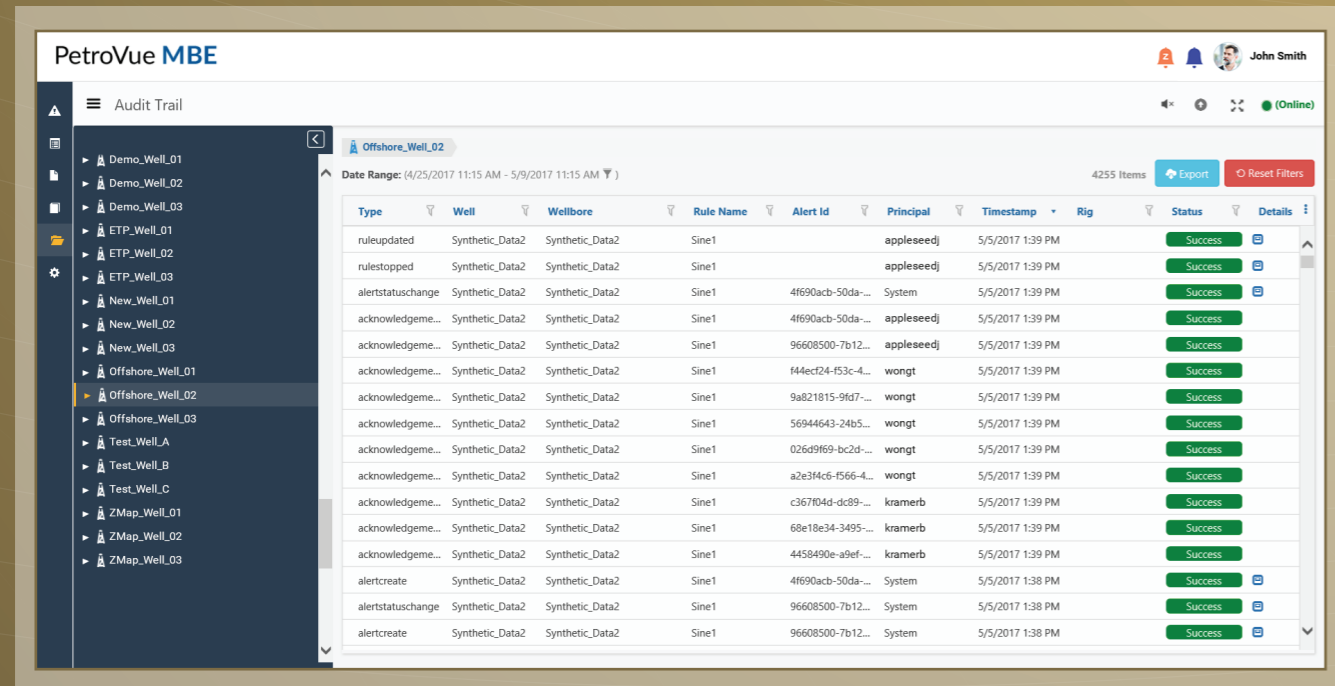


# MBE – Manage-By-Exception System

## 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.



Type	Well	Wellbore	Rule Name	Alert Id	Principal	Timestamp	Rig	Status	Details
ruleupdated	Synthetic_Data2	Synthetic_Data2	Sine1		appleseedj	5/5/2017 1:39 PM		Success	
rulestopped	Synthetic_Data2	Synthetic_Data2	Sine1		appleseedj	5/5/2017 1:39 PM		Success	
alerstatuschange	Synthetic_Data2	Synthetic_Data2	Sine1	4f690acb-50da...	System	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	4f690acb-50da...	appleseedj	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	96608500-7b12...	appleseedj	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	f44ecf24-f53c-4...	wongt	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	9a821815-9fd7...	wongt	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	56944643-24b5...	wongt	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	026d9f69-bc2d...	wongt	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	a2e3f4c6-f566-4...	wongt	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	c367f04d-dc89...	kramerb	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	68e18e34-3495...	kramerb	5/5/2017 1:39 PM		Success	
acknowledgeme...	Synthetic_Data2	Synthetic_Data2	Sine1	4458490e-a9ef...	kramerb	5/5/2017 1:39 PM		Success	
alertcreate	Synthetic_Data2	Synthetic_Data2	Sine1	4f690acb-50da...	System	5/5/2017 1:38 PM		Success	
alerstatuschange	Synthetic_Data2	Synthetic_Data2	Sine1	96608500-7b12...	System	5/5/2017 1:38 PM		Success	
alertcreate	Synthetic_Data2	Synthetic_Data2	Sine1	96608500-7b12...	System	5/5/2017 1:38 PM		Success	

