volumes
- Improvement in identifying Production Exceptions

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

Solution Overview



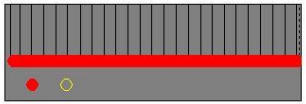
Lloydminster District

Tank Level Management System – PI ProcessBook Display

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

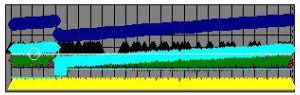
Well Status: Running
Pump Speed: 142
Hydraulic Pressure: 8238
Tank Status: Normal

Well and Tank Status:

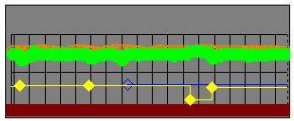


Estimate Flow Rate: 43.1 m3/d
Target Flow Rate: 42.6 m3/d
BS&W: 77.5 %
Cross Level: 132.5 m3

Tank Trends:

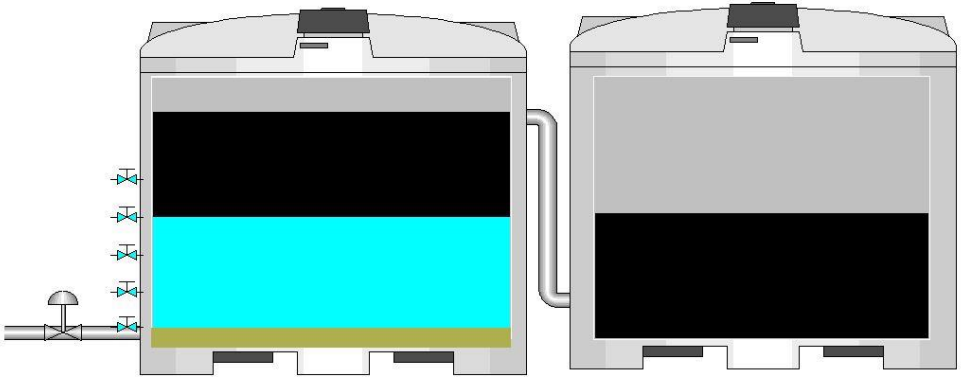


Burner Status :



