MBE – Manage-By-Exception System

Keeping Track of the Changes

- An un-editable audit trail tracks all system and user actions.
- Each alert is tagged with a unique id number to aid identification.
- To aid in audit trail analysis, the audit trail may be exported to an external Excel spread sheet or database.

D	etroVue MBE												•		John S	- tal.
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▲	≡ Audit Trail												H ×	0	X •(0	Online
	<	A Offshor	e_Well_0	02												
•	► A Demo_Well_01	Date Range	: (4/25/2	2017 11:15 AM	1 - 5/9/2	017 11:15 AM 🝸)						4255 Items	•	Export	O Reset Fi	iters
	▶ Å Demo_Well_02 ▶ Å Demo_Well_03		_		_		_						_		-	
	► À ETP Well 01	Туре	7	Well	Â	Wellbore	Ŷ	Rule Name 🕅	Alert Id 🦷	Principal 7	Timestamp •	Rig 🕅	St	atus	V Detai	ils ‡
-	k ETP_Well_02	ruleupda	ted	Synthetic,	Data2	Synthetic_Data2		Sine1		appleseedj	5/5/2017 1:39 PM			Success		1
٠	▶ <u>Å</u> ETP_Well_03	rulestopp	ped	Synthetic	Data2	Synthetic_Data2		Sine1		appleseedj	5/5/2017 1:39 PM			Success		-1
	► <u>Å</u> New_Well_01	alertstatu	uschang	e Synthetic,	Data2	Synthetic_Data2		Sine1	4f690acb-50da	System	5/5/2017 1:39 PM			Success	•	
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	► À Test_Well_A	acknowle	edgeme.	Synthetic	Data2	Synthetic_Data2		Sine1	026d9f69-bc2d	wongt	5/5/2017 1:39 PM			Success		
	► Â Test_Well_B	acknowle	edgeme.	Synthetic	Data2	Synthetic_Data2		Sine1	a2e3f4c6-f566-4	wongt	5/5/2017 1:39 PM			Success		
	▶ ĝ Test_Well_C ▶ ĝ ZMap_Well_01	acknowle	edgeme.	Synthetic,	Data2	Synthetic_Data2		Sine1	c367f04d-dc89	kramerb	5/5/2017 1:39 PM			Success		
	► A ZMap_Well_02	acknowle	edgeme.	Synthetic	Data2	Synthetic_Data2		Sine1	68e18e34-3495	kramerb	5/5/2017 1:39 PM			Success		
	► Å ZMap_Well_03	acknowle	edgeme.	Synthetic	Data2	Synthetic_Data2		Sine1	4458490e-a9ef	kramerb	5/5/2017 1:39 PM			Success		
		alertcrea	te	Synthetic	Data2	Synthetic_Data2		Sine1	4f690acb-50da	System	5/5/2017 1:38 PM			Success		
		alertstatu	uschang	e Synthetic	Data2	Synthetic_Data2		Sine1	96608500-7b12	System	5/5/2017 1:38 PM			Success		
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The audit trail tracks the action of each alert, well, wellbore and acknowledgement

About Petrolink $\langle \bullet \rangle$

Petrolink provides wellsite data management, real-time data solutions, engineering analytics and drilling optimization services to the upstream oil and gas industry worldwide. Petrolink offers unmatched security and an independent neutral link across the oilfield, data sources, disciplines and partners to enhance drilling operations' efficiency and safety.

MBE – Manage-By-Exception System

Alerts you need, when and where you need them $\langle \frown \rangle$

Operators have numerous wells that need to be monitored at all times. Paying attention to each screen and which items are most important to resolve can be unmanageable. The result is alert overload.

The MBE system is the next generation alerting application designed to increase the user's effectiveness by prioritizing the alerts received. The system allows the user to set-up rules to constantly monitor a specified condition, and then permits the user to select and prioritize the resulting alerts they wish to receive, reducing alert overload.

Paying attention to what's truly important

MBE constantly monitors the condition of the rule and then raises only the resulting priority alert to exactly the right person, relieving alert overload and ensuring people are paying attention to only what's really important.