The audit trail tracks the action of each alert, well, wellbore and acknowledgement

## About Petrolink

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

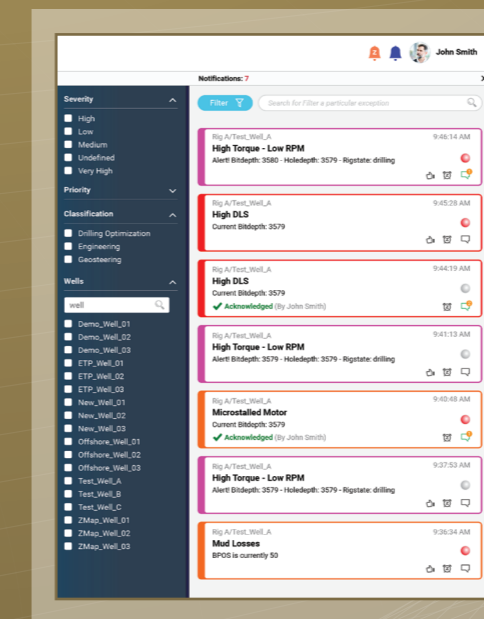
## Alerts you need, when and where you need them

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.



The alert activity stream helps the user work smarter

- 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.



# MBE – Manage-By-Exception System

## Globally Versatile

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.

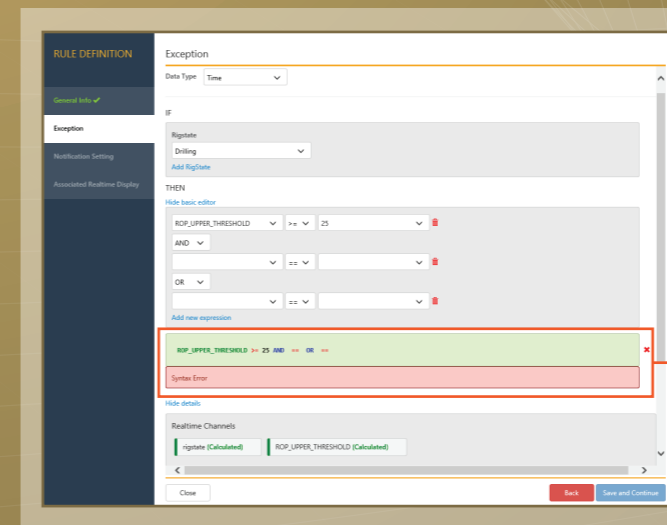
Name	Rig	Well	# of Instances	Severity	Eval Time	Domain	Acknowledged at	Acknowledged by	Status
Torque - RPM Rule	Rig B	Synthetic_Data	1	Very High	3/1/2017 4:13 AM	Domain 3	3/2/2017 10:18 AM	appleseedj	Raised Ack
Sine2	Rig C	Synthetic_Data	1	Very High	3/15/2017 11:50 PM	Domain 1	3/16/2017 10:41 AM	appleseedj	Raised Ack
High Pressure	Rig A	Test_Well_A	1	Very High	3/9/2017 8:16 PM	Domain 1			Raised
New Gamma Rule	Demo Rig	Demo_Well	32	High	3/15/2017 6:59 PM	Domain 1			Lowered
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
Warning! Hookload is currently : 272.24 kib									
<b>COMMENTS</b> Team, note the Hookload number, please look further into this! Posted at 3/13/2017 10:07 PM by acronah/Petrolink									
DLS Rule	Rig C	Demo Well A01	11	Medium	3/16/2017 11:59 AM	Domain 1			Raised
BPOS Alert	Rig A	Test_Well_A	2	Medium	3/9/2017 10:13 AM	Domain 1	3/9/2017 10:52 AM	wongt	Raised Ack
synthetic test2	Rig E	Synthetic_Data	932	Low	3/15/2017 11:50 PM	Domain 1			Raised
MissingAuditChannel	Rig F	Requests_Well	1	Low	3/8/2017 6:27 PM	Domain 1	3/9/2017 5:36 PM	conradb	Raised Ack
LKV Sine - Test 2	Rig B	Synthetic_Data	2	Low	3/9/2017 10:05 AM	Domain 1	3/9/2017 4:32 PM	wongt	Raised Ack

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 Energetics 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 includes an expression inspector

## Rule Creation Made Easy

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