Production Tank

Sales Tank

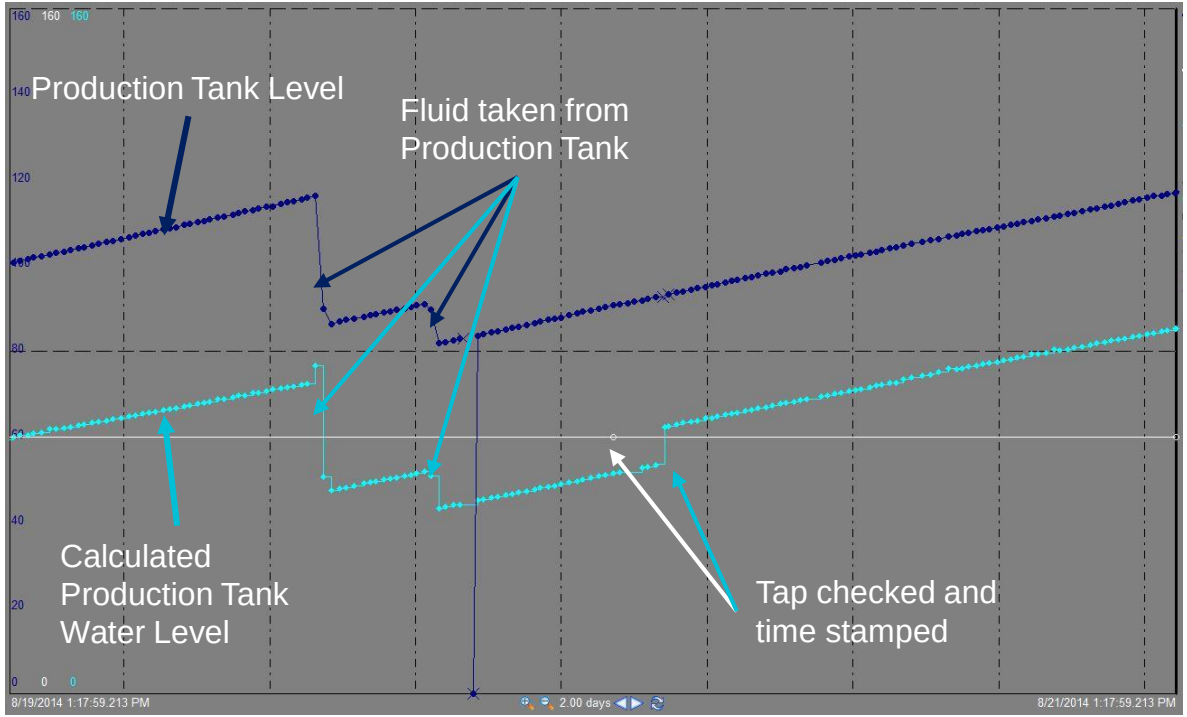


Tank Level: 131.0 m3
Water Level: 70.9 m3
Tap Level: 9/29/2014 1:12:04 PM 60.0 m3
latest water haul: 9/29/2014 3:23:56.49101 PM 30.9 m3
Next water haul in: 0.0 Hours