	ë 🕯	John Smith
	Notifications: 7	x
Severity ^	Filter Y Search for Filter a particular exception	Q)
High		
Low	Rig A/Test_Wel_A	9:46:14 AM
Medium	High Torque - Low RPM	9790.19700
Undefined	Alert! Bitdepth: 3580 - Holedepth: 3579 - Rigstate: drilling	•
Very High		ದಿ ಭ 🔩
Priority 🗸		
Classification	Rig A/Test_WelL_A	9:45:28 AM
	High DLS Current Bitdepth: 3579	•
Drilling Optimization	Current Disciplit. 337 9	4 10 12
Engineering		<u> </u>
Geosteering	Rig A/Test_Well_A	9:44:19 AM
Wells ^	High DLS	0
well Q	Current Bitdepth: 3579	
	 Acknowledged (By John Smith) 	छ 🗢
Demo_Well_01		9:41:13 AM
Demo_Well_02	Rig A/Test_Well_A High Torque - Low RPM	9:41:13 AM
Demo_Well_03 ETP. Well_01	Alerti Bitdepth: 3579 - Holedepth: 3579 - Rigstate: drilling	0
ETP_Wel_01		0 to 🖓
ETP_Well_03		
New_Well_01	Rig A/Test_WelL_A	9:40:48 AM
New_Well_02	Microstalled Motor Current Bitdepth: 3579	•
New_Well_03	Acknowledged (By John Smith)	छ 字
Offshore_Well_01 Offshore_Well_02	-	~ ~
Offshore_Well_02	Rig A/Test_Well_A	9:37:53 AM
Test_Well_A	High Torque - Low RPM	0
Test_Well_B	Alert! Bitdepth: 3579 - Holedepth: 3579 - Rigstate: drilling	
Test_Well_C		0 10 1
ZMap_Well_01	Rig A/Test_WelLA	9:36:34 AM
ZMap_Well_02 ZMap_Well_03	Ng A/Testwella Mud Losses	9.35.34 AM
zmap_wei_us	BPOS is currently 50	•
		6 번 모

The alert activity stream helps the user work smarter



Intelligent Solutions for Today's Data Challenges

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- Alerts are distributed to all global users, are viewable to
 - online users and sent via email and SMS text to
 - out-of-office personnel.
- An alert activity stream brings the mission critical and
 - related drilling conditions, front and center improving the user's situational awareness.
- MBE generates notifications on predictive alerts and events and includes a display link providing detailed analysis.



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MBE – Manage-By-Exception System

Globally Versatile $\langle \bigcirc \rangle$

Built to provide critical alerting information to globally located users, MBE conducts condition monitoring of rig operations and drill string sensor data once it arrives at the point of aggregation.

- The MBE system is a cloud-based application allowing access to any global user with internet and the right permission.
- Provides near-instantaneous notification of alerts to the rig, Real-Time Operations Center RTOC, and back office personnel.

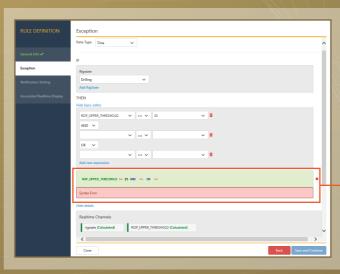
troVue MB											à	ol 🚯	Ĭ
■ Alert Status											4× 0	×	
Search by name		6	Historical Mode									🖸 Re	e
Name	Rig 🕅	Well	T # of Instances	Severity • 🕅	Eval Time	Domain	T	Acknowledged at	Acknowledged by	Status			
Torque - RPM Rule	Rig B	Synthetic_Data	1	Very High	3/1/2017 4:13 AM	Domain 3		3/2/2017 10:18 AM	appleseedj	Raised Ack		g 📫	
Sine2	Rig C	Synthetic_Data	1	Very High	3/15/2017 11:50 PM	Domain 1		3/16/2017 10:41 AM	appleseedj	Raised Ack		12 🗆	
High Pressure	Rig A	Test_Well_A	1	Very High	3/9/2017 8:16 PM	Domain 1				Raised	ć] ② □	
New Gamma Rule	Demo Rig	Demo_Well	32	High	3/15/2017 6:59 PM	Domain 1				Lowered	ć) Ø 🗆	
Hookload	Rig A	Test Well A	1	High	3/9/2017 8:16 PM	Domain 1		3/13/2017 5:00 PM	conradb	Raised Ack		ଷ 🗗	
	-	Test_weit_A		riigii	37572017 0.1011	D O I I I O I I I O I I		5,15,2017 51001111	oomaab	Naised Char		× ~	
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In addition to recording an acknowledgement, comments may be added to make note of specific conditions and to advise the global team

State-of-the-Art Technology

Combines proprietary software, WITSML and the first ever deployment of the advanced Energistics Transfer Protocol – ETP.

- Implements HTML5 for a wider compatibility between browsers and devices.
- The constant data stream of ETP results in a lower bandwidth allocation providing near instant access to drilling performance and downhole data.



Rule Creation Made Easy $\langle \bigcirc$

- Rules may be created in advance without a well or wellbore assignment. This allows the user to create and test the rules in advance, saving time and improving accuracy once drilling commences.
- assign a rule to any number of wells and wellbores.
- Considering that some formulas may contain proprietary intellectual property, the MBE system enables the rules to be shared without divulging the formula behind the rule.
- This allows the system to compartmentalize the proprietary data while delegating the workload.



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Rule creation includes an expression inspector

MBE includes a Develop-Once-Use-Many strategy to rule creation by adding the ability to



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