JOYN
OIL & GAS PRODUCTION

User Manual for APBE Functions

CONTENTS

NDayAvg(V,N)

Description:

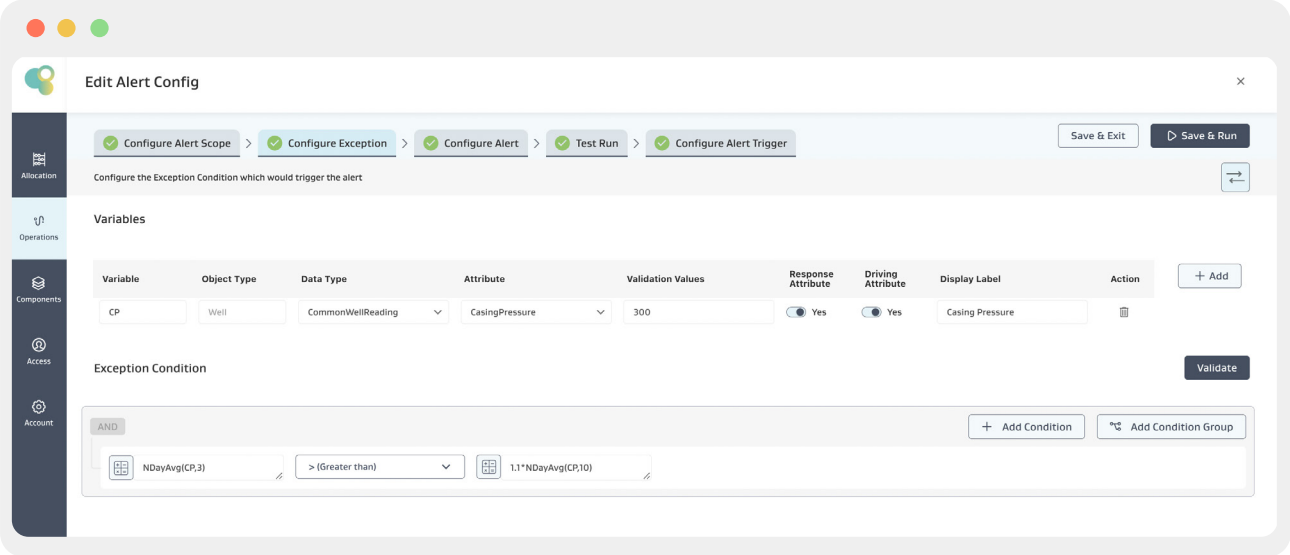
The Average value of the Variable (V) is calculated using all the available Readings in the **"Last N Days."**

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Average Casing pressure over the past 3 **"Days"** is 10% more than that in the past 10 "Days."

Exception Condition: The below Exception Condition shows the syntax and logic used



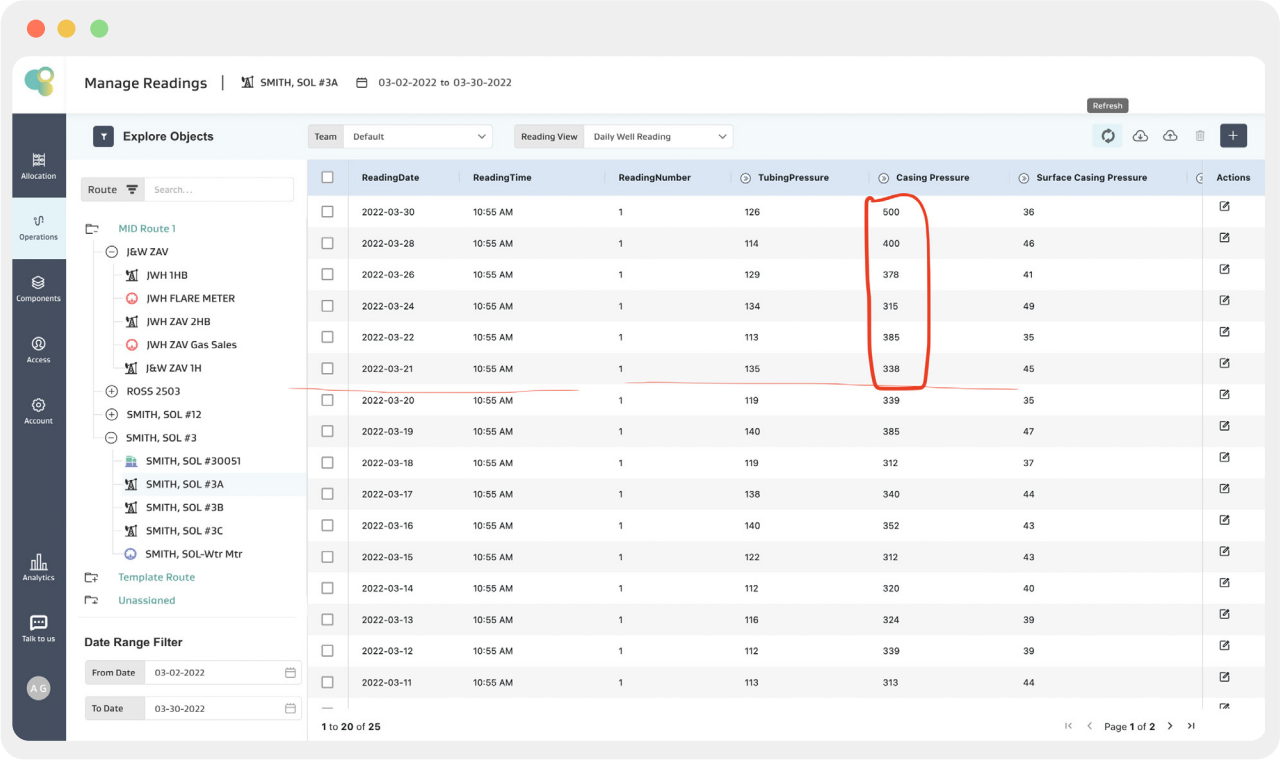
Mathematical logic:

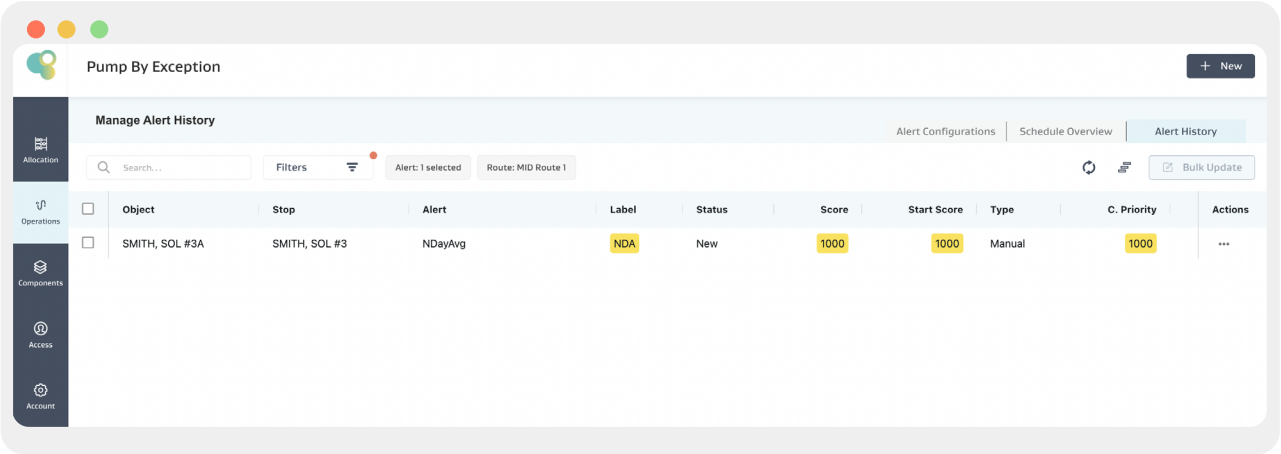
On the Well SMITH, SOL #3A

Given the last 3 Days only have 2 readings available, the 30th and 28th March Readings, only these two readings are used to calculate the Average over the past 3 days, i.e., **(500+400)/2 = 450**

Given the last 10 Days only have 6 readings available, only these 6 readings are used to calculate the Average over the past 10 days, i.e., **(500+400+378+315+385+338)/6 = 386**

Given **450 > 1.1*386 = 424.6**, the condition is satisfied, and an alert for SMITH, SOL #3A Well is created as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true

- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression. E.g., If we are using NDayAvg(CP,10) and we have only 6 days of data, we compute the Average of 6 Days and not 10 Days.

- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

NReadingAvg(V,N)

Description:

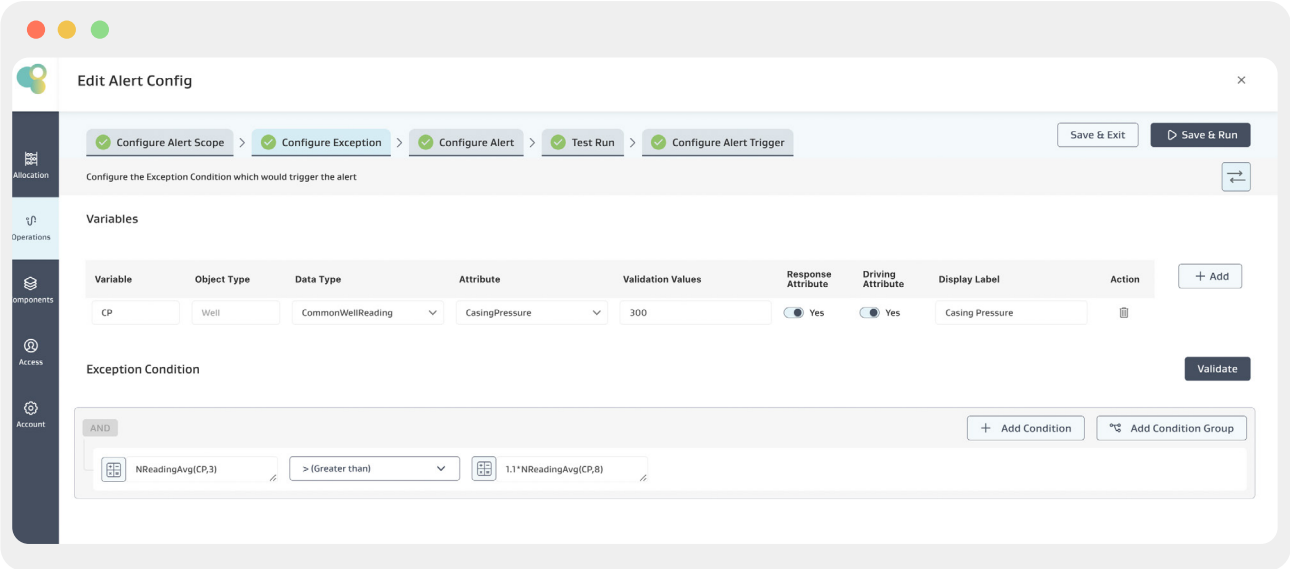
Returns the Average value of the Variable **(V)** fetched from the last N available **"Readings"** on the object, irrespective of the days

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Average Casing pressure over the past 3 **"Readings"** is 10% more than in the past 8 **"Readings."**

Exception Condition: The below Exception Condition shows the syntax and logic used

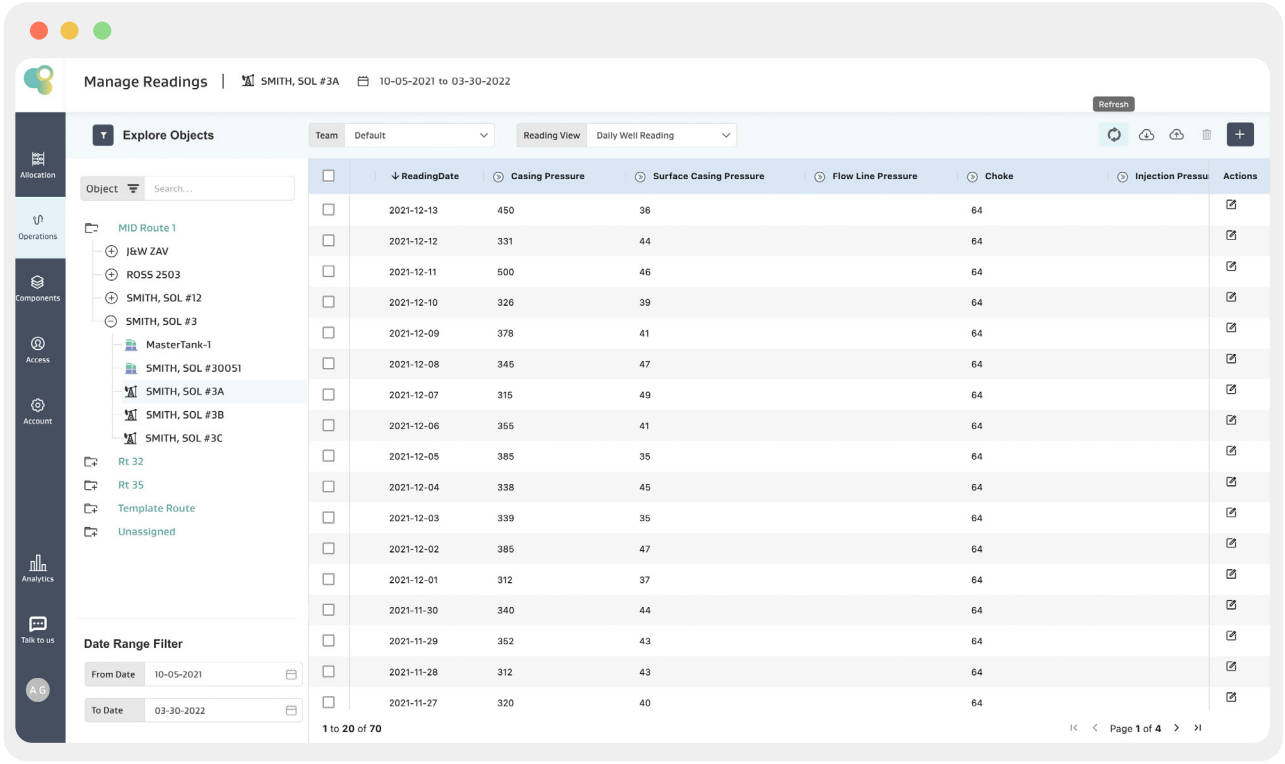


Mathematical logic:

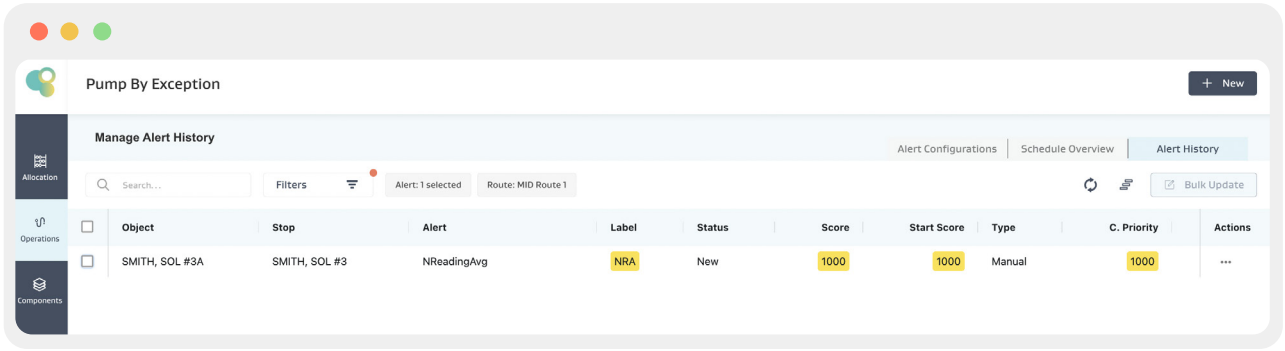
On the Well SMITH, SOL #3A:

Last 3 Readings Average is: (450+331+500)/3 = 427

Last 8 Readings Average is: (450+331+500+326+378+345+315+355)/8 = 375



Given that the Last 3 Reading Average of Casing Pressure is greater than 1.1 times the 8 Reading Average of Casing Pressure, the condition is satisfied, and an alert for SMITH, SOL #3A Well, is created, as shown below.



Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped. However, the expression is evaluated for other objects, and an alert is generated if the condition is true.

- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression. E.g., If we are using NReadingAvg(CP,7) and we have only 5 readings overall, we compute the average of 5 and not 7.

- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

PercentDeviationFromAvg(V,N)

Description:

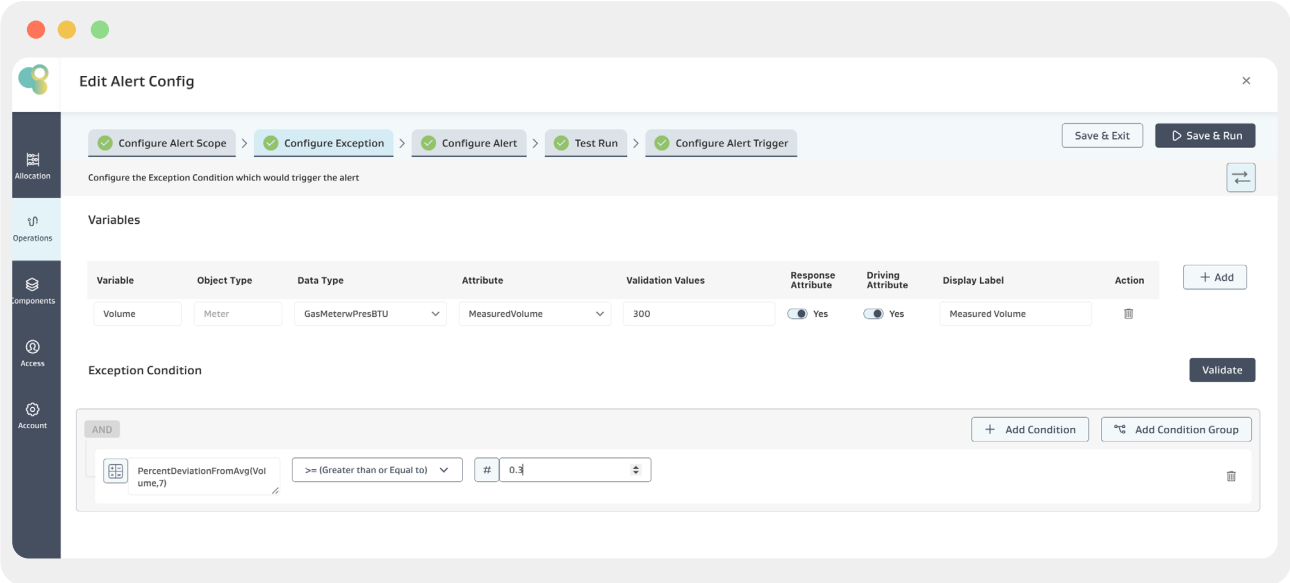
Returns the Percentage Deviation of the Current Reading (or Last Available Reading) of the Variable **(V)** with the average of the last N available **"Readings"** on the object

Input: V (Decimal) , N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an alert when the Percentage Deviation of the "Current Reading" is more than 30% of the average of the last 7 readings

Exception Condition: The below Exception Condition shows the syntax and logic used