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

Lloydminster District

Tank Level Management System – PI ProcessBook Trend



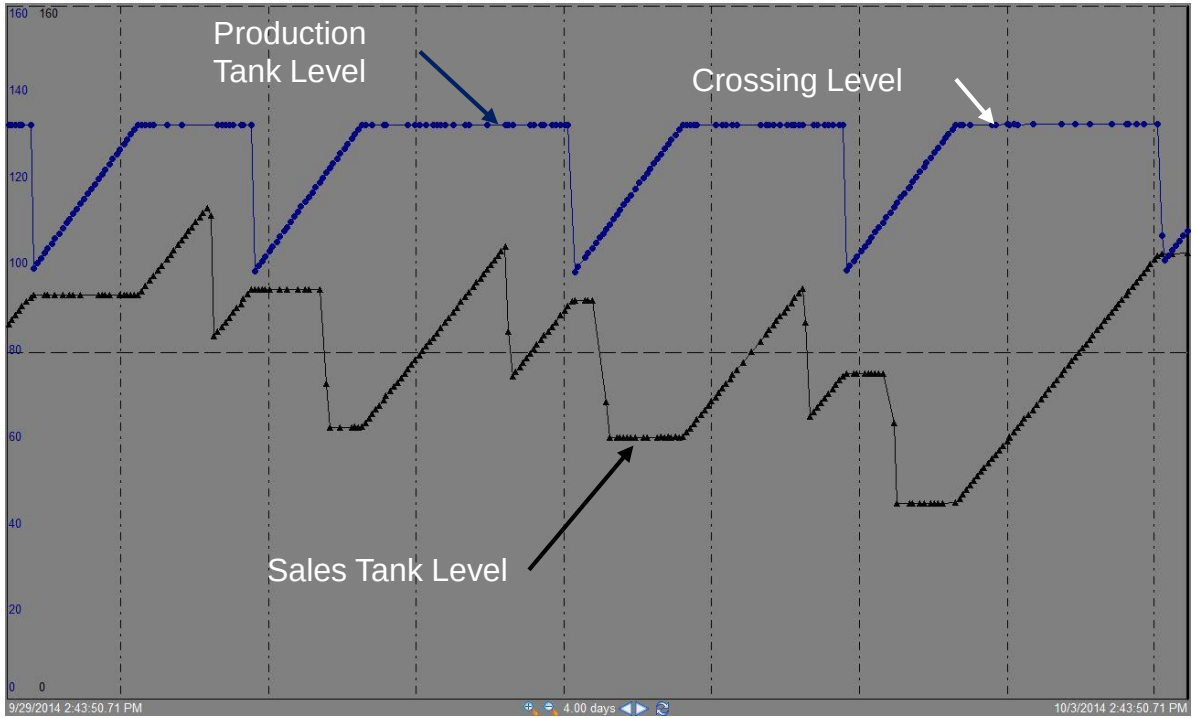
Lloydminster District

Tank Level Management System – Tank Foam Overs

- Foam is a low density phase which gas is entrained within a thin layer

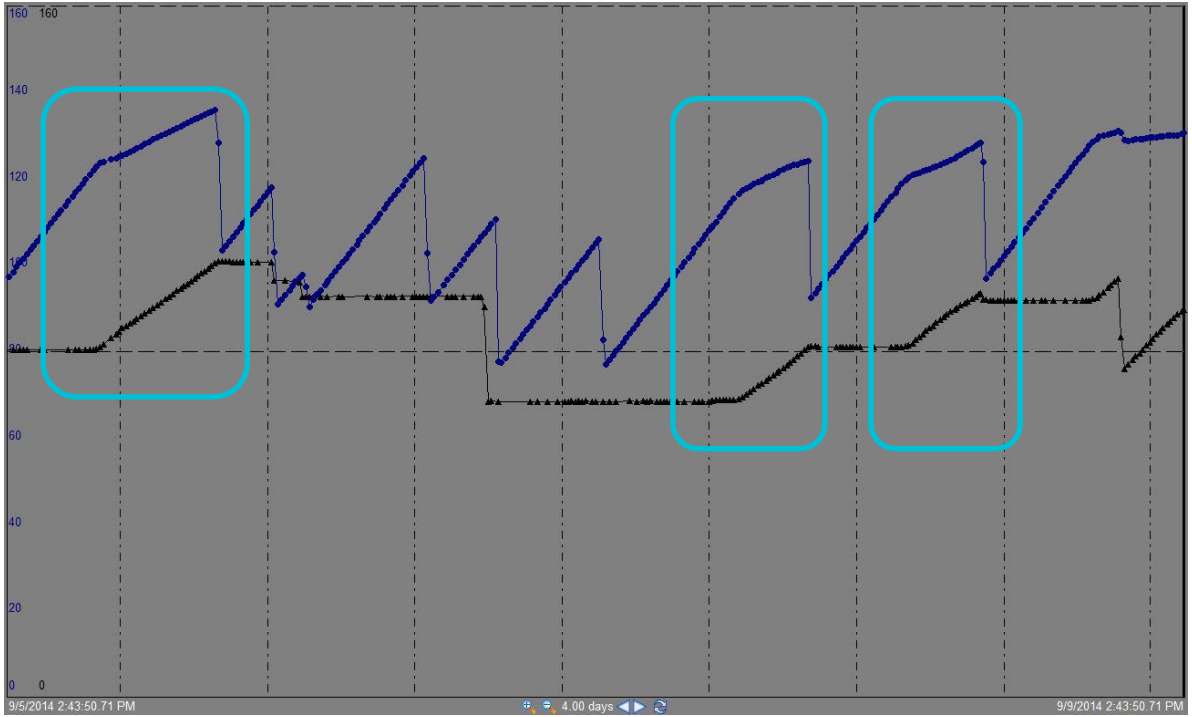
Lloydminster District

Tank Foam PI Notifications – PI ProcessBook Trend



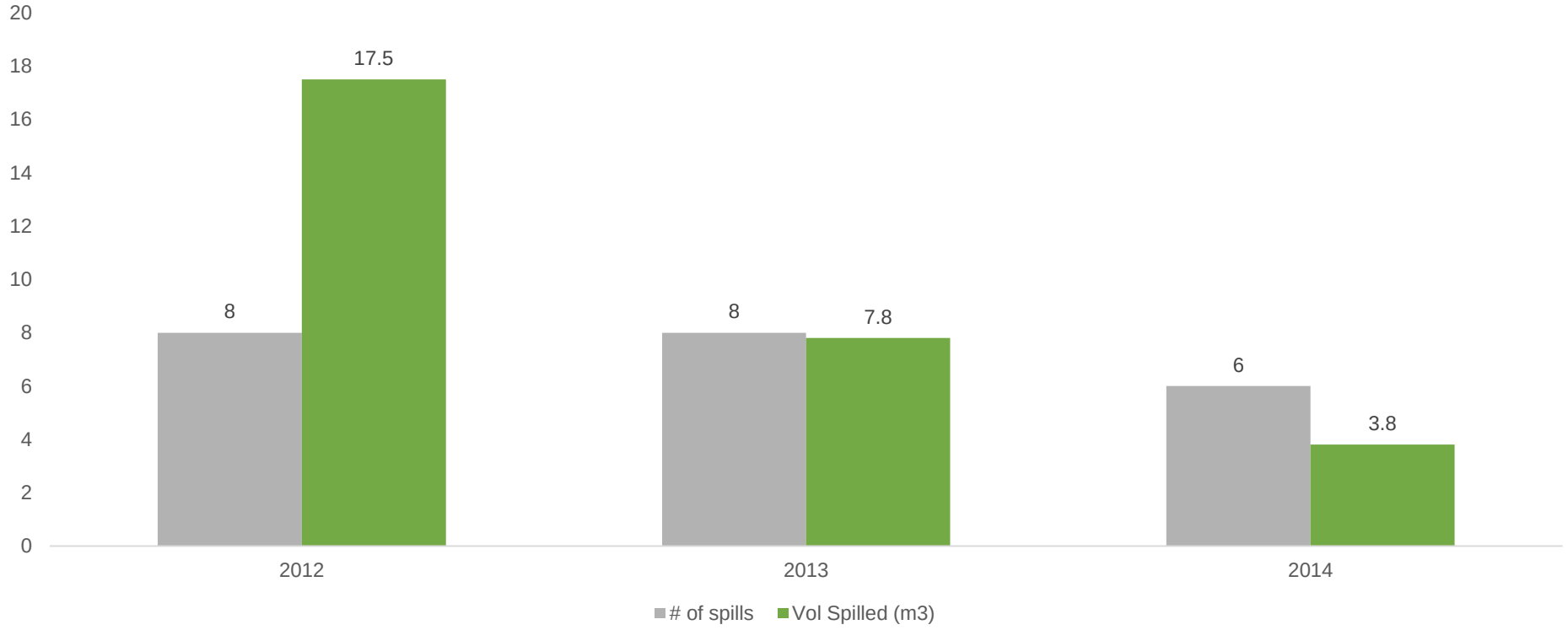
Lloydminster District

Tank Foam PI Notifications – PI ProcessBook Trend



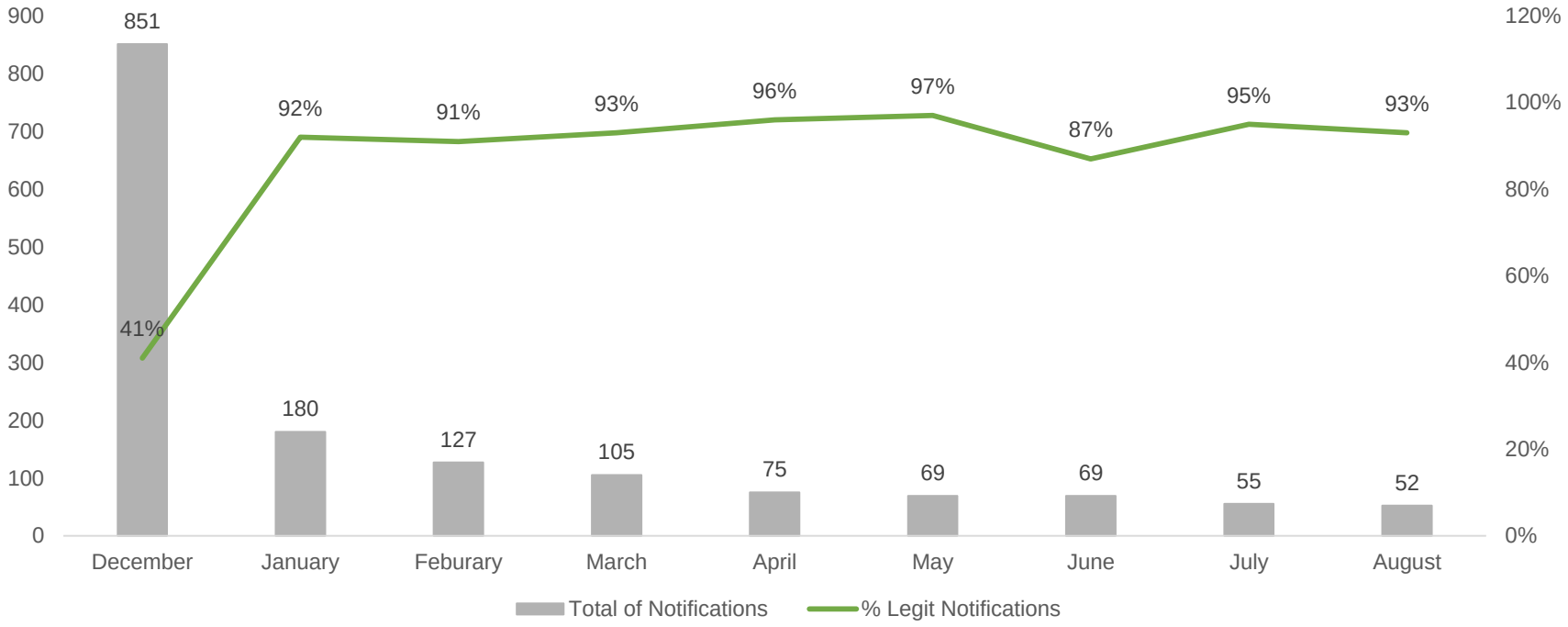
Lloydminster District

Tank Foam PI Notifications – Tank Foam Over History



Lloydminster District

Tank Foam PI Notifications – Tank Foam Notification Improvement



Lloydminster District

Tank Level Management System - TLMS Summary Hauled Report

Summary Report - Tanks' Hauled Volume — Create Report

Report Properties			Change
Country:	Canada	PI Server:	CANADAPI
District:	Lloydminster	Report End Time	14-Apr-14 15:36:00
Area:	Lloyd Heavy Oil	Report Time Range (hrs)	24

Start Time:	13-Apr-14 15:36:00	End Time	14-Apr-14 15:36:00

100/09-06-049-01W4/00

Production Tank	Time	Volume(m3)
	13-Apr-14 16:13:10	27.9
	13-Apr-14 23:23:16	24.4
	14-Apr-14 00:48:17	21.5
	14-Apr-14 04:43:21	10.2
	14-Apr-14 06:08:21	26.8
	14-Apr-14 07:53:23	24.1
	14-Apr-14 10:13:25	21.6
	14-Apr-14 14:18:29	23.2
	Total	**179.7**

Sales Tank	Time	Volume(m3)
	14-Apr-14 04:39:19	5.6
	14-Apr-14 05:49:21	25.5
	14-Apr-14 14:19:29	3.2
	Total	**34.4**

100/05-36-050-06W4/00

Production Tank	Time	Volume(m3)
	14-Apr-14 07:33:23	26.5
	14-Apr-14 14:18:29	24.9
	Total	**51.5**

Sales Tank	Time	Volume(m3)
	Total	**0.0**

100/09-14-050-02W4/02

Production Tank	Time	Volume(m3)
	13-Apr-14 16:58:11	31.4
	14-Apr-14 05:13:20	28.4
	14-Apr-14 10:58:25	30.5
	14-Apr-14 14:13:28	25.4
	Total	**115.6**

Sales Tank	Time	Volume(m3)
	Total	**0.0**

Lloydminster District

Tank Level Management System - TLMS Production Report

Tank Hauling Prediction Report — Create Report

FALSE

Report Properties			Change
Country:	Canada	PI Server:	cgymsapsc005d
District:	Lloydminster	Report Start Time:	4/14/2014 15:43
Area:	Operator 01	Report Time Range (hrs):	42

100/05-12-049-02W4/00		Hours To Haul Production Tank	Time	Hours To Haul Sales Tank	Time
Flow Rate (m3/d)	140.1	2	4/14/2014 17:43	2	4/14/2014 17:43
Current Production Tank Level (m3)	82.5	6.4	4/14/2014 22:09		
Current Water Level (m3)	64.6	11.6	4/15/2014 3:17		
Current Sales Tank Level (m3)	94.6	16.7	4/15/2014 8:26		
		21.9	4/15/2014 13:39		
		27.9	4/15/2014 19:36		
		33.8	4/16/2014 1:34		
		39.8	4/16/2014 7:31		

100/08-11-049-02W4/00		Hours To Haul Production Tank	Time	Hours To Haul Sales Tank	Time
Flow Rate (m3/d)	23			20.9	4/15/2014 12:39
Current Production Tank Level (m3)	134.5				
Current Water Level (m3)	46.3				
Current Sales Tank Level (m3)	65.9				

102/12-18-049-01W4/00		Hours To Haul Production Tank	Time	Hours To Haul Sales Tank	Time
Flow Rate (m3/d)	27.4			2	4/14/2014 17:43
Current Production Tank Level (m3)	109.8			21.6	4/15/2014 13:22
Current Water Level (m3)	22.7				
Current Sales Tank Level (m3)	109.7				

Lloydminster District

DSC Exception Report - Morning Exception Report

Morning Exception Report

Area:	Lloyd Heavy Oil
Start Time:	4/14/2014 6:00
End Time:	4/13/2014 6:00

Active Notifications:		
UWI	Tank Status	Start Time

Well list of flow rate droped more than 25% of target

UWI	Oil Production (m3)	24 hour averge flow rate (m3/d)	Target flow rate (m3/d)	Percentage drop	Casing Pressure (kPa)	Casing Pressure (kPa) - 24 hour ago
100/01-02-051-05W4/00	4	11.01	17.37	36.62%	9.72	10.92
100/02-02-051-05W4/00	3.19	4.17	5.76	27.57%	348.21	350.32
100/09-10-046-01W4/00	2.06	19.48	26.01	25.10%	-3.93	-3.02
100/11-02-051-05W4/00	1.94	3.54	7.58	53.24%	-1.28	-0.51
100/15-04-048-06W4/02	4.05	6.64	9.89	32.84%	-0.91	4.89
102/16-30-046-05W4/00	1.06	5.9	8.2	28.02%	3.15	4.03
104/04-30-048-04W4/00	1.83	2.81	5.64	50.13%	30.74	20.61

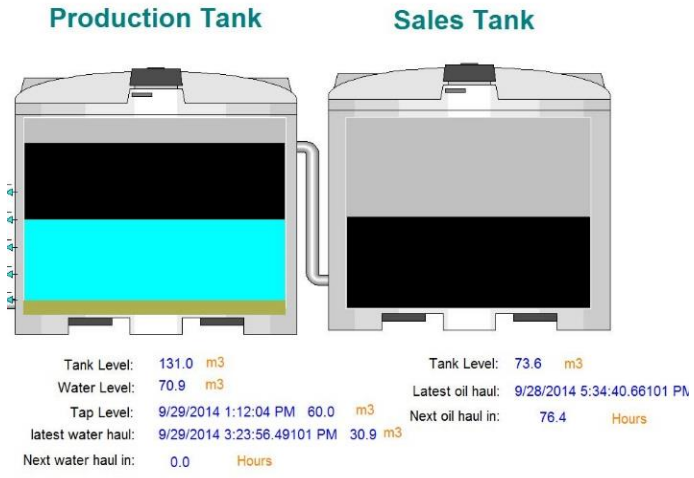
Results and Benefits

- 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

TLMS Project Summary

“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.”

devon



Business Challenges

- Difficulty managing fluid inventory inside tanks
- Managing by exception
- Inconsistent prioritization of trucking schedules

Solution

- Seek Industrial Evolution to support
- Utilize PI System tools to manage fluid inventory
- Reports to support Fluid Management Best Practices

Results and Benefits

- Real time alerts
- Proactive instead of reactive
- Spill volume reduction by >50% annually

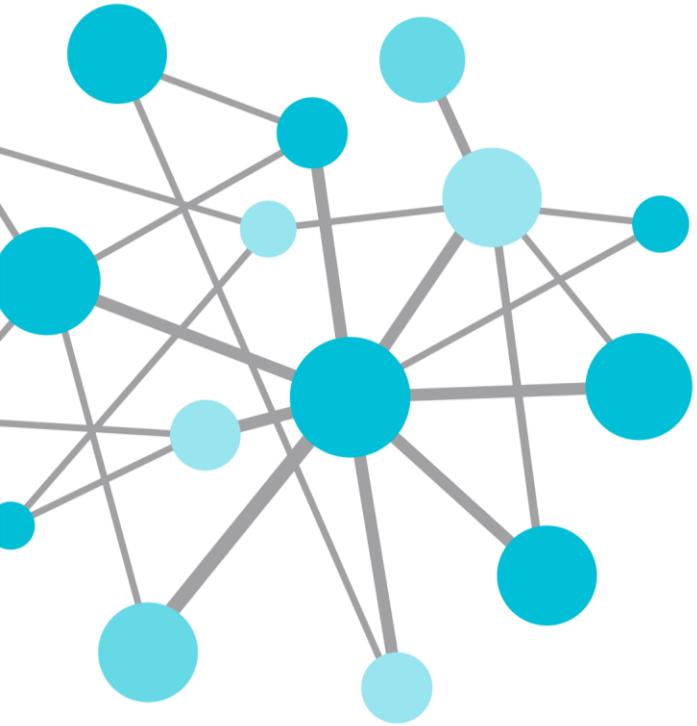
Future Plans and Next Steps

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

Questions

Please wait for the microphone before asking your question

Please state your name and your company



THANK YOU

Brought to you by OSIsoft.

Contact Information

Chad Roach

chad.roach@dvn.com

Production Foreman, Devon Energy

Jorge Wong

jorge.wong@dvn.com

Lead Systems Analyst, Devon Energy