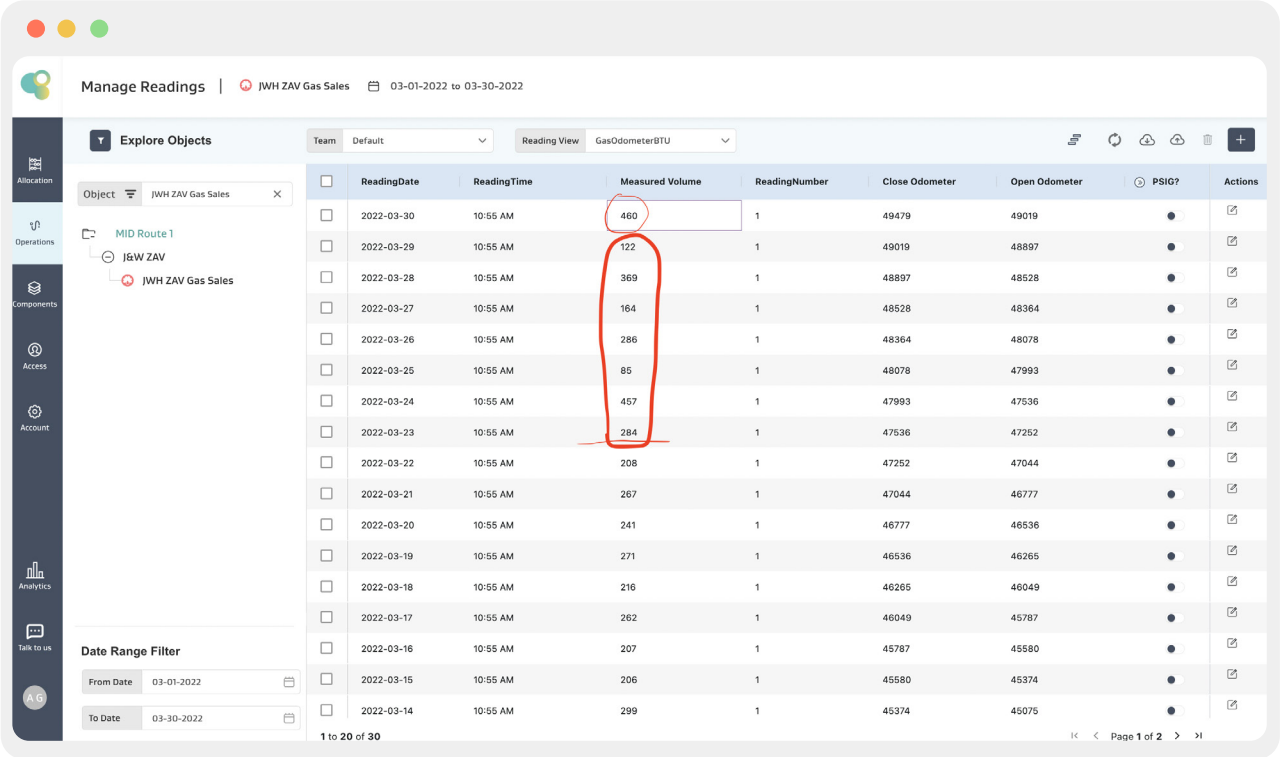


Mathematical logic:

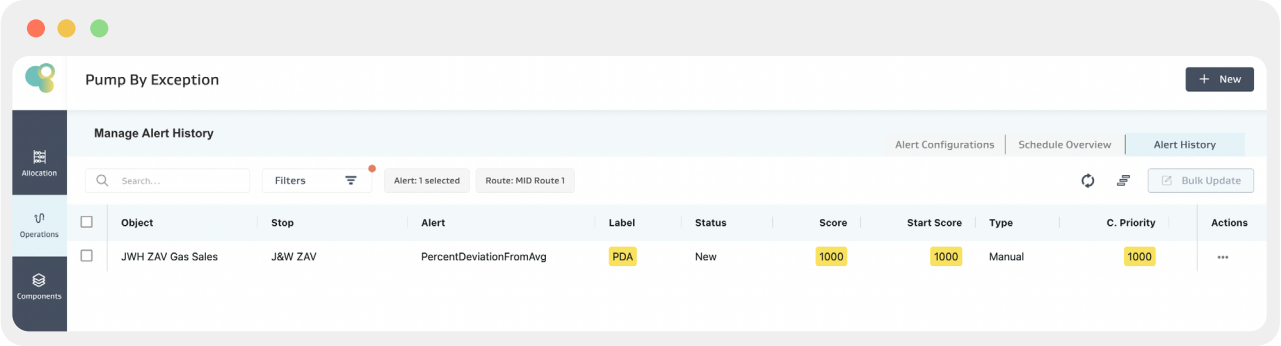
On JWH ZAV Gas Sales Meter

Current Reading: 460

Last 7 readings average: (122+369+164+286+85+457+284)/7 = 252.42



Given (Current Reading- Average of 7 Readings)/Average of 7 Readings = (460-252.42)/252.42 = 0.82, which is more than 0.3, i.e., 30%, the condition is satisfied, and an alert is created on the meter as shown below



Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped. However, the expression is evaluated for other objects, and an alert is generated if the condition is true.

- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression. E.g., If we are using PercentDeviationFromAvg(Volume,10) and we have only the current Reading and 5 other readings overall, we compute the average of 5 and not 10 readings.
    - The percent Deviation function requires a minimum of 1 reading apart from the Current Reading. If that is also unavailable, the expression evaluation fails, and the object is skipped.
    - If the average of the last N readings is zero, then the expression evaluation fails, and the object is skipped.

- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

IsNull(V)

Description:

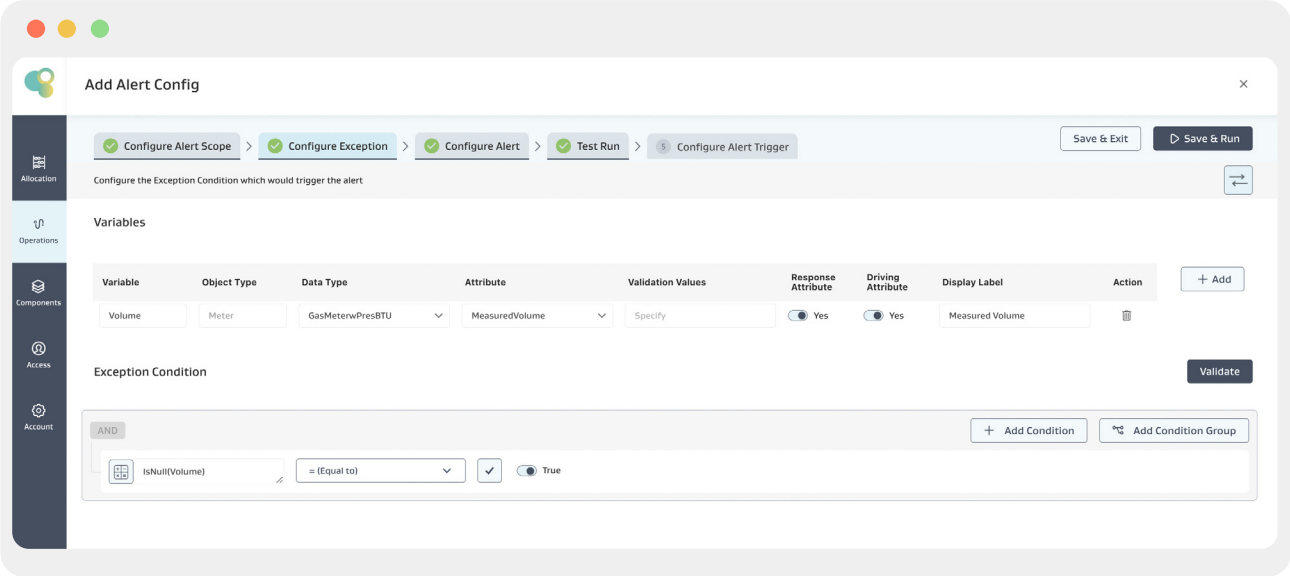
Checks whether the last available Reading on the object for Variable (V) is NULL or not and returns True/-False Value

Input: V (Decimal, Date, Picklist) , Output: True/False

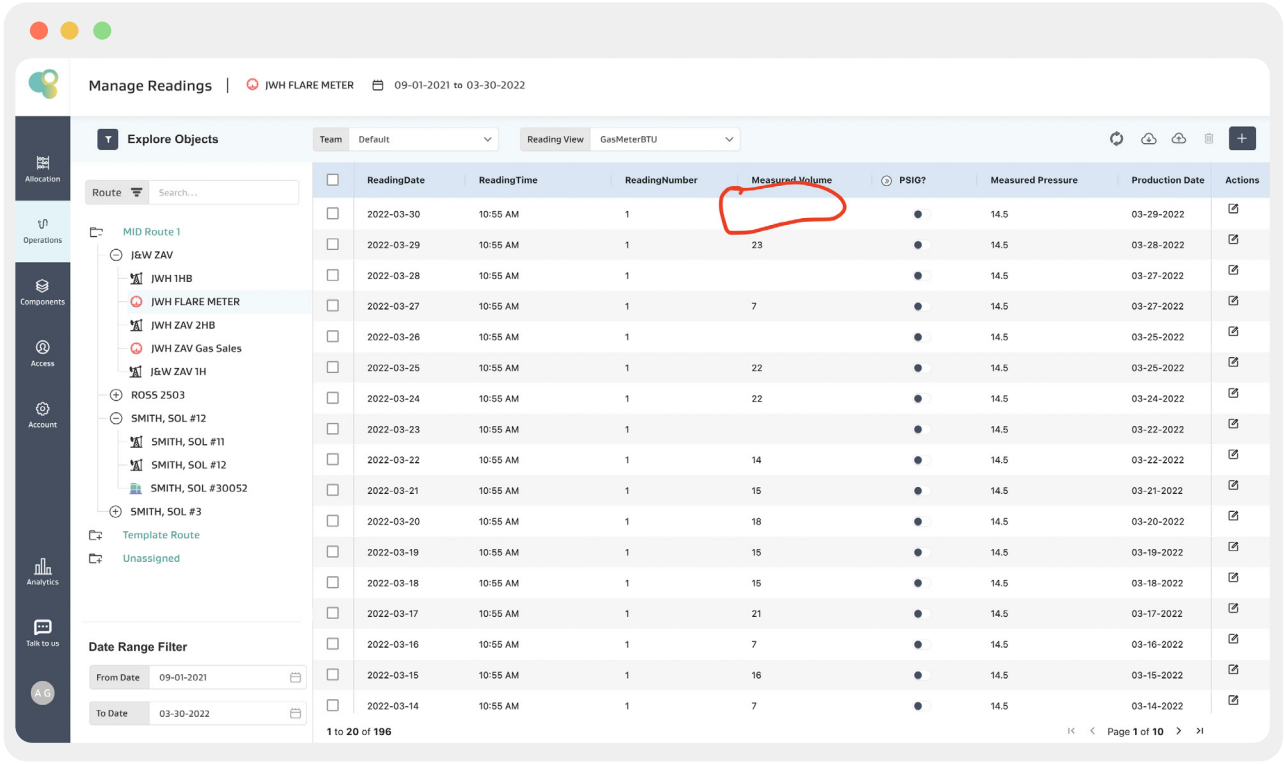
Example:

Alert Requirement: Show an alert when the Last Available “Measured Volume” Reading is NULL on a meter in the selected routes

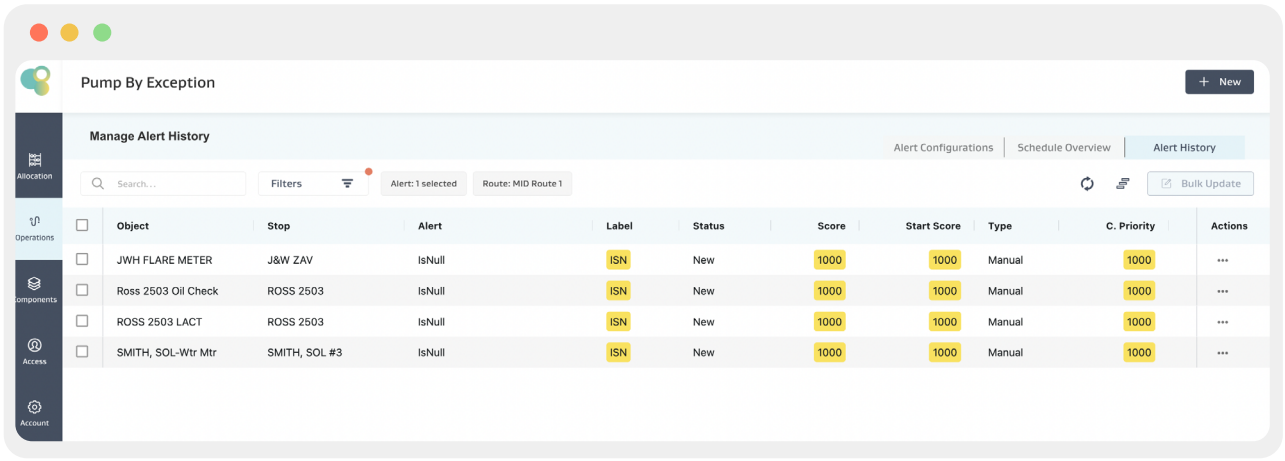
Exception Condition: The below Exception Condition shows the syntax and logic used



Given that the Last Available Reading for the JWH Flare Meter is March 30th, and the measured volume is NULL, the condition is satisfied, and an alert is created for all meters on which this condition is true.



All meters with NULL Values are shown below:



NDayVariance(V,N)

Description:

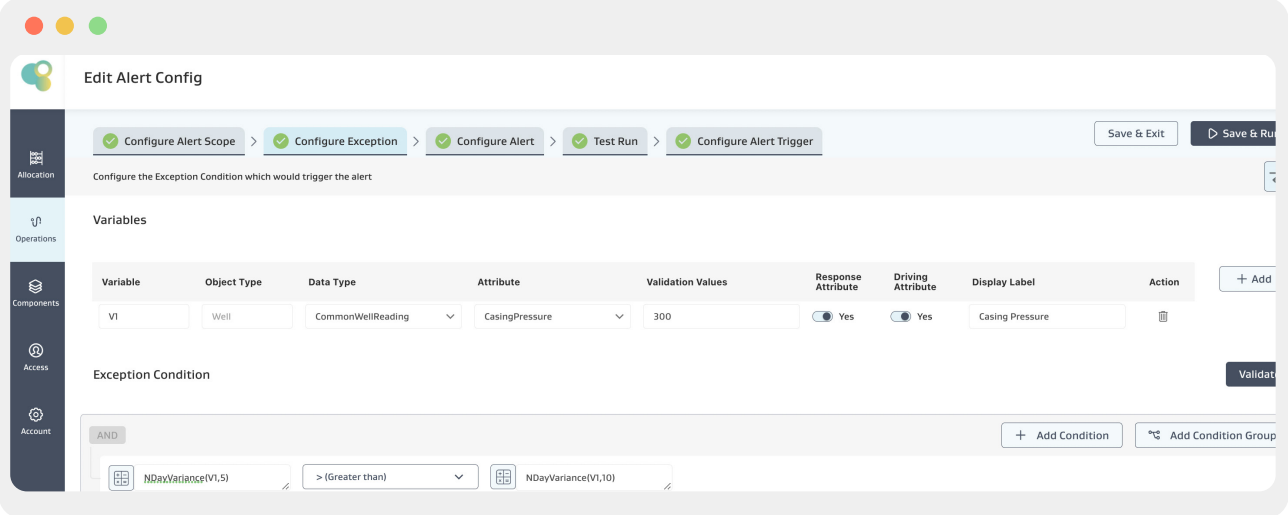
The Variance of values of the Variable **(V)** fetched from all the available Readings in the **"Last N Days"** using 'population variance' for this function.

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when Variance of Casing pressure over the past 5 **"Days"** is greater than the past 10 **"Days."**

Exception Condition: The below Exception Condition shows the syntax and logic used



Mathematical logic:

On the Well SMITH, SOL #3A

Assuming Current Date as March 30th. Given the last 5 Days only have 3 readings available, 30th, 28th, 26th March Readings, then only those 3 readings are used to calculate the Variance over the past 5 days, i.e., 500, 400, 350

Variance is calculated as Summation of $((X_i - Mean)^2)/N$

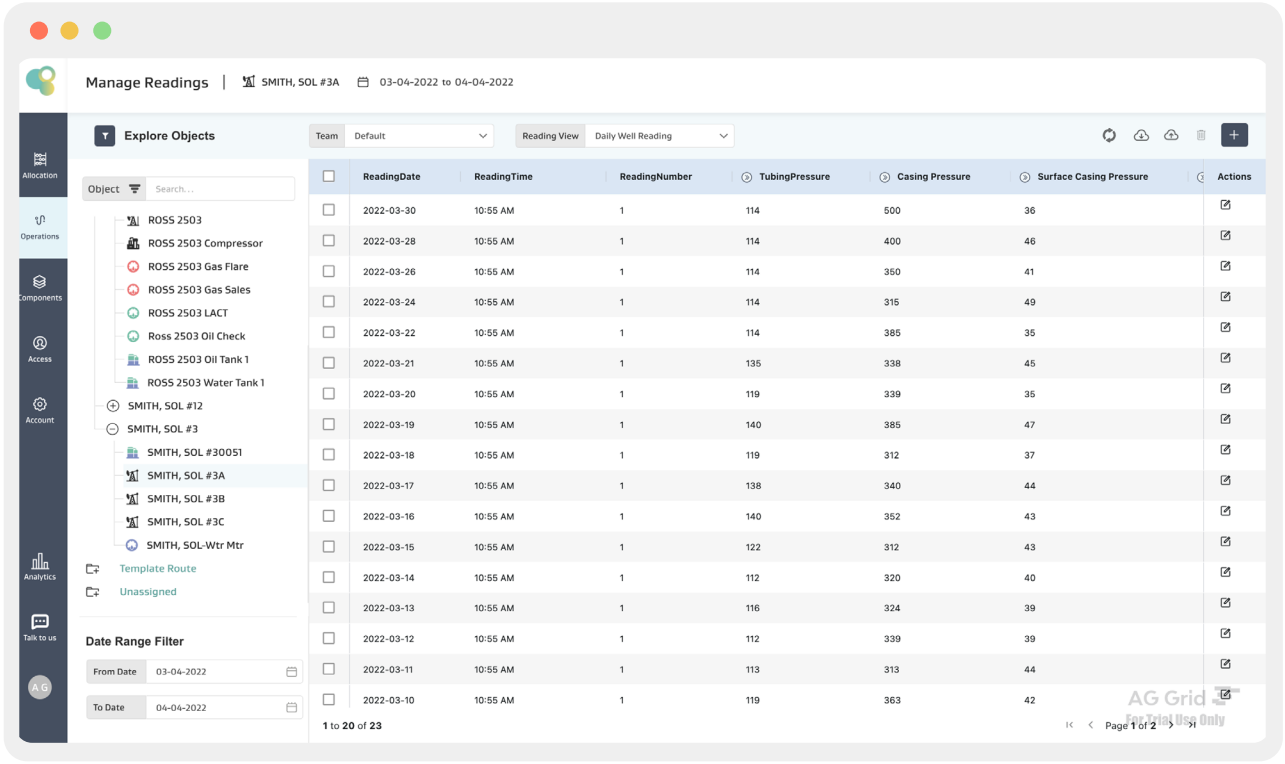
where X_i are the readings, Mean is the Average of those readings, and N is "Number of Days"

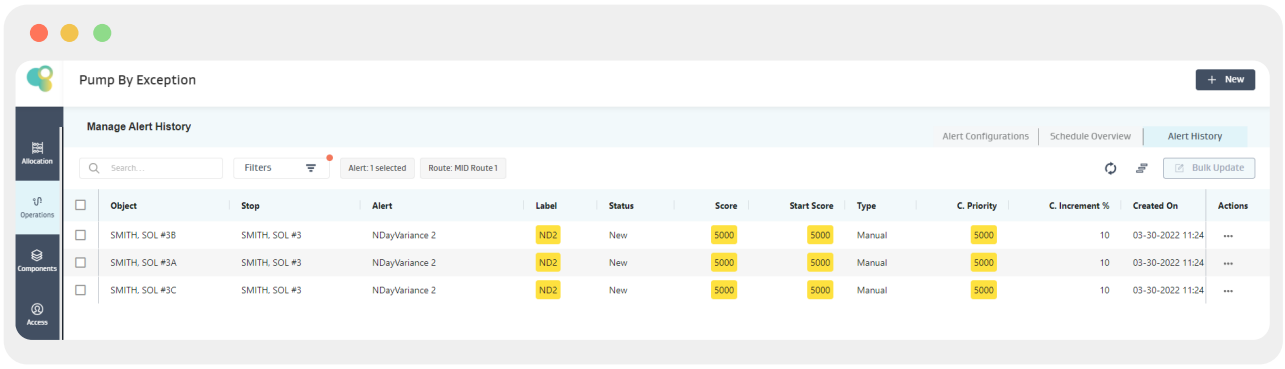
For the given data, Mean = (500+400+350)/3 = 416.67,

Variance = $((500-416.67)^2 + (400-416.67)^2 + (300-416.67)^2)/3 = 3888.88$

Given the last 10 Days only have 6 readings available, then only those 6 readings are used to calculate the Variance over the past 10 days, i.e., (500,400,350,315,385,338) Variance = 3617.22

Given 3888.88 > 3617.22, the condition is satisfied, and an alert is created for the SMITH, SOL #3A Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true

- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression. E.g., If we are using NDayVariance(CP,10) and we have only 6 days of data, we compute the Variance of 6 Days and not 10 Days.

- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

NReadingVariance(V,N)

Description:

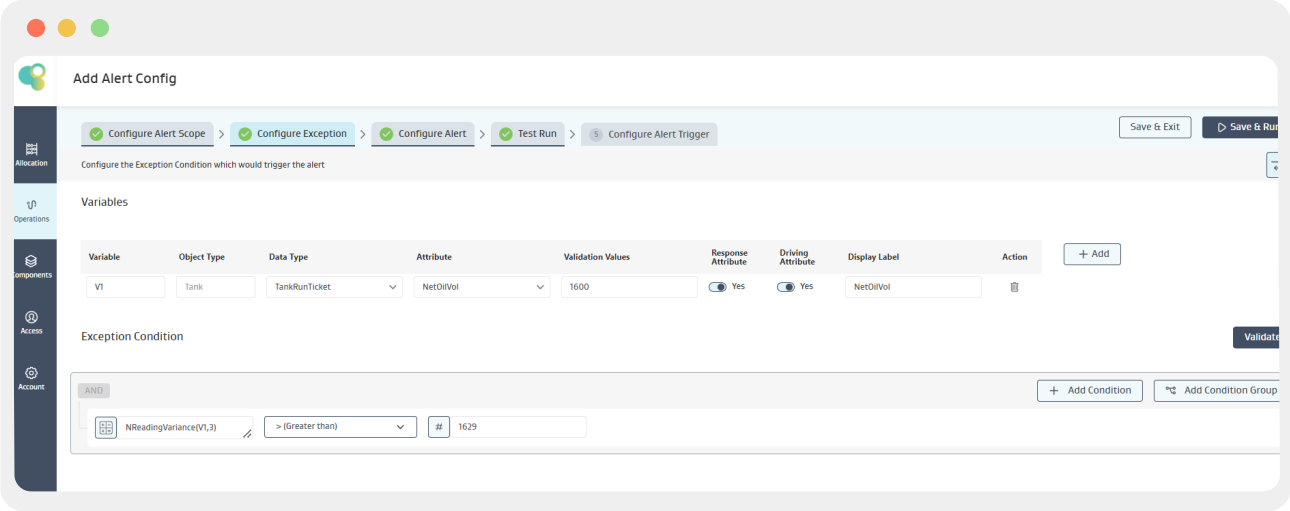
The Variance of values of the Variable **(V)** fetched from the "Last N Available Readings" using 'population variance' for this function.

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when Standard Deviation over the past **3 "Readings"** is Greater than **1629**

Exception Condition: The below Exception Condition shows the syntax and logic used



Mathematical logic:

On the tank SMITH, SOL#30051

Given 3 readings available are captured, only these 3 readings are used to calculate of Variance irrespective of the date, i.e., 153.816, 219.829, 123.053

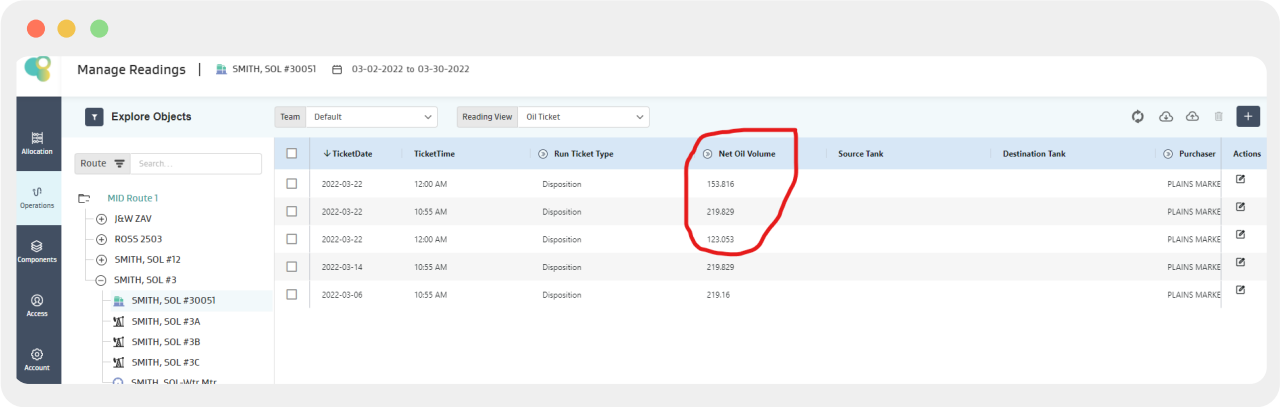
Variance is calculated as Summation of $((X_i - Mean)^2)/N$

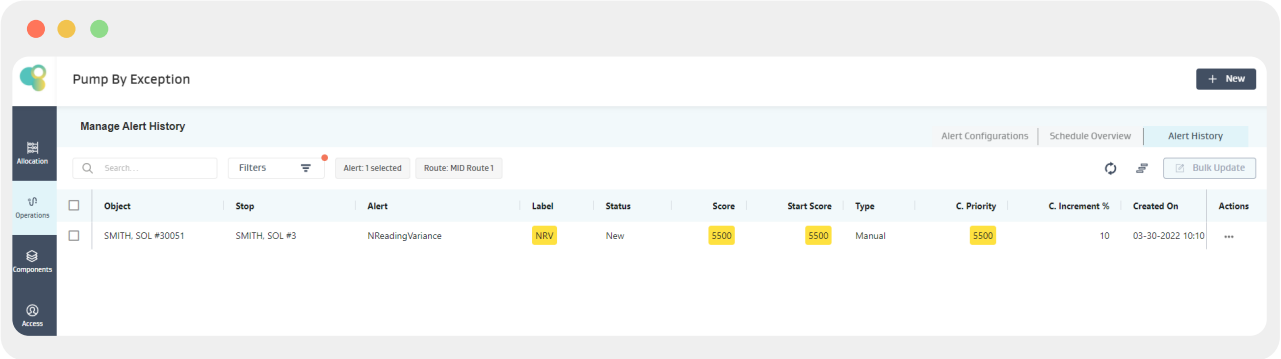
where X_i are the readings, Mean is the Average of those readings, and N is "Number of Readings"

For the given data, Mean = (153.816+219.829+123.053)/3 = 165.566

Variance = $((153.816-165.566)^2 + (219.829-165.566)^2 + (123.053-165.566)^2)/3 = 1629.9636$

Given 1629.9636 > 1629, the condition is satisfied, and an alert is created for the SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression. E.g., If we are using NReadingVariance(CP,10) and we have 6 readings, then we compute the Variance of 6 readings and not 10 Readings.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

NDayStdev(V,N)

Description:

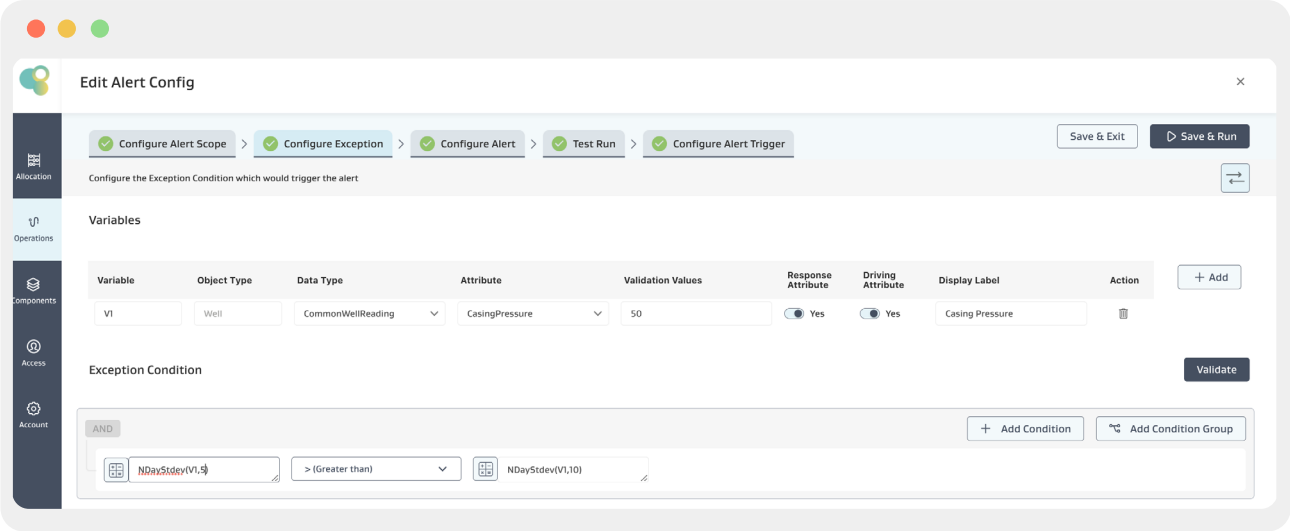
Standard Deviation of values of the Variable **(V)** fetched from all the available Readings in the "Last N Days" using 'population variance' for this function.

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when Standard Deviation of Casing pressure over the past 3 **"Days"** is less than that in the past 10 **"Days."**

Exception Condition: The below Exception Condition shows the syntax and logic used



Mathematical logic:

On the Well SMITH, SOL #3A

Assuming Current Date as March 30th. Given the last 5 Days only have 3 readings available, 30th, 28th, 26th March Readings, then only those 3 readings are used to calculate the standard deviation over the past 5 days, i.e., 500, 400, 350

Standard Deviation is calculated as "Square Root" of [Summation of $((X_i - Mean)^2)/N$] i.e Square Root of Variance

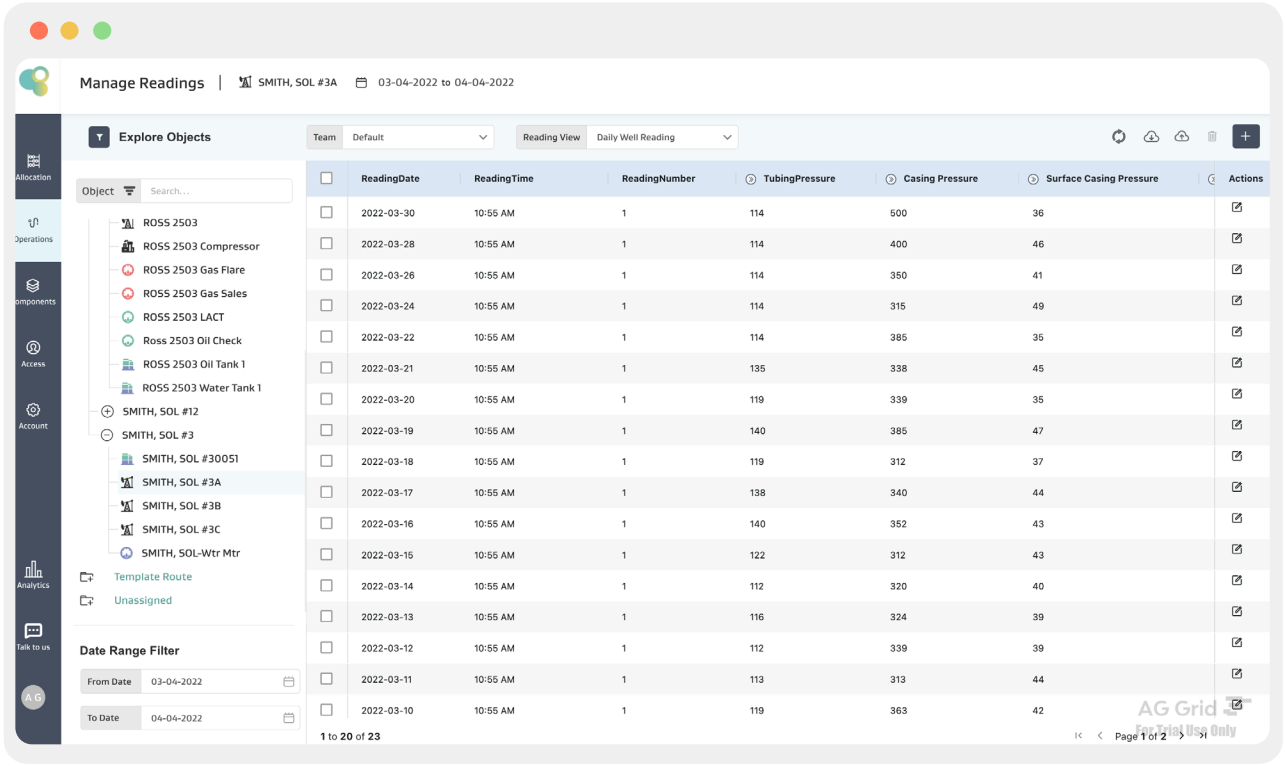
where X_i are the readings, Mean is the Average of those readings, and N is "Number of Days"

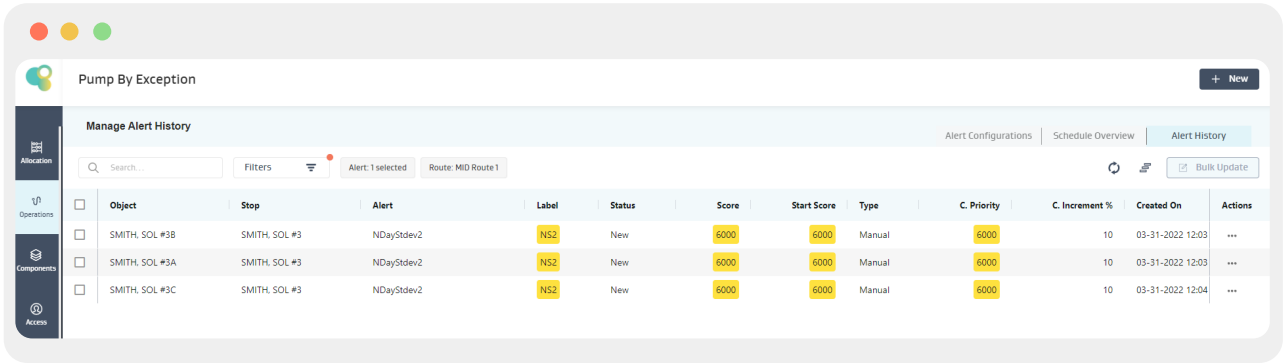
For the given data, Mean = (500+400+350)/3 = 416.67,

Standard Deviation = Square Root of $[((500-416.67)^2 + (400-416.67)^2 + (300-416.67)^2)/3]$ = 62.36

Given the last 10 Days only have 6 readings available, then only those 6 readings are used to calculate the standard deviation over the past 10 days, i.e., (500,400,350,315,385,338). Standard Deviation = 60.14

Given 62.36 >60.14, the condition is satisfied, and an alert is created for the SMITH, SOL #3A Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

NReadingStdev(V,N)

Description:

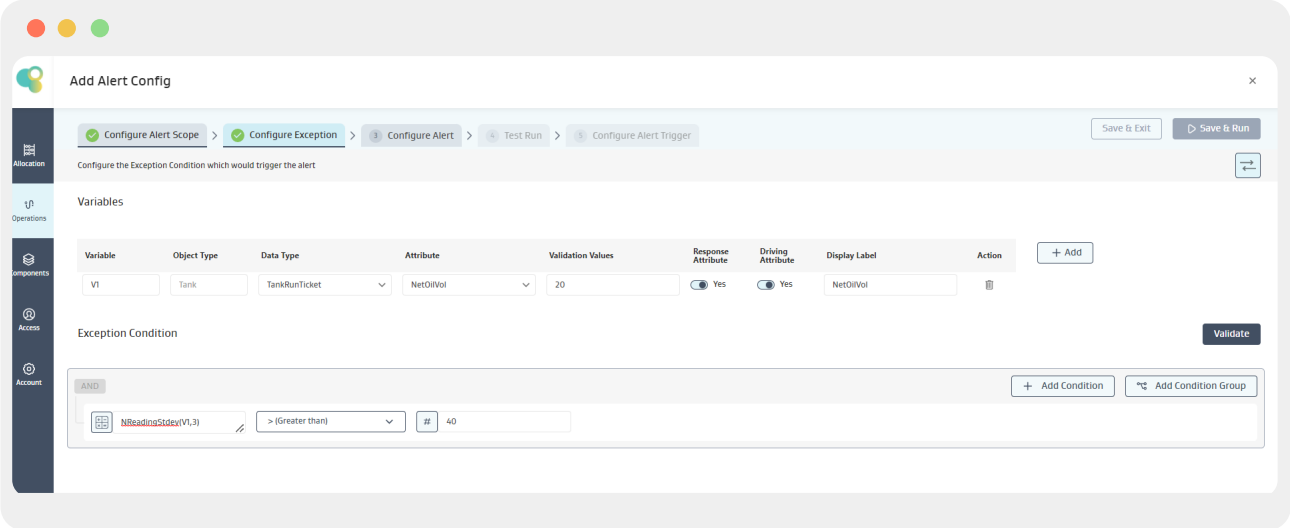
The Standard Deviation of values of the Variable ***(V)*** fetched from the "Last N Available Readings" using 'population variance' for this function.

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when Standard Deviation over the past 3 **"Readings"** is Greater than **40**

Exception Condition: The below Exception Condition shows the syntax and logic used



Mathematical logic:

On the tank SMITH, SOL#30051

Given only 3 readings are available for the last day of readings are reported, then only those 3 readings will are used to calculate the Standard Deviation, i.e., 153.816, 219.829, 123.053

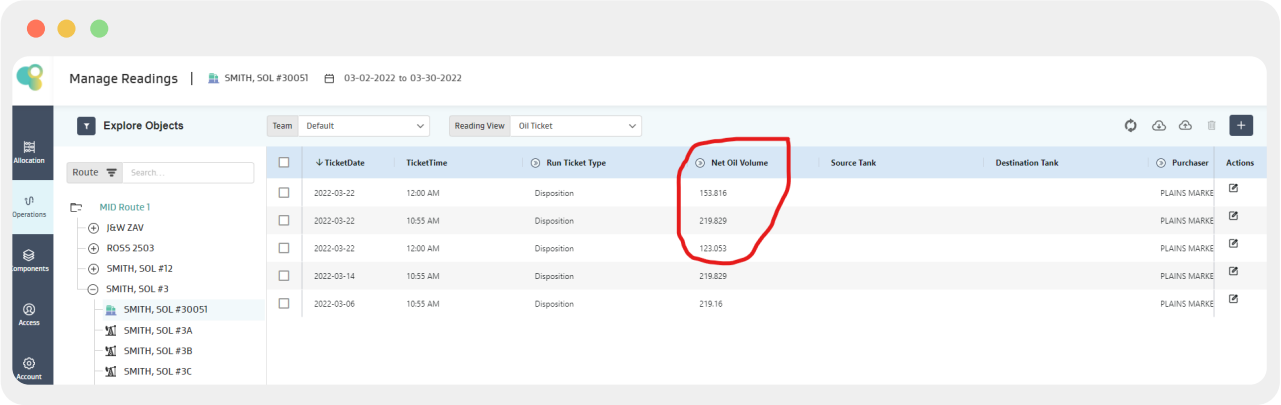
Standard Deviation is calculated as "Square Root" of [Summation of $((X_i - \text{Mean})^2)/N$] i.e Square Root of Variance

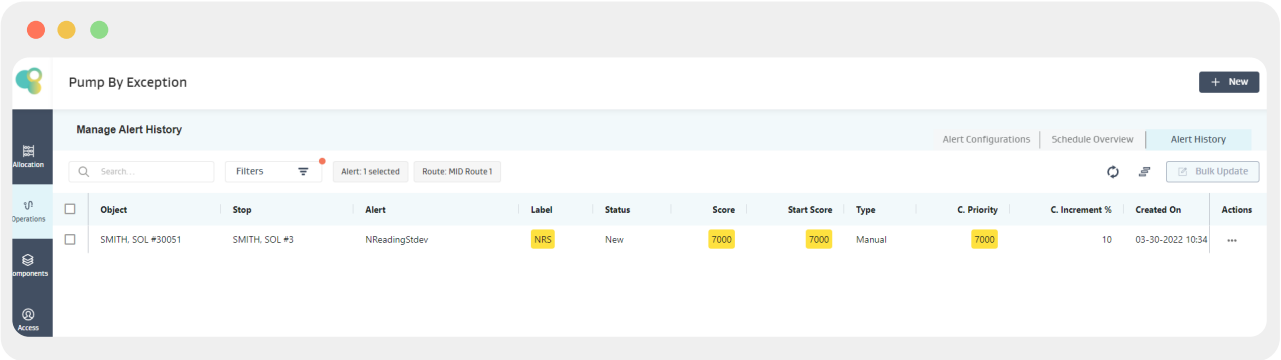
where X_i are the readings, Mean is the Average of those readings, and N is "Number of Readings"

For the given data, Mean = (153.816+219.829+123.053)/3 = 165.566

Standard Deviation = Square Root of $[((153.816-165.566)^2 + (219.829-165.566)^2 + (123.053-165.566)^2)/3]$ = **40.372808**

Given **40.372808 > 40**, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

MtdAvg(V)

Description:

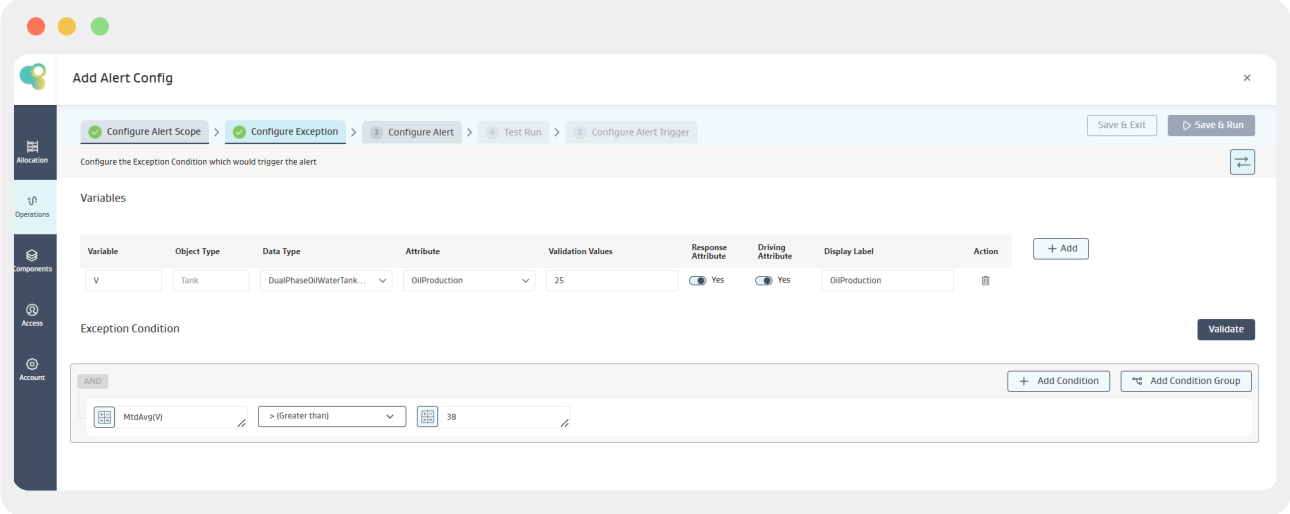
Average of values of the Variable **(V)** fetched from the Month Readings

Input: V (Decimal), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Average Oil Production for the **"Month"** is greater than 38

Exception Condition: The below Exception Condition shows the syntax and logic used

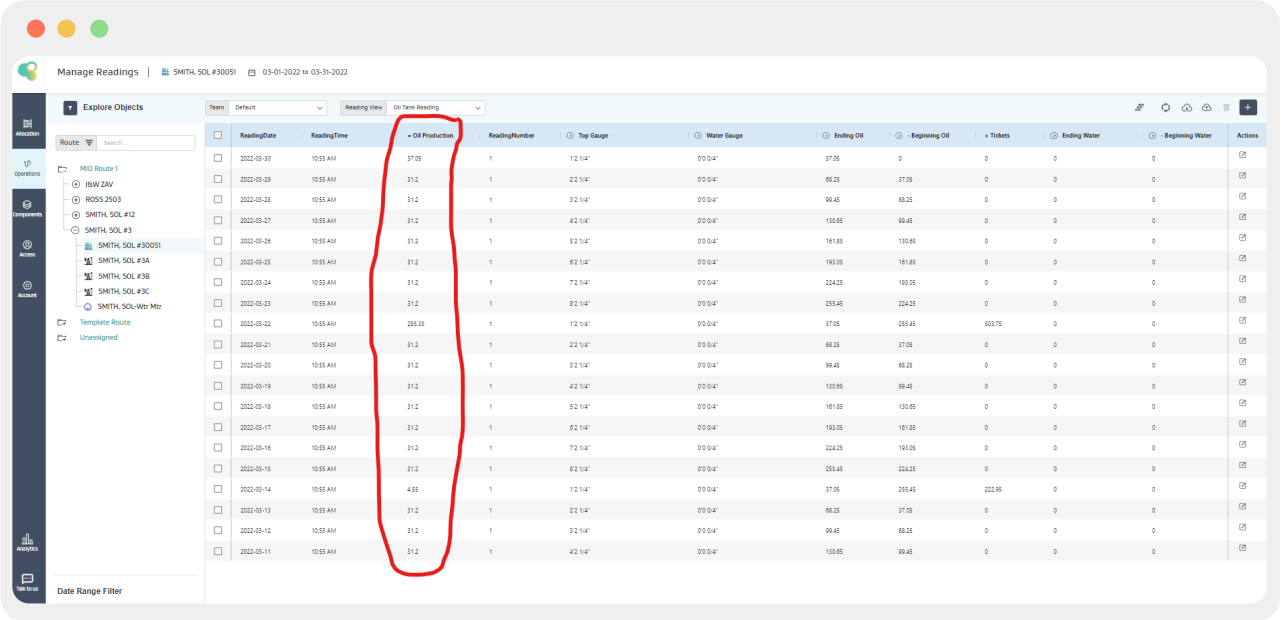


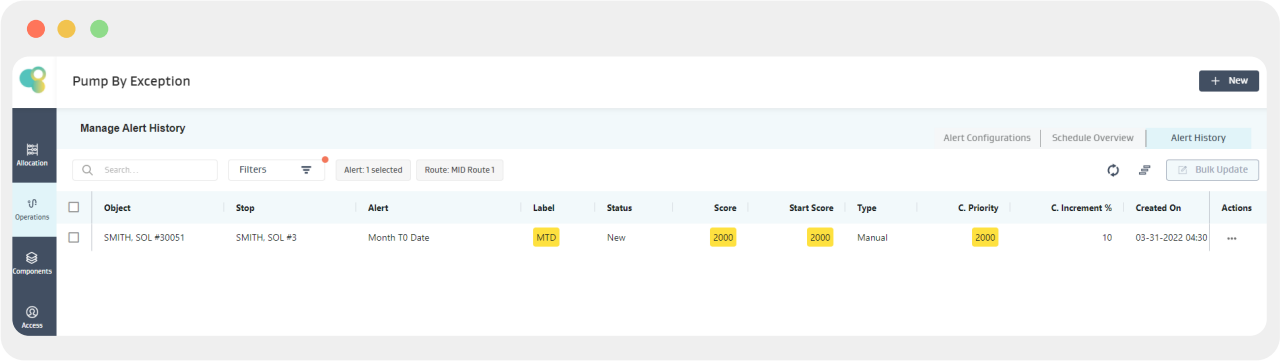
Mathematical logic:

On the tank SMITH, SOL#30051

If there are 30 readings available for a given month, then these 30 readings will be used to calculate Month-to-Date Value i.e **Avg MTD = 38.09**

Given 38.09 > 38, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

MtdSum(V)

Description:

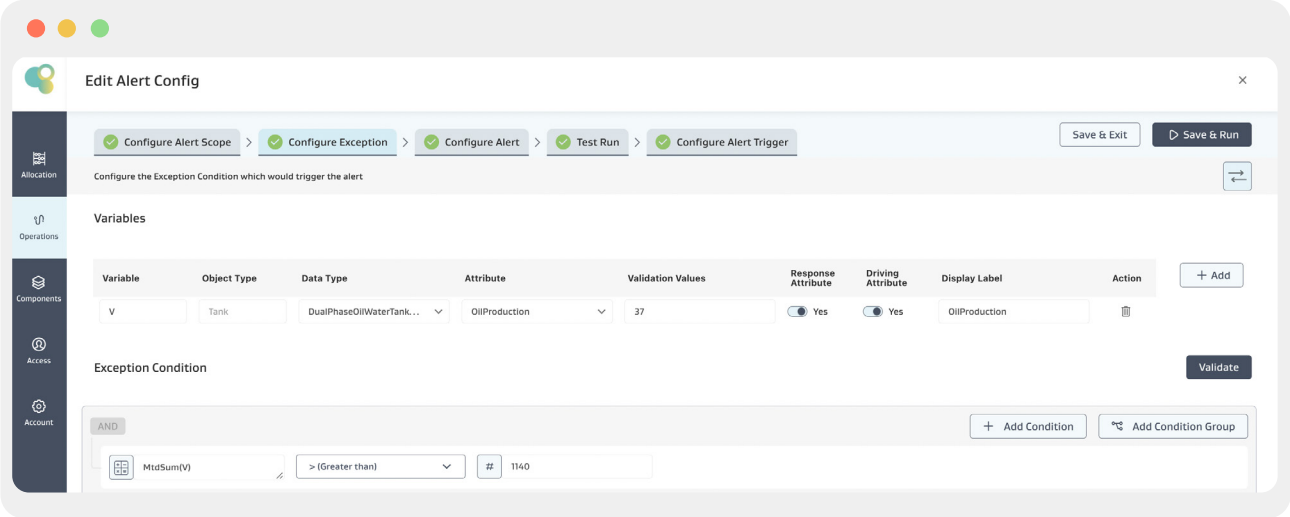
Sum of values of the Variable ***(V)*** fetched from the Month Readings

Input: V (Decimal), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Sum of the Oil Production for the **"Month"** is greater than 1140

Exception Condition: The below Exception Condition shows the syntax and logic used

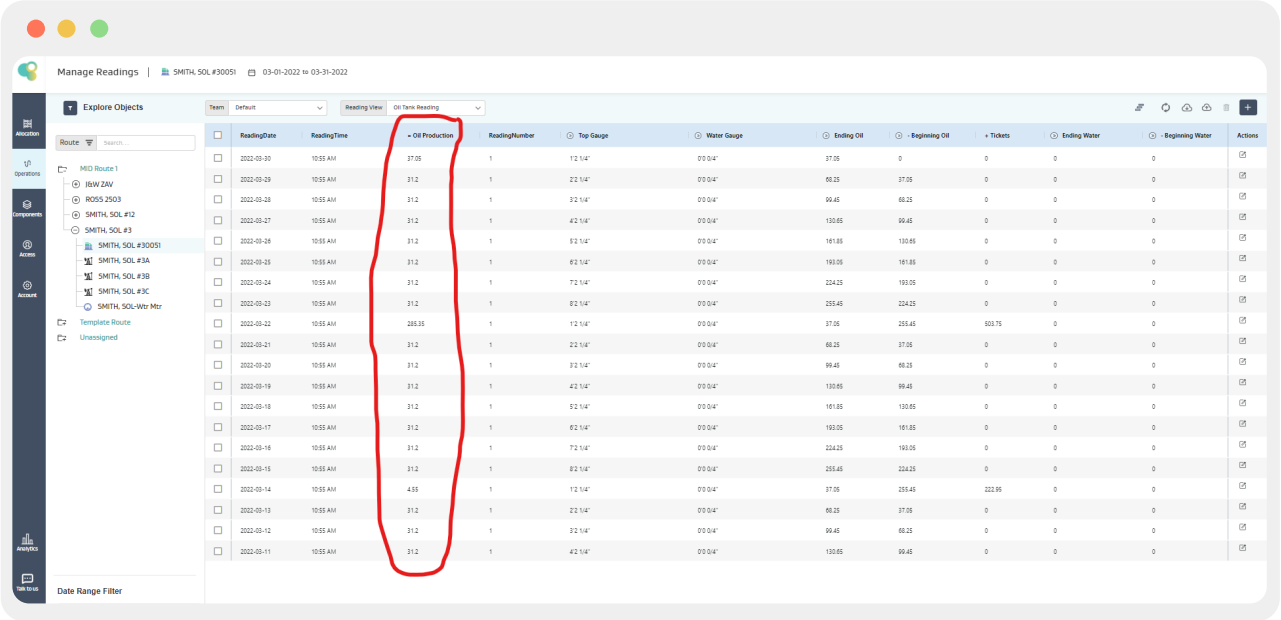


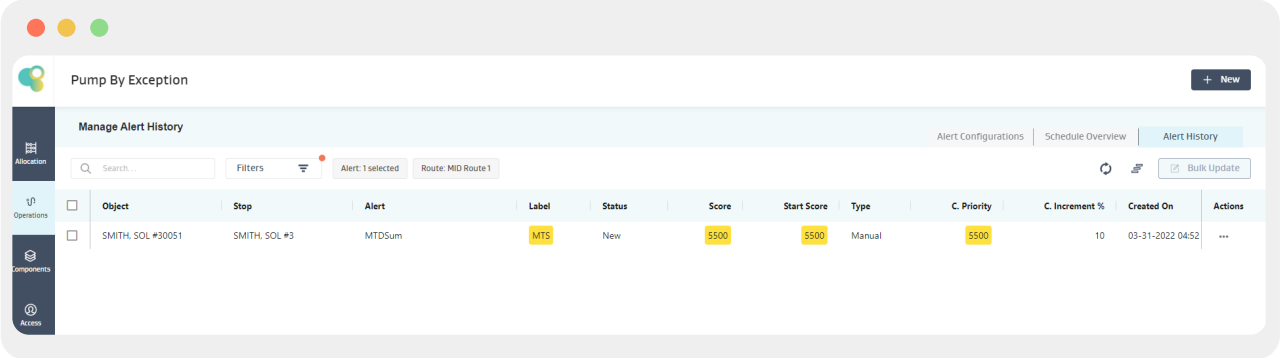
Mathematical logic:

On the tank SMITH, SOL#30051

Given only 30 readings are available for a month, then only those 30 readings will be taken for calculation of Month To Date Sum

Given Sum>1140 the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

WtdAvg(V)

Description:

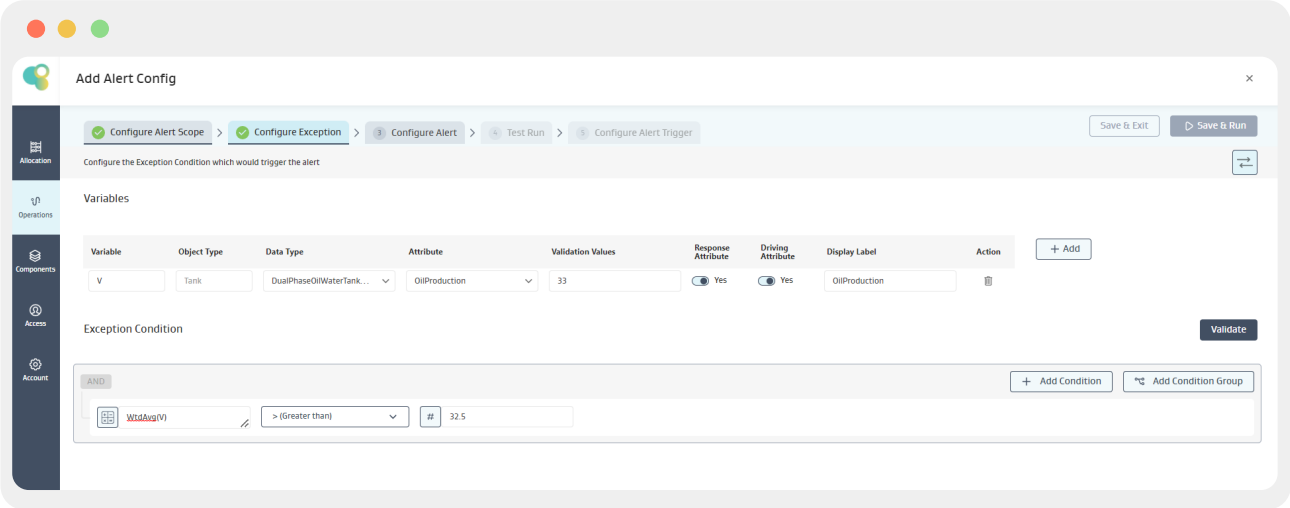
Average of values of the Variable **(V)** fetched from the Week Readings

Input: V (Decimal), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Average Oil Production for the **"Week"** is greater than 32.5

Exception Condition: The below Exception Condition shows the syntax and logic used

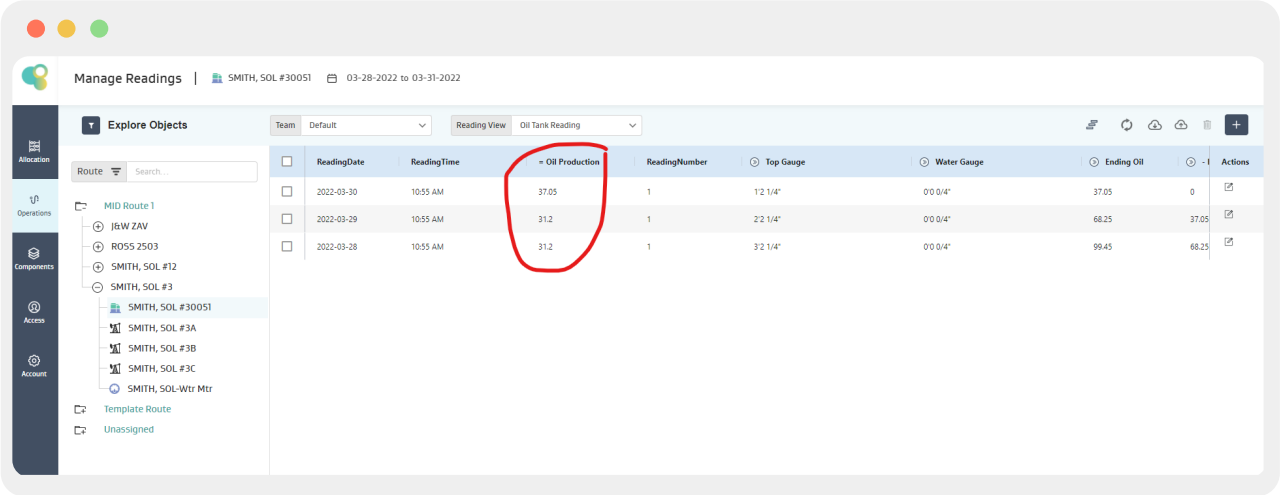


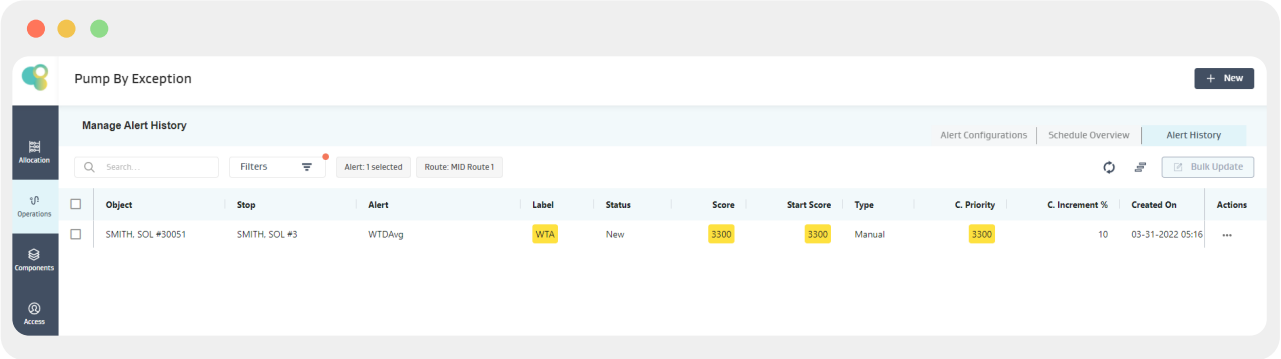
Mathematical logic:

On the tank SMITH, SOL#30051

If there are only 4 readings available for the current week (starting Monday), then only these 4 readings will be used to calculate the Week-to-Date value, i.e., **Average WTD = 33.15**

Given 33.15 > 32.5, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

WtdSum(V)

Description:

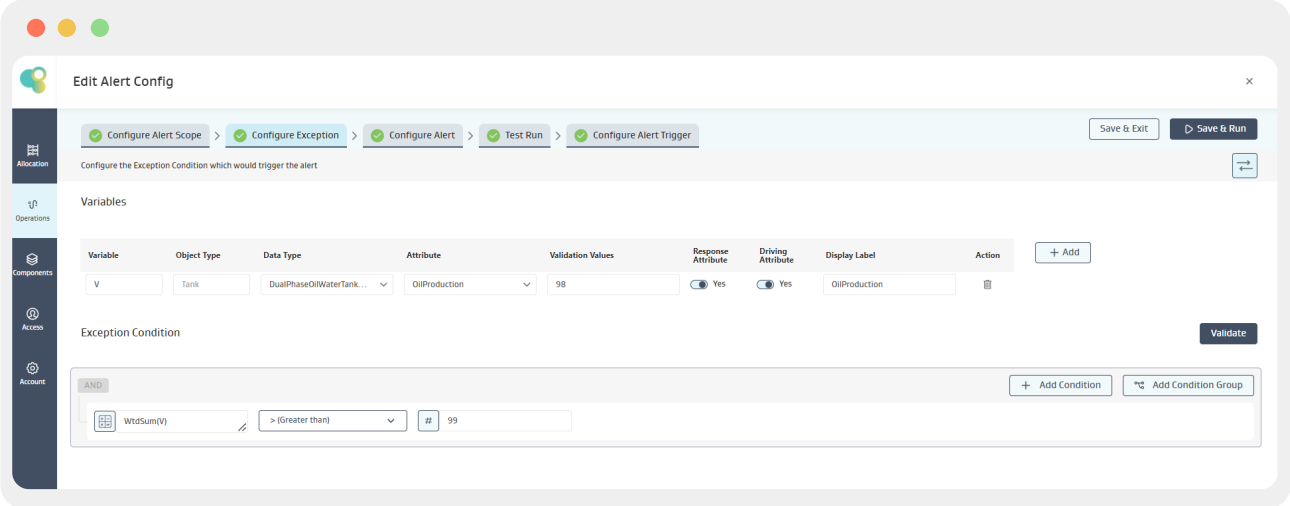
Sum of values of the Variable **(V)** fetched from the Week Readings

Input: V (Decimal), Output: Decimal

Example:

Alert Requirement: Show an Alert when Sum of Oil Production for the **"Week"** is greater than 99

Exception Condition: The below Exception Condition shows the syntax and logic used

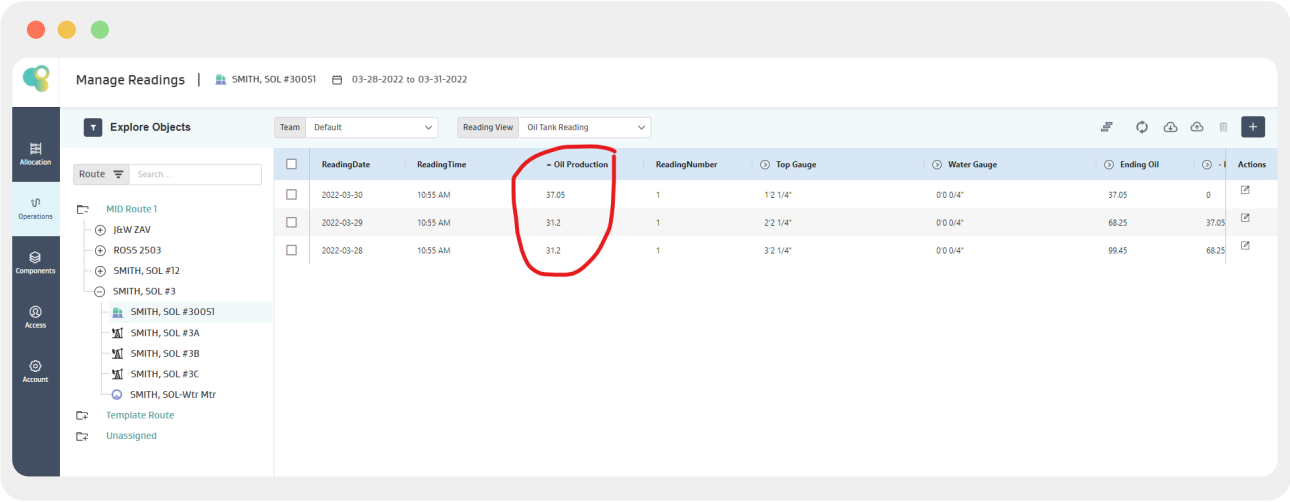


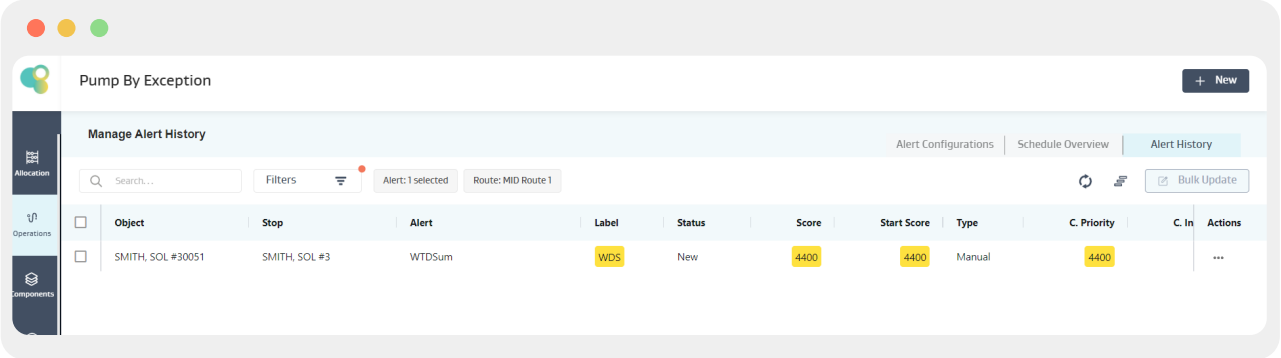
Mathematical logic:

On the tank SMITH, SOL#30051

If there are only 4 readings for the current week (starting Monday), then only these 4 readings will be used to calculate the Week-to-Date value, i.e., **Sum WTD = 99.45**

Given 99.45 > 99, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

YtdAvg(V)

Description:

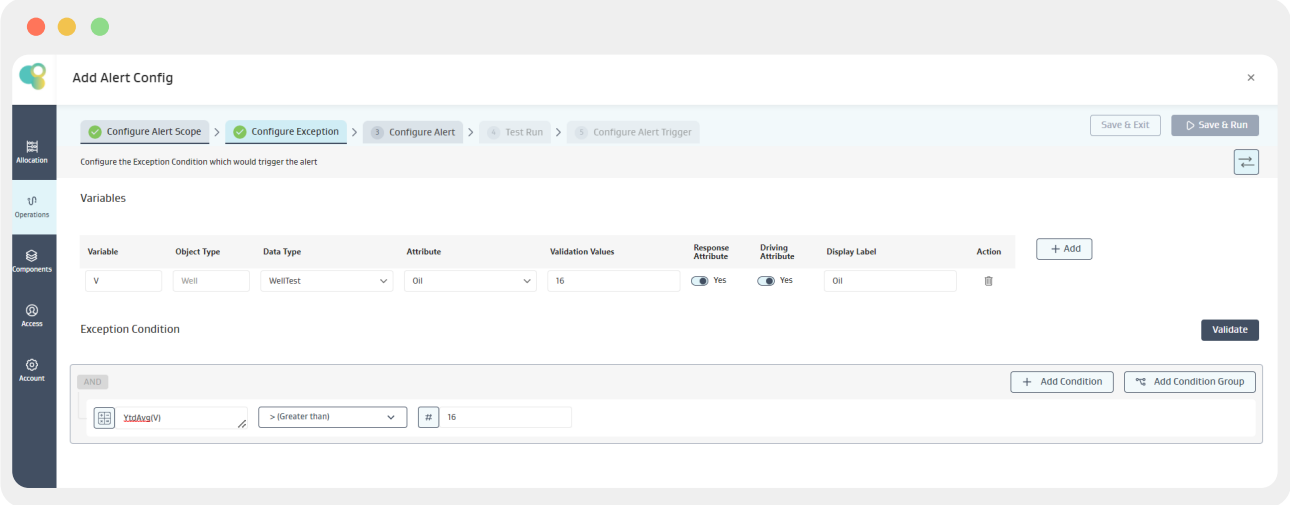
Average of values of the Variable **(V)** fetched from the Year Readings

Input: V (Decimal), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Average of Oil for the **"Year"** is greater than 16

Exception Condition: The below Exception Condition shows the syntax and logic used

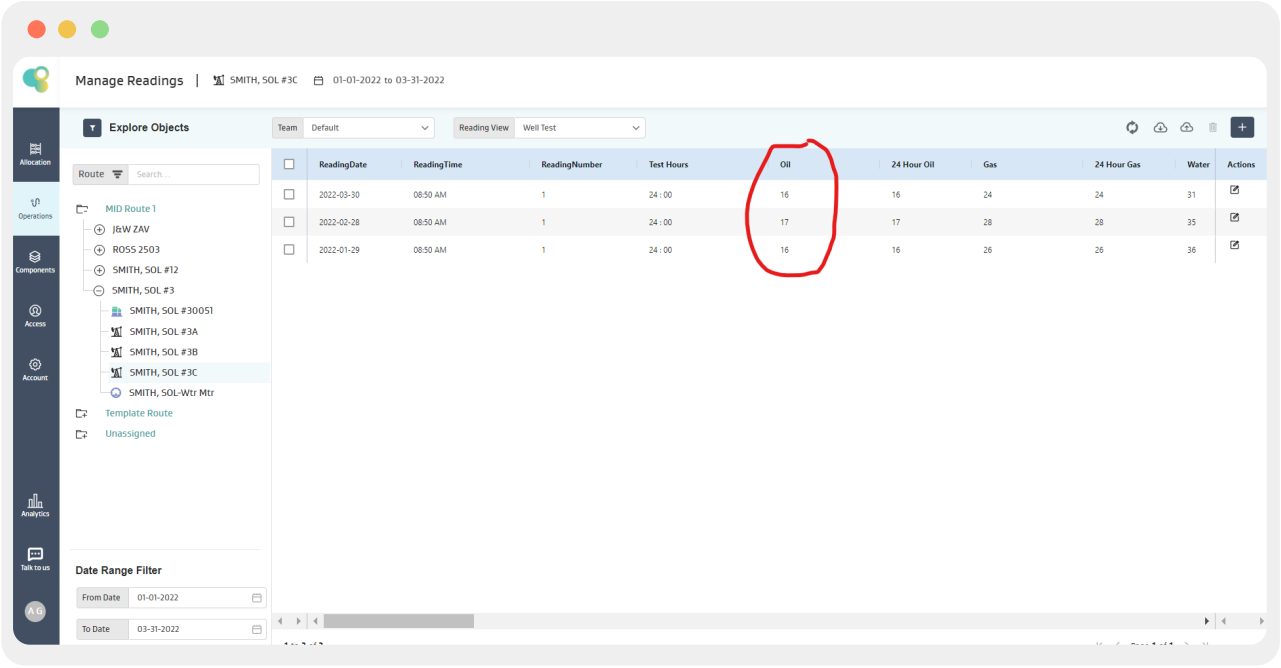


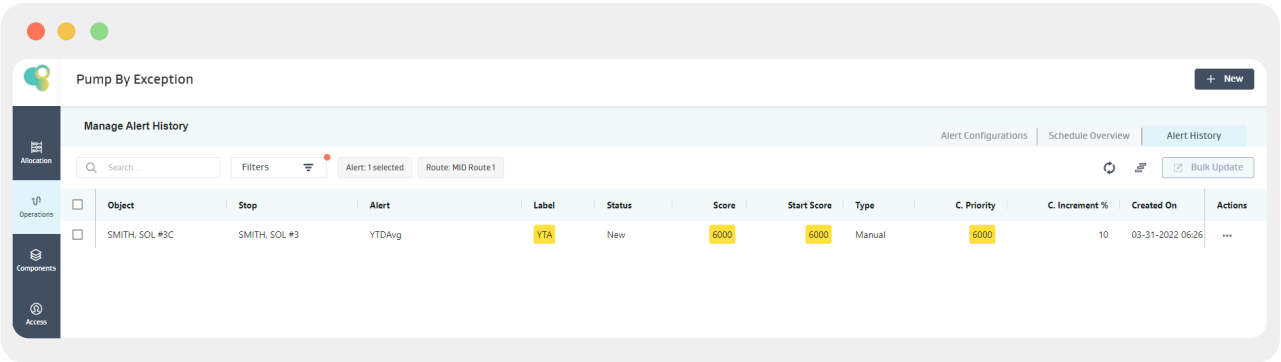
Mathematical logic:

On the Well SMITH, SOL#3C

If there are only 3 readings available for a Year, then only these 3 readings will be used to calculate the Year-to-Date value, i.e., **Average YTD = 16.33**

Given 16.33 > 16, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

YtdSum(V)

Description:

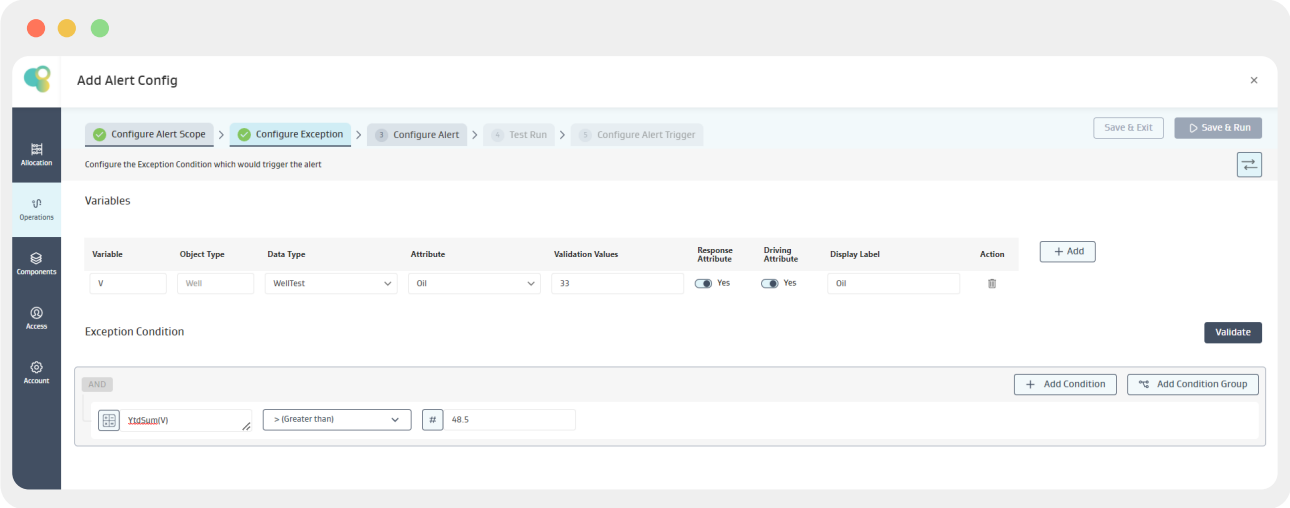
Sum of values of the Variable **(V)** fetched from the Year Readings

Input: V (Decimal), Output: Decimal

Example:

Alert Requirement: Show an Alert when Sum of Oil for the **"Year"** is greater than 48.5

Exception Condition: The below Exception Condition shows the syntax and logic used

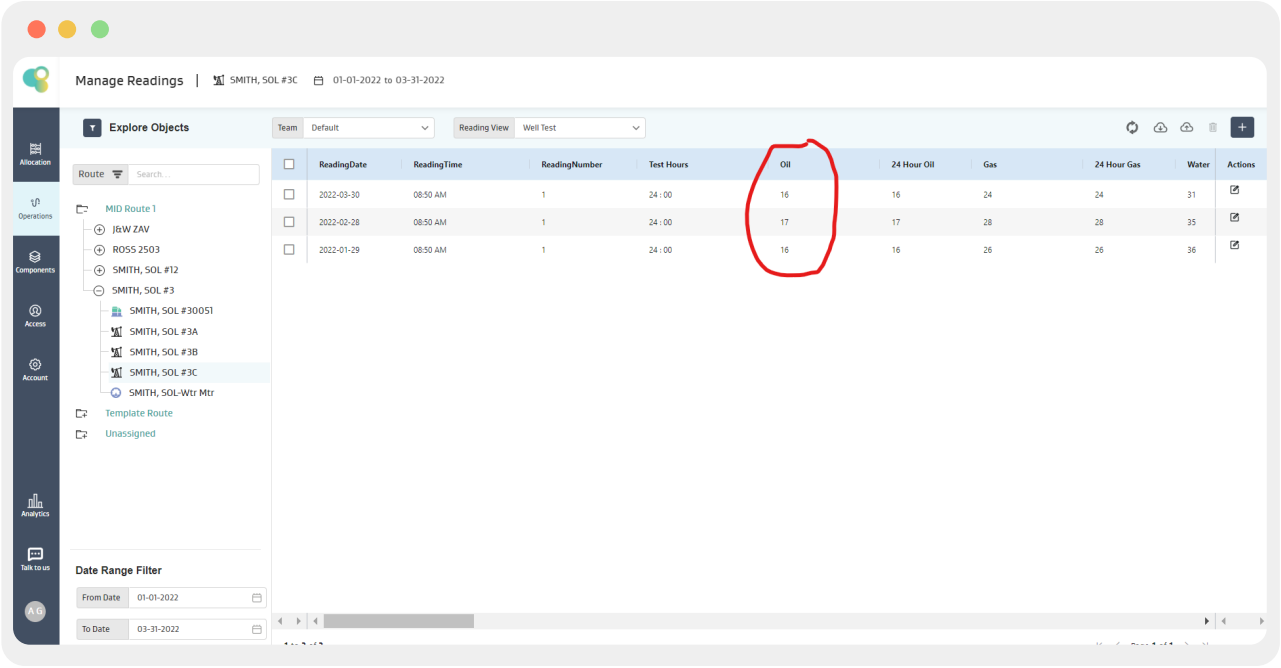


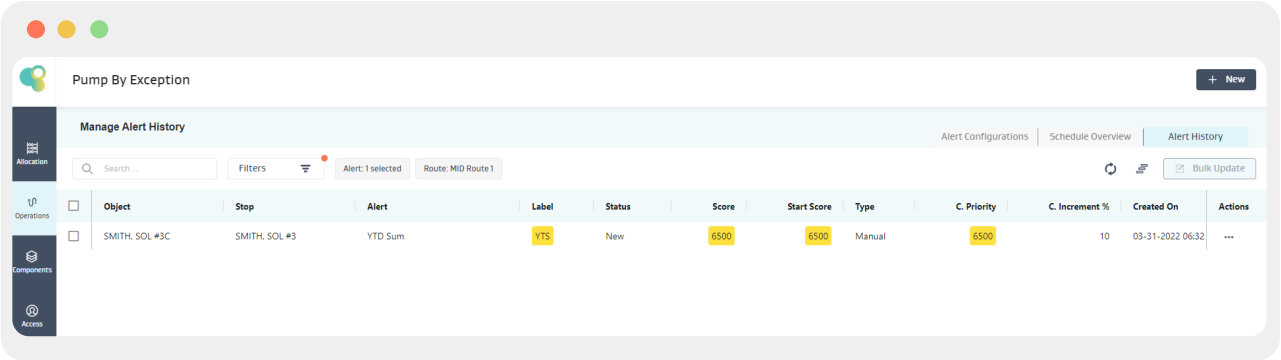
Mathematical logic:

On the well SMITH, SOL#3C

For Year, 3 readings are available, so only those three readings will be taken for calculation of Year To Date Sum, i.e., **Sum YTD = 49**

Given 49 > 48.5, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

DayDiff(D1,D2)

Description:

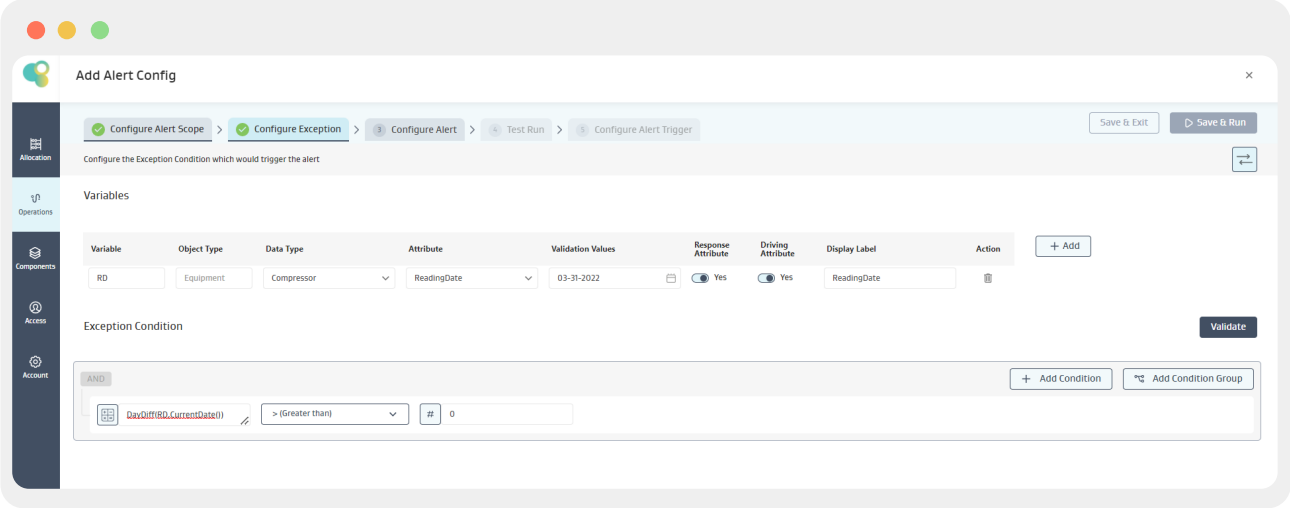
Calculates the number of days between the dates D1 and D2

Input: D1 &D2 (mm-dd-yyyy), Output: Integer

Example:

Alert Requirement: Show an Alert when Date Difference between the Current Date and the Reading Date is greater than 0 i.e. Daily Compressor Reading requirement

Exception Condition: The below Exception Condition shows the syntax and logic used



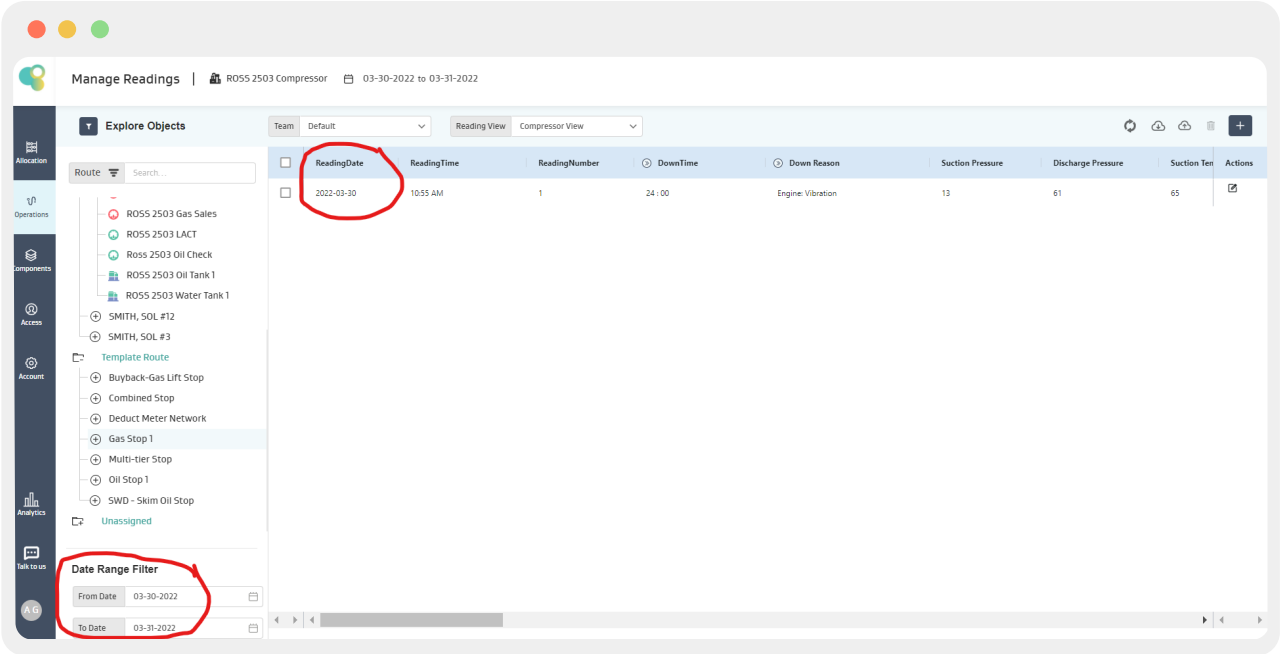
Mathematical logic:

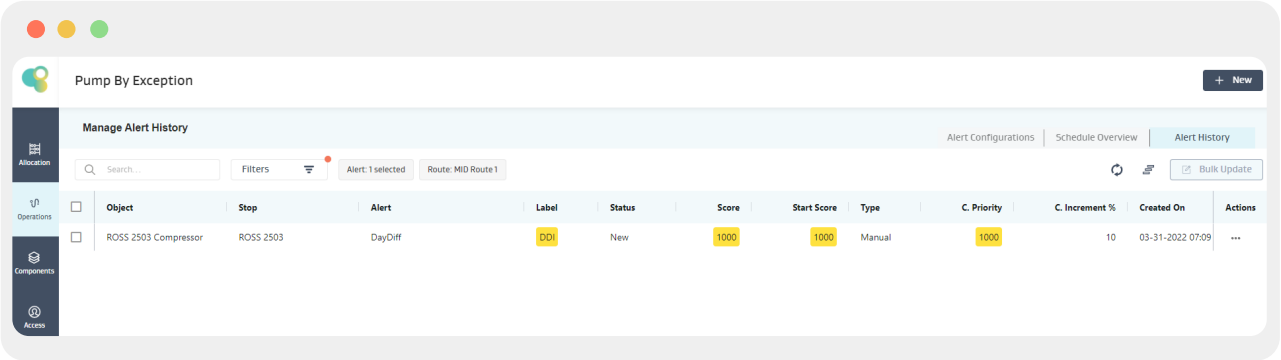
On the Equipment, ROSS 2503 Compressor

The Last Available Reading is 3/30/2022

The Current Date is 3/31/2022

Given Current Date - Last Available Reading > 0, the condition is satisfied, and an alert is created for ROSS 2503 Compressor, as shown below.





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true.

MonthDiff(D1,D2)

Description:

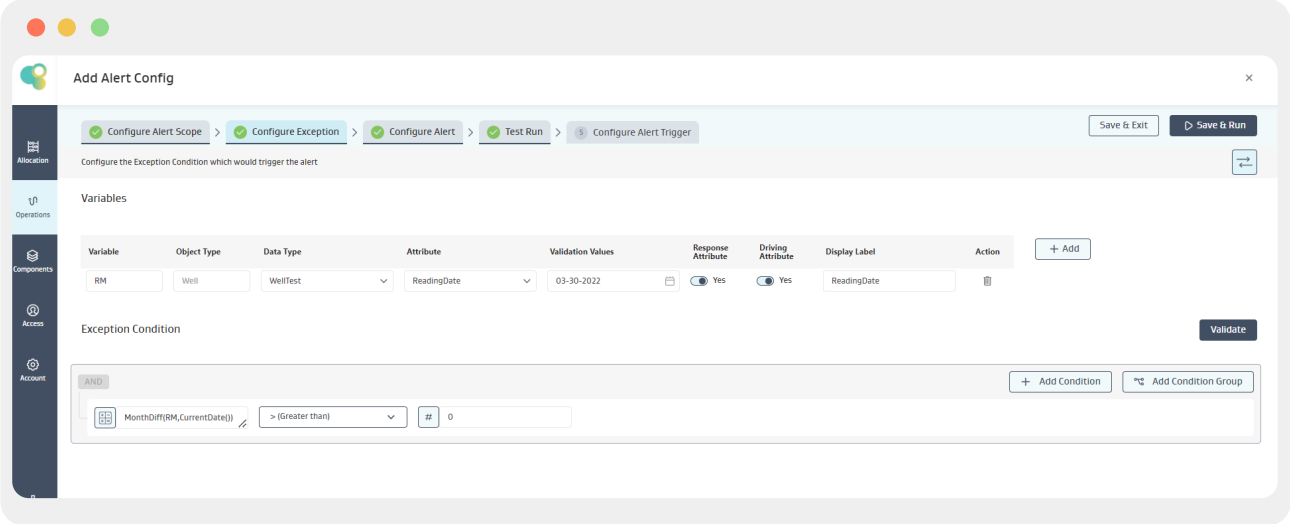
Calculates the number of months between the dates D1 and D2. Only Completed months are taken into account.

1 Month is Calculated on Date-to-Date basis. Eg: If Current Date is April 4th and Reading Date is March 5th, then MonthDiff(CurrentDate()-RD) = 0, but if the Current Date is April 5th, then MonthDiff(CurrentDate()-RD) = 1

Input: D1 &D2 (mm-dd-yyyy), Output: Integer

Example:

Alert Requirement: Show an Alert when Month Difference between the Current Month and the Last Available Reading Month is greater than zero for Well Test Due Requirement



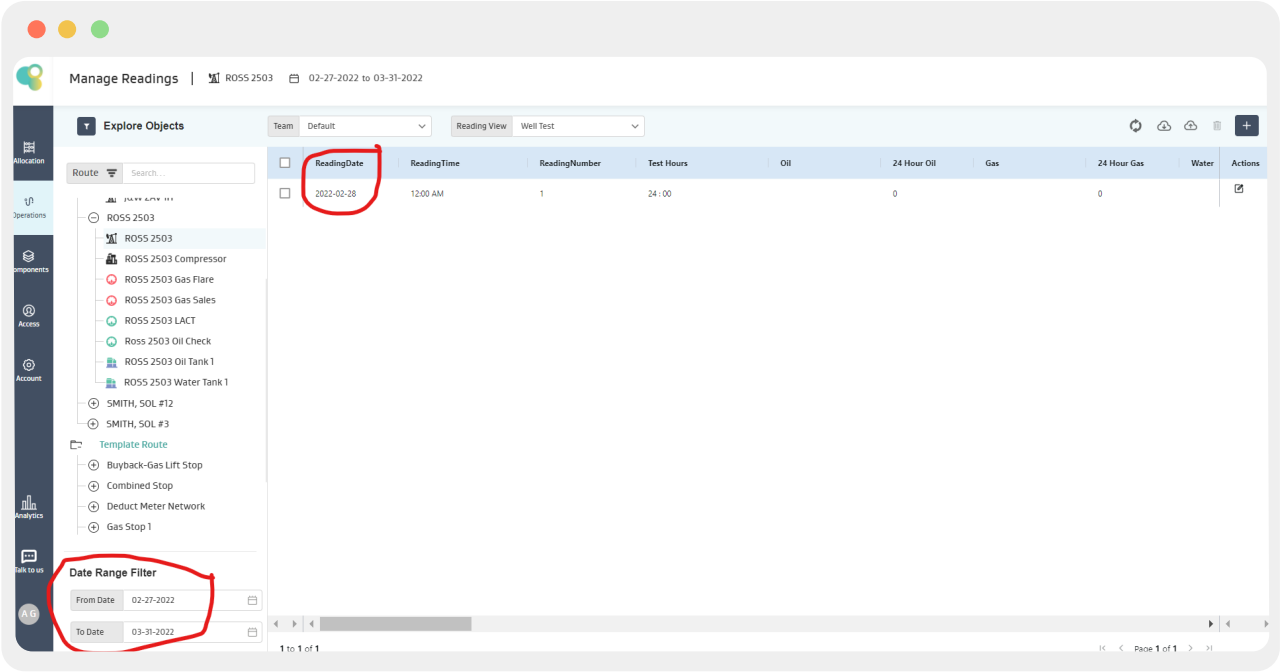
Mathematical logic:

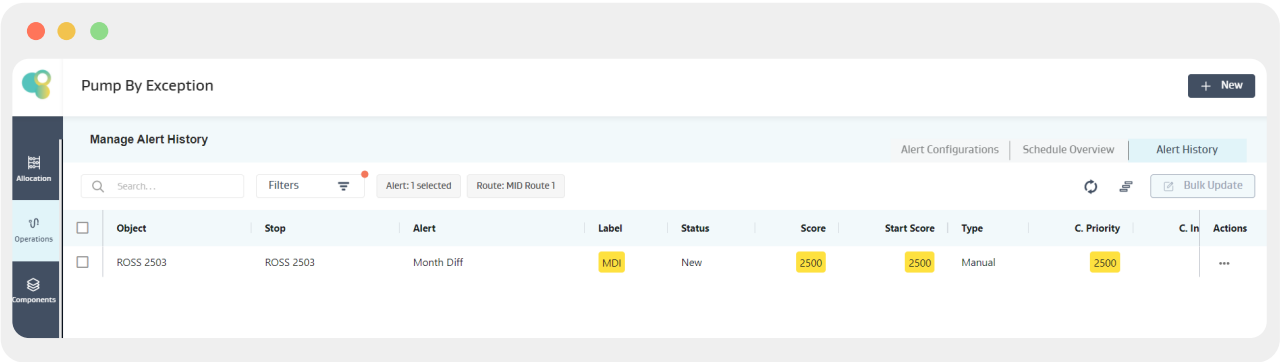
On the Well for Well Test, ROSS 2503

The Last Available Reading is 2/28/2022

The Current Date is 3/31/2022

Given Current Month - Last Available Reading Month> 0, the condition is satisfied, and an alert is created for ROSS 2503, as shown below.





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true

NReadingSum(V,N)

Description:

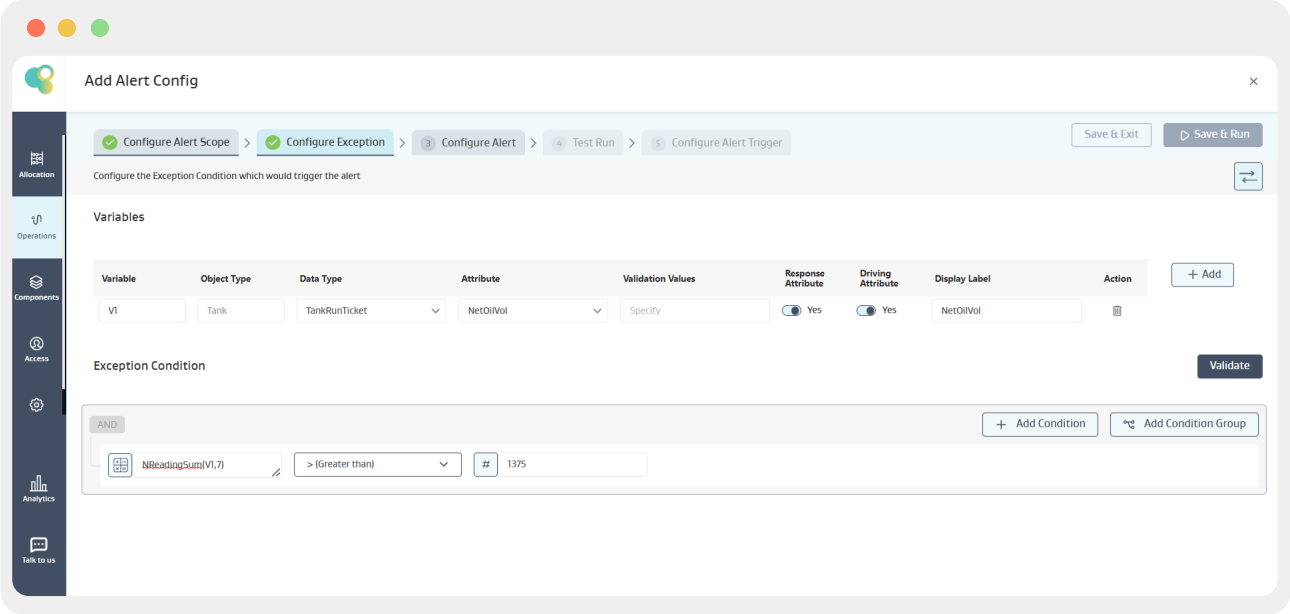
Sum of values of the Variable (V) fetched from the “Last N Available Readings”

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when Sum of **NetOilVolume** for the **“Last 7 readings”** is greater than 1375

Exception Condition: The below Exception Condition shows the syntax and logic used

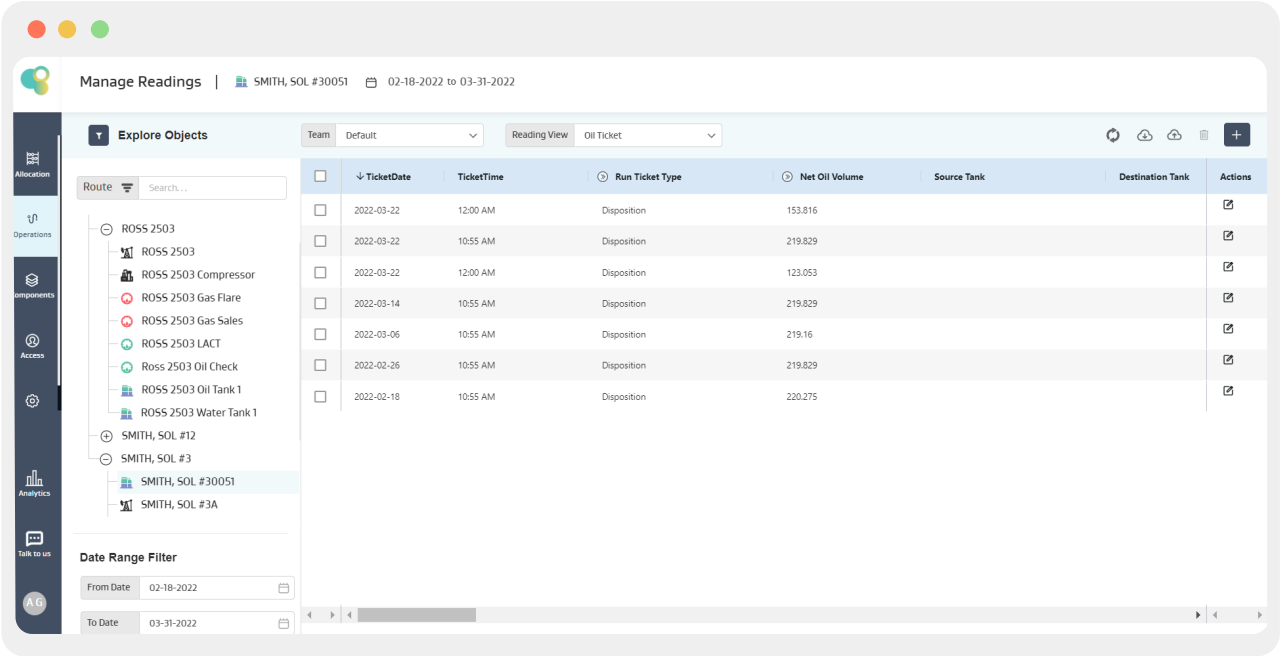


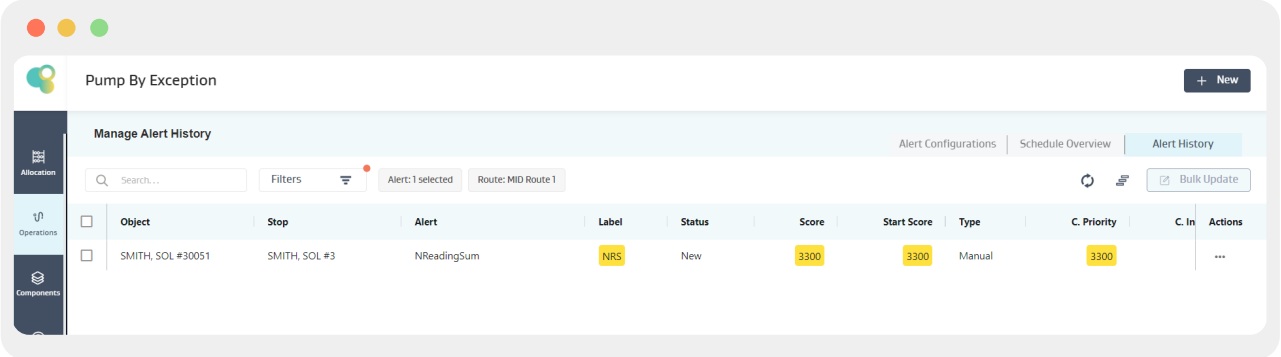
Mathematical logic:

On the tank SMITH, SOL#30051

Given last 7 readings are available, so those 7 readings will be taken for calculation, i.e., **(153.816, 219.829, 123.053, 219.829, 219.16, 219.829, 220.275) = 1375.791**

Given 1375.791 > 1375, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true

- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression. E.g., If we are using NDayAvg(CP,10) and we have only 6 days of data, we compute the Average of 6 Days and not 10 Days.

- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

NDaySum(V,N)

Description:

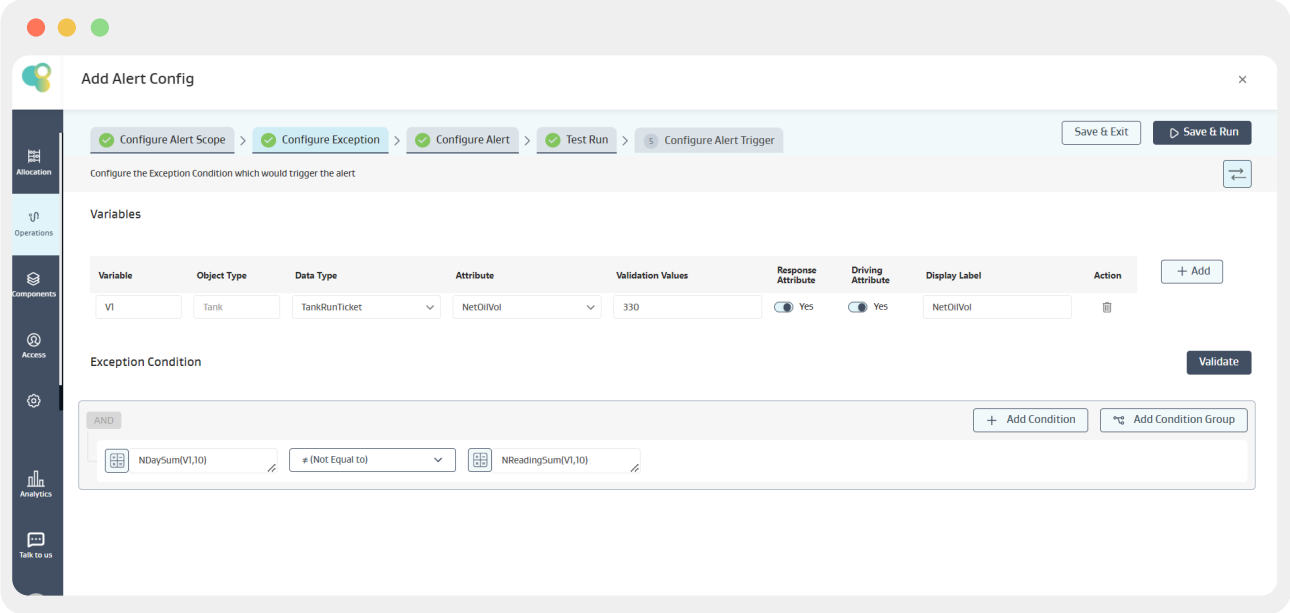
The Sum of values of the Variable (V) fetched from all the available readings in the “Last N Days”

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Sum of **NetOilVolume** for the **“Last 10 Days”** is not equal to the Sum of **NetOilVolume** for the **“Last 10 readings”**

Exception Condition: The below Exception Condition shows the syntax and logic used



Mathematical logic:

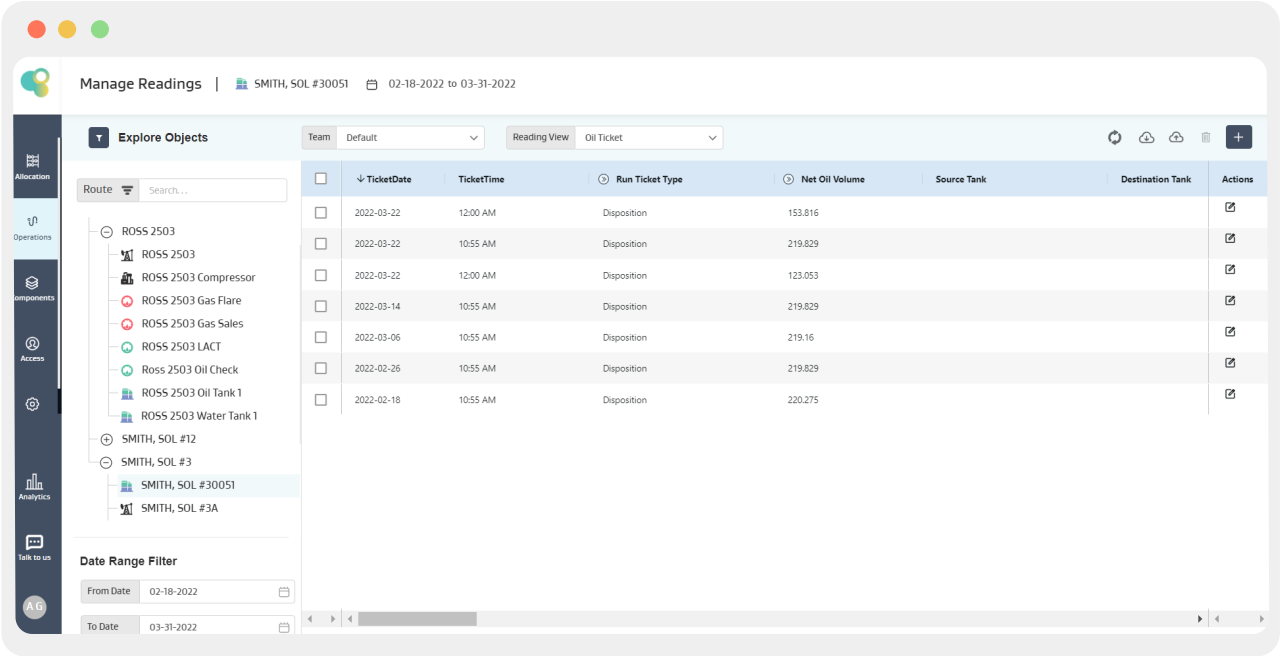
On the tank SMITH, SOL#30051

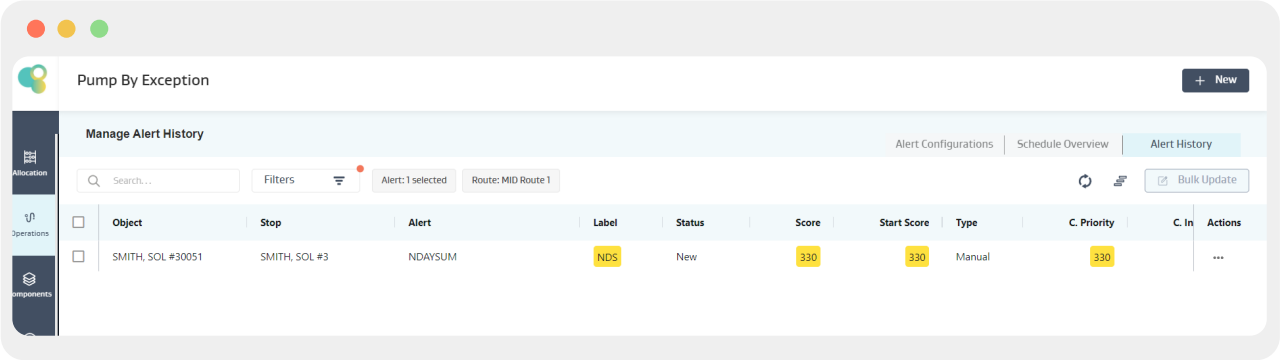
Assuming Current Date as 30th March

Given the last 7 readings are available, only those 7 readings will be taken for calculation of NReadingSum, i.e., **(153.816, 219.829, 123.053, 219.829, 219.16, 219.829, 220.275) = 1375.791**

Also, there are 3 readings on the same day in the last 10 Days available readings which will be used for NDaySum, i.e., **(153.816, 219.829, 123.053) = 496.698**

Given **496.698** is Not Equal to **1375.791**, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

IsStatic(V,N)

Description:

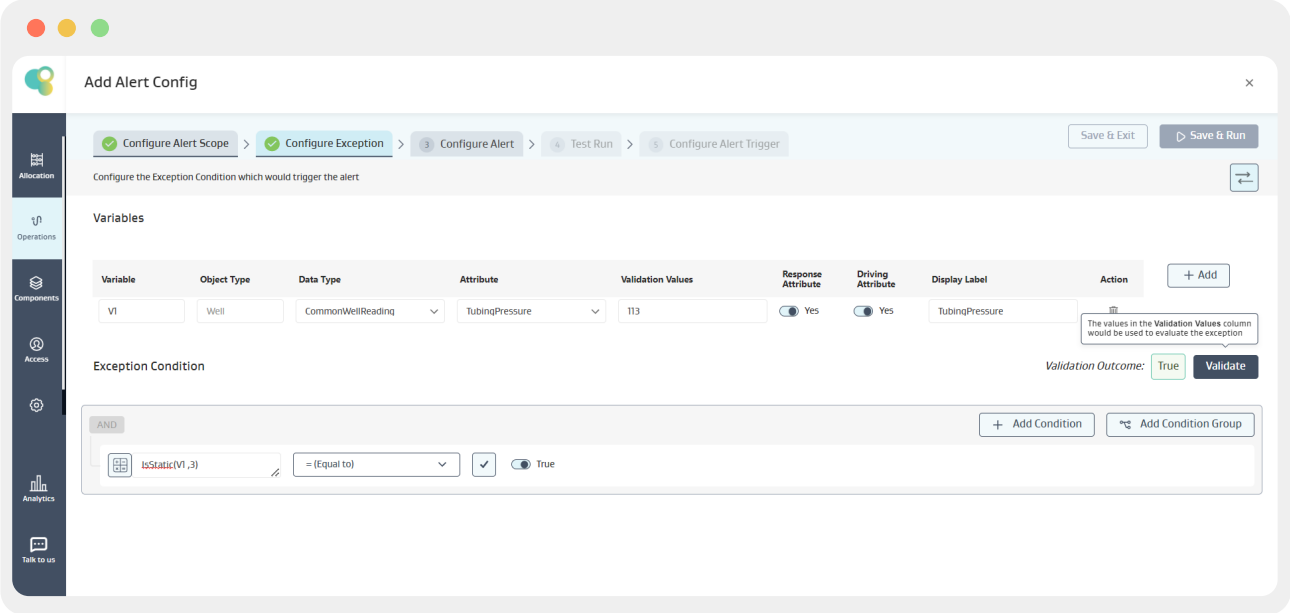
Helps to create an Alert when the values of the Variable **(V)** fetched from all the available Readings in the "Last N Days" are the Same or Carry Forwarded

Input: V (Decimal, Integer, Picklist, Boolean), N (Positive Integer >=1), Output: True/False

Example: `

Alert Requirement: Show an Alert when Tubing pressure over the past 3 **"Days"** is same

Exception Condition: The below Exception Condition shows the syntax and logic used

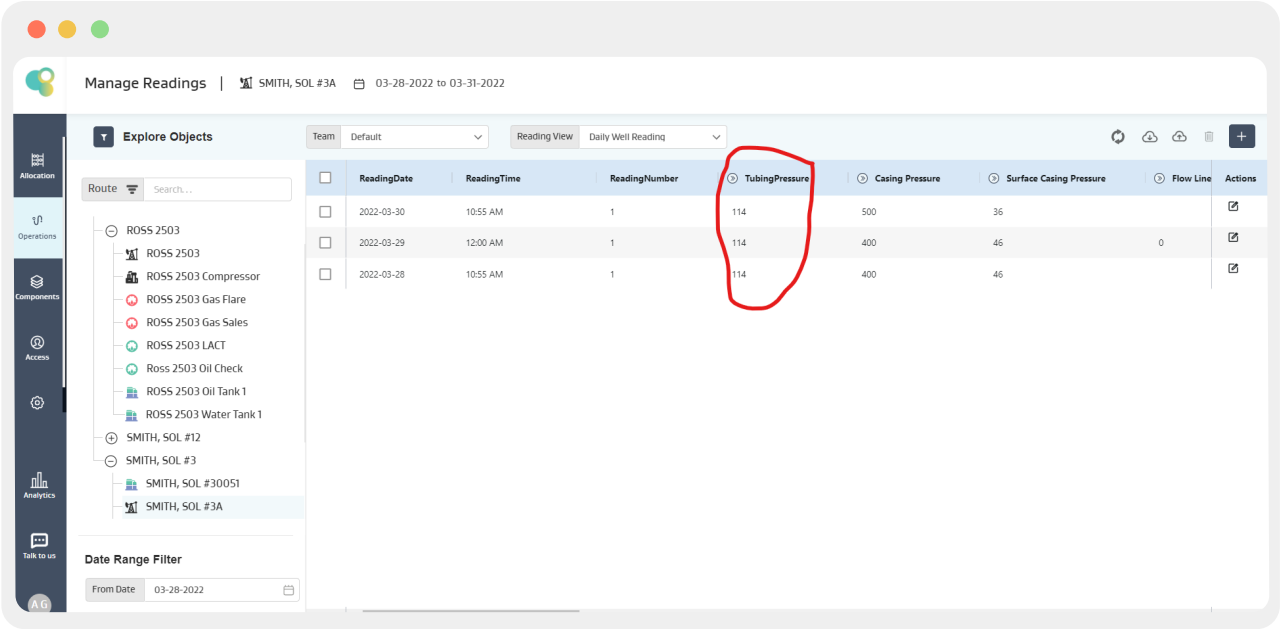


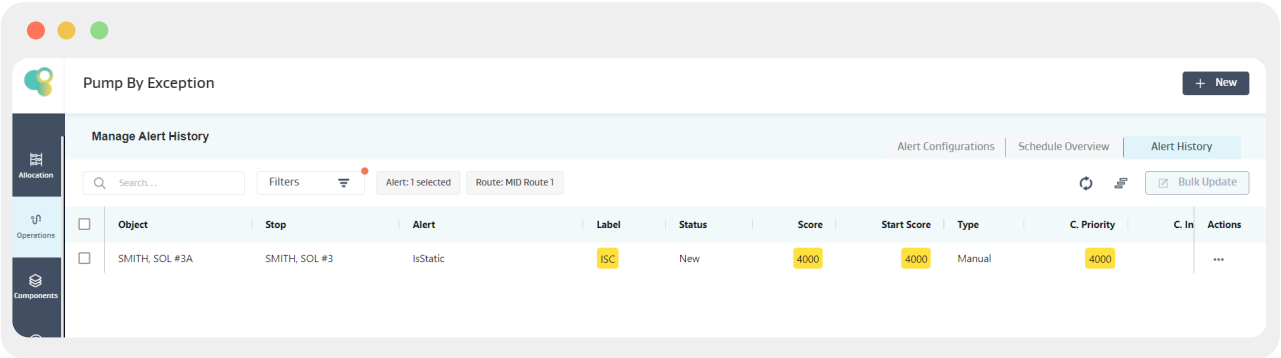
Mathematical logic:

On the Well SMITH, SOL #3A

Given Tubing Pressure for the last 3 days is 114

Given 114 is static to True, the condition is satisfied, and an alert is created for SMITH, SOL #3A Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

NReadingSumExCurr(V,X)

Description:

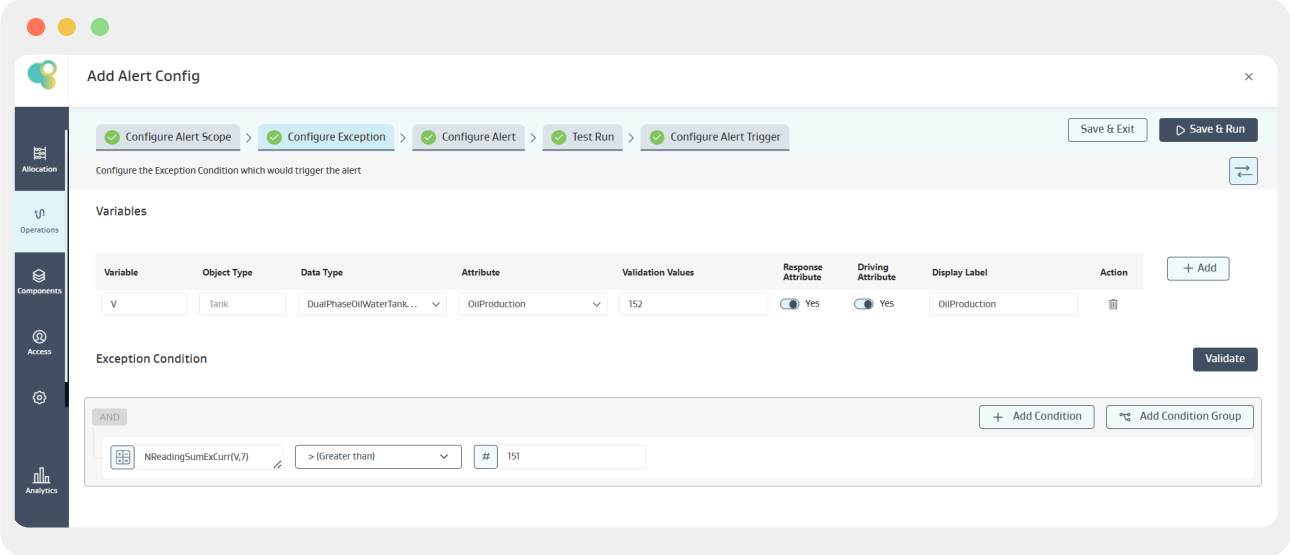
The Sum of the Variable **(V)** values fetched from the “Last N Readings” **(N)** excluding the Current Reading

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Sum of **Oil Production** for the **“Last 7 readings” excluding Current Reading** is greater than 410

Exception Condition: The below Exception Condition shows the syntax and logic used

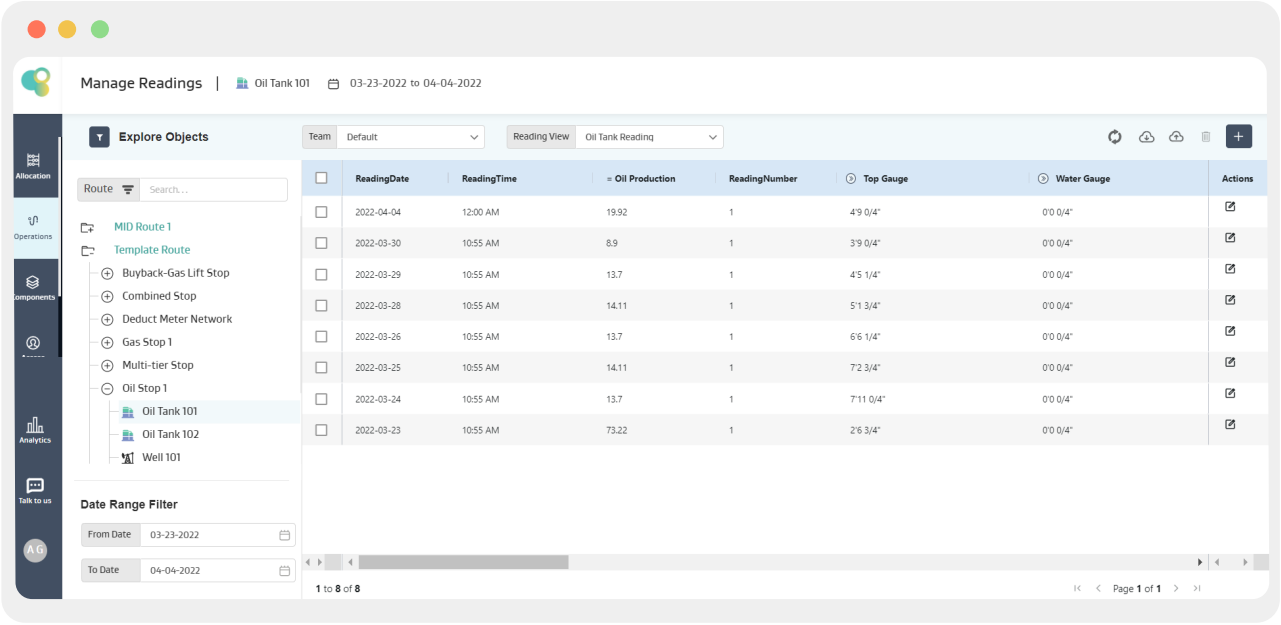


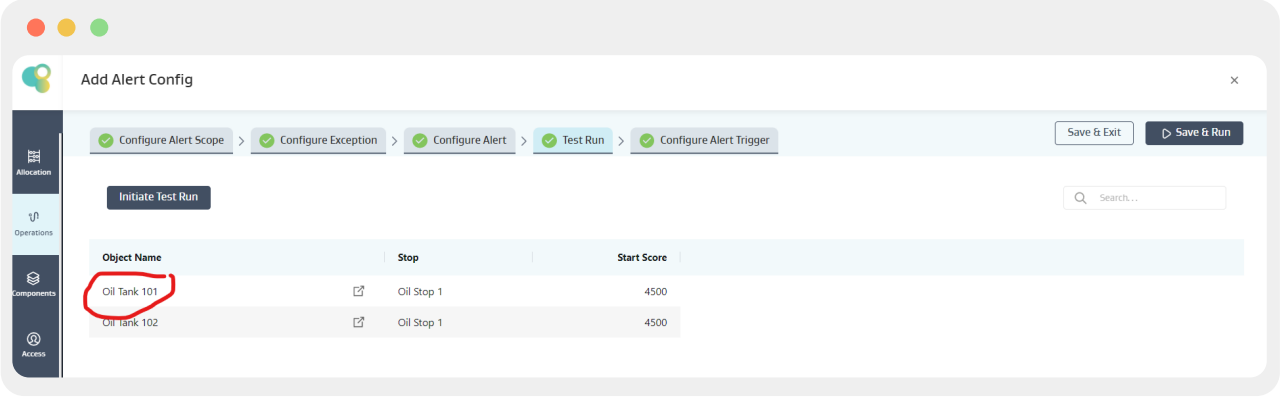
Mathematical logic:

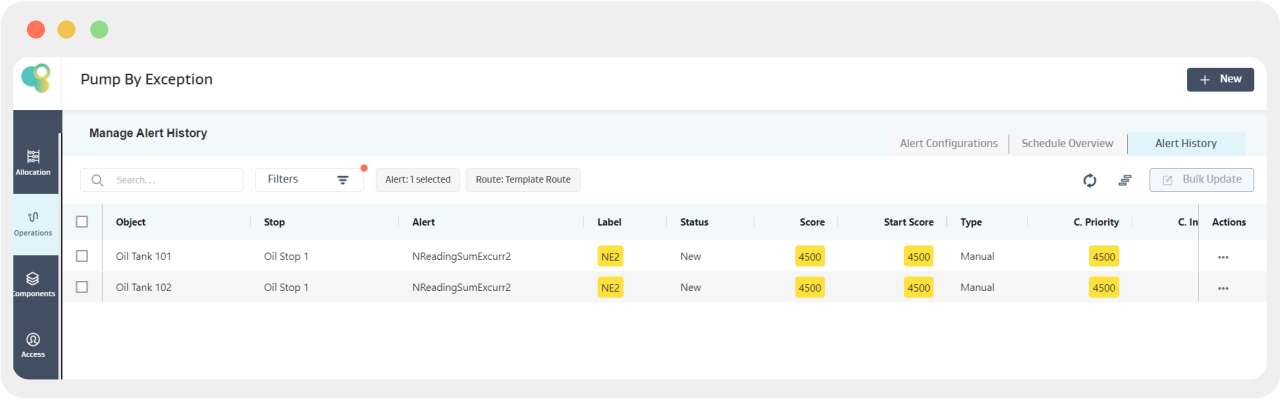
On the tank Oil Tank 101

The last 7 readings are available, so those 7 readings will be taken for calculation, i.e., **(8.9 , 13.7, 14.11, 13.7, 14.11,13.7, 73.22 = 151.44)**

Given 151.44 > 151, the condition is satisfied, and an alert is created for Oil Tank 101 Tank, as shown below







Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

NDaySumExCurr(V,X)

Description:

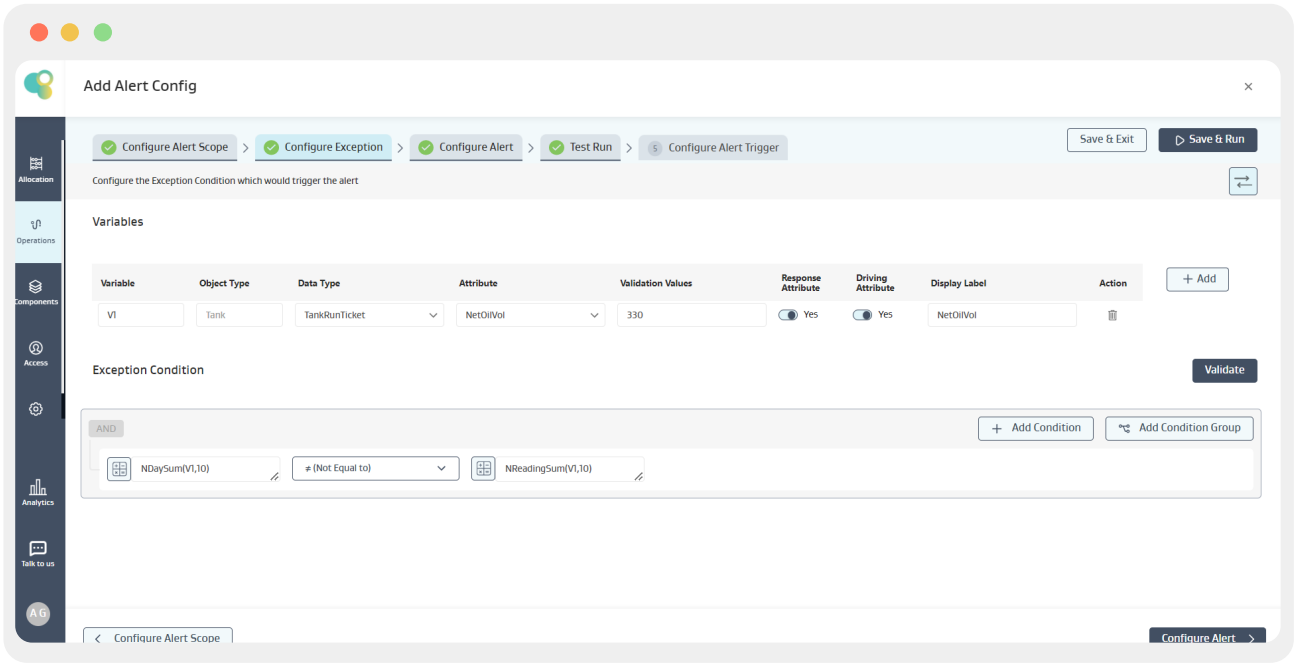
The Sum of values of the Variable **(V)** fetched from all the available readings in the "Last N Days" **(N)** excludes the Current Day Reading.

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Sum of **NetOilVolume** for the **"Last 10 days"** excluding the current date is not equal to the Sum of **NetOilVolume** for the **"Last 10 readings"** excluding the current reading

Exception Condition: The below Exception Condition shows the syntax and logic used



Mathematical logic:

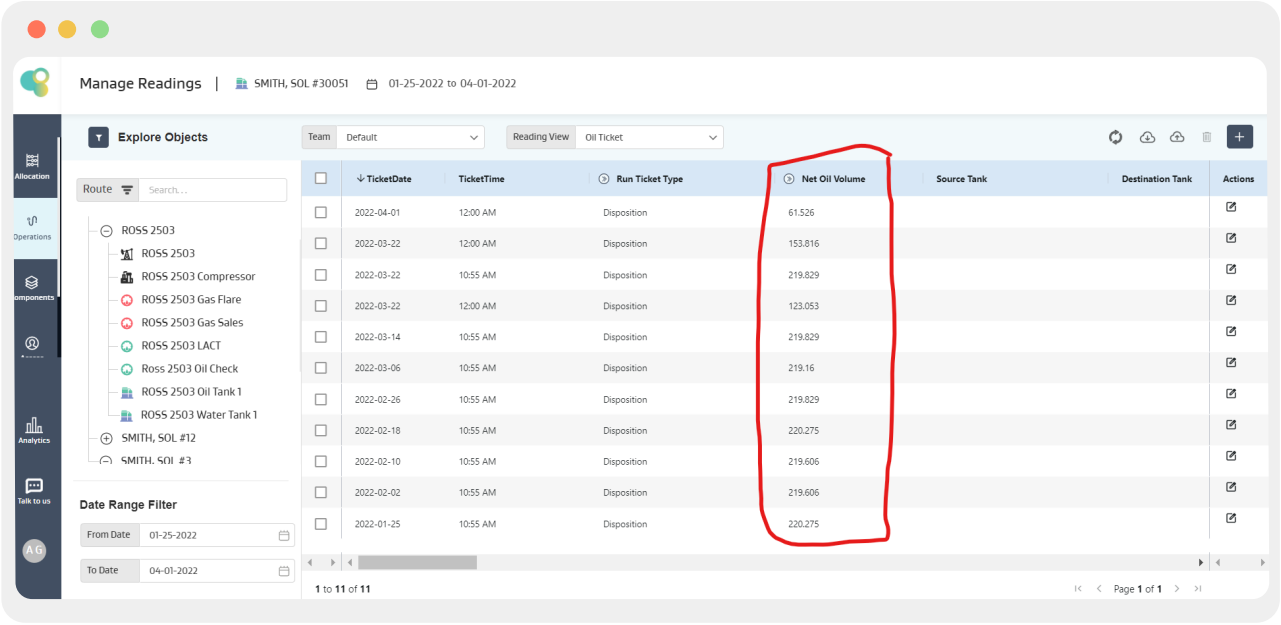
On the tank SMITH, SOL#30051

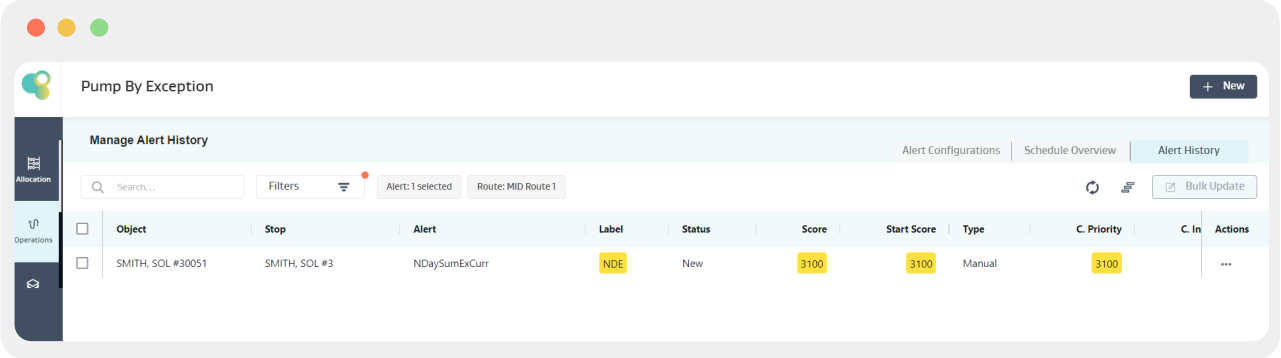
Assuming Current Date as 1st April

The last 10 readings are available, so only those 10 readings will be taken for calculation of NReadingSumEx-Curr, i.e., **(153.816, 219.829, 123.053, 219.829, 219.16, 219.829, 220.275, 219.606, 219.606, 220.275) = 2035.278**

For NDaySumExCurr, there are 3 readings in the last 10 Days available readings, i.e., **(153.816, 219.829, 123.053) = 496.698**

Given **496.698** is Not Equal to **1375.791**, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

NReadingAvgExCurr(V,X)

Description:

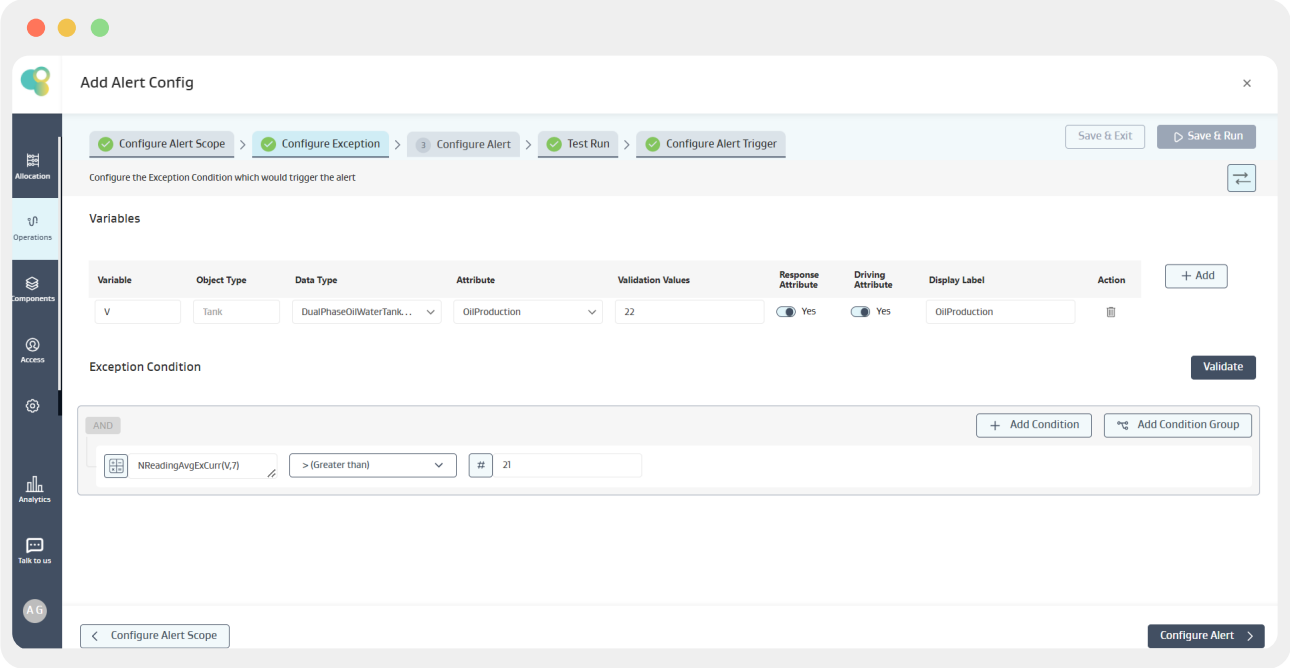
The Average of values of the Variable **(V)** fetched from the Last N Readings **(N)** excluding the Current Reading

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Average of **Oil Production** for the **"Last 7 readings" excluding the Current Reading** is greater than 21

Exception Condition: The below Exception Condition shows the syntax and logic used

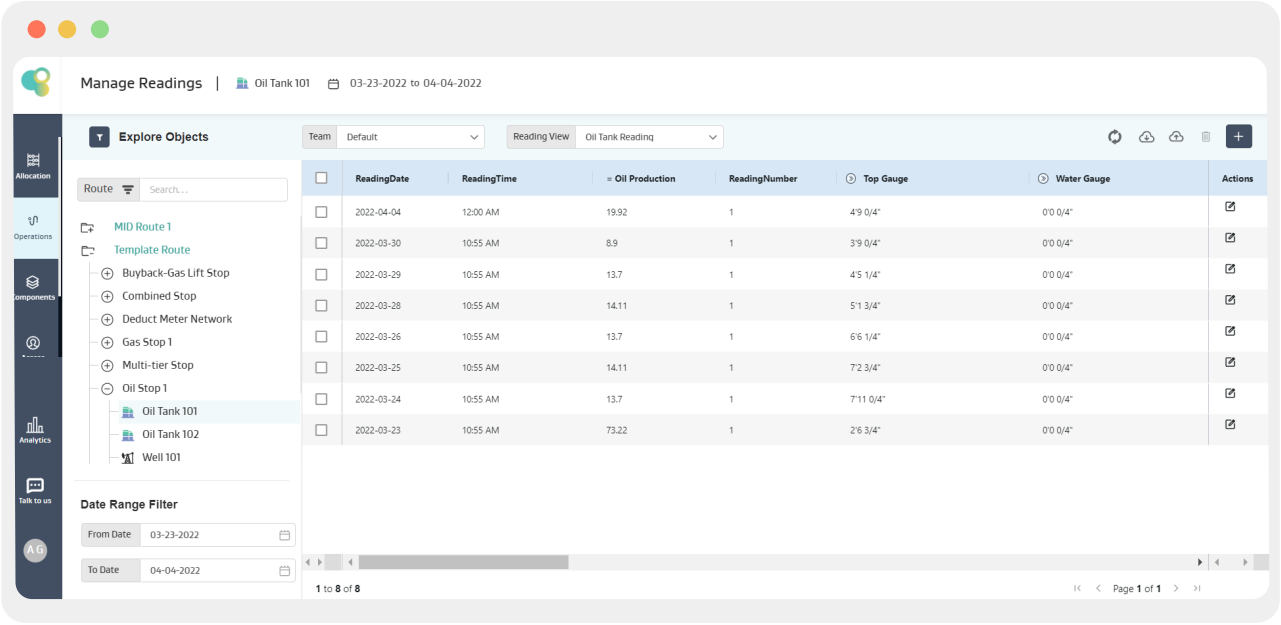


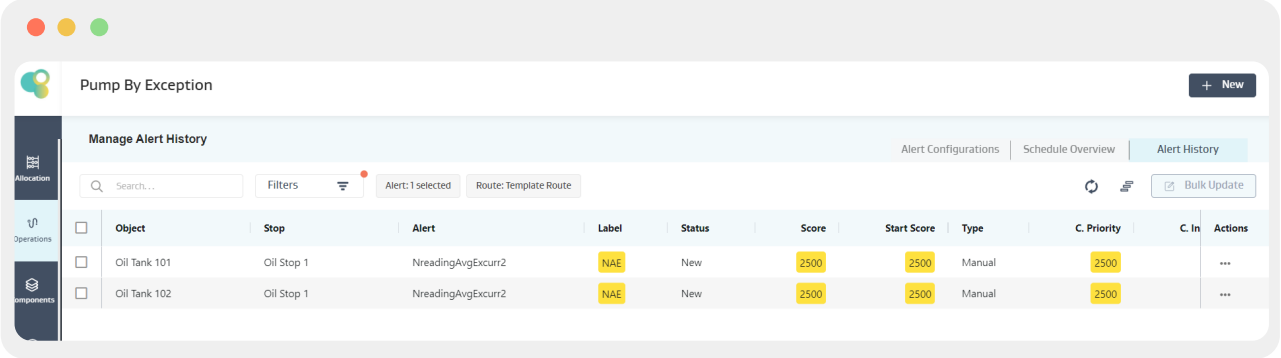
Mathematical logic:

On the tank Oil Stop 1

The last 7 readings are available, so only those 7 readings will be taken for calculation, i.e., **(8.9 , 13.7, 14.11, 13.7, 14.11,13.7, 73.22 = 21.634)**

Given 21.634 > 21, the condition is satisfied, and an alert is created for Oil Stop 1 Tank, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

NDayAvgExCurr(V,X)

Description:

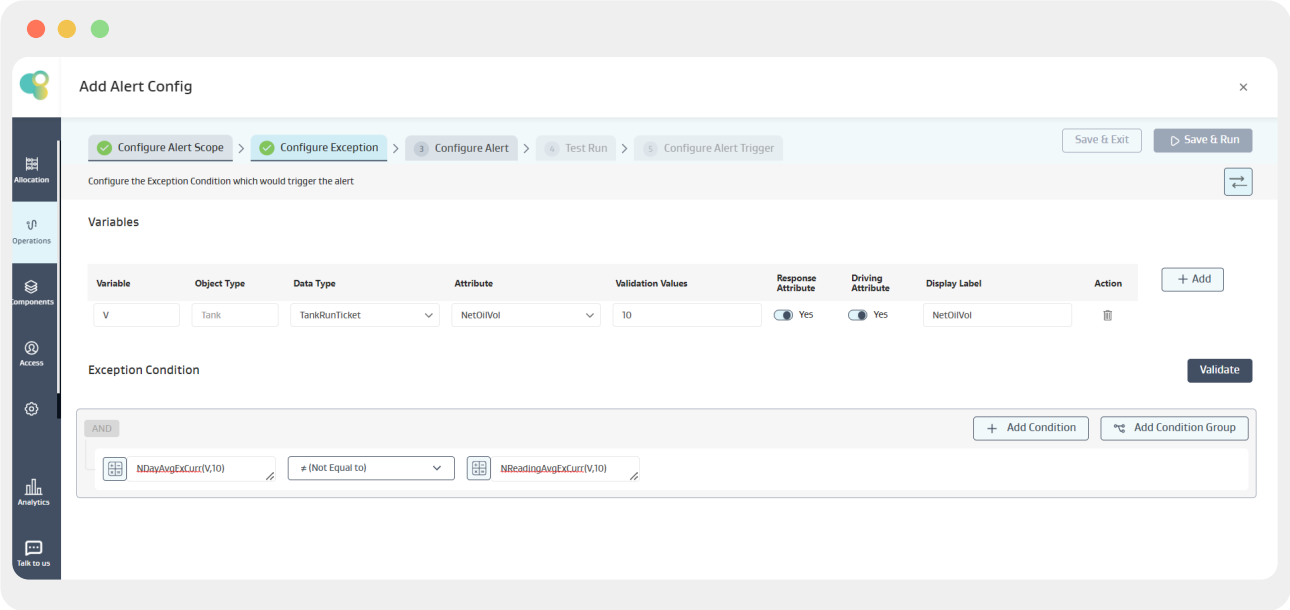
The average of values of the Variable (V) fetched from all the available readings in the “Last N Days” (N) excluding the Current Day Reading.

Input: V (Decimal), N (Positive Integer >=1), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Average of **NetOilVolume** for the **“Last 10 days”** excluding the current date is not equal to the Average of **NetOilVolume** for the **“Last 10 readings”** excluding the current reading

Exception Condition: The below Exception Condition shows the syntax and logic used



Mathematical logic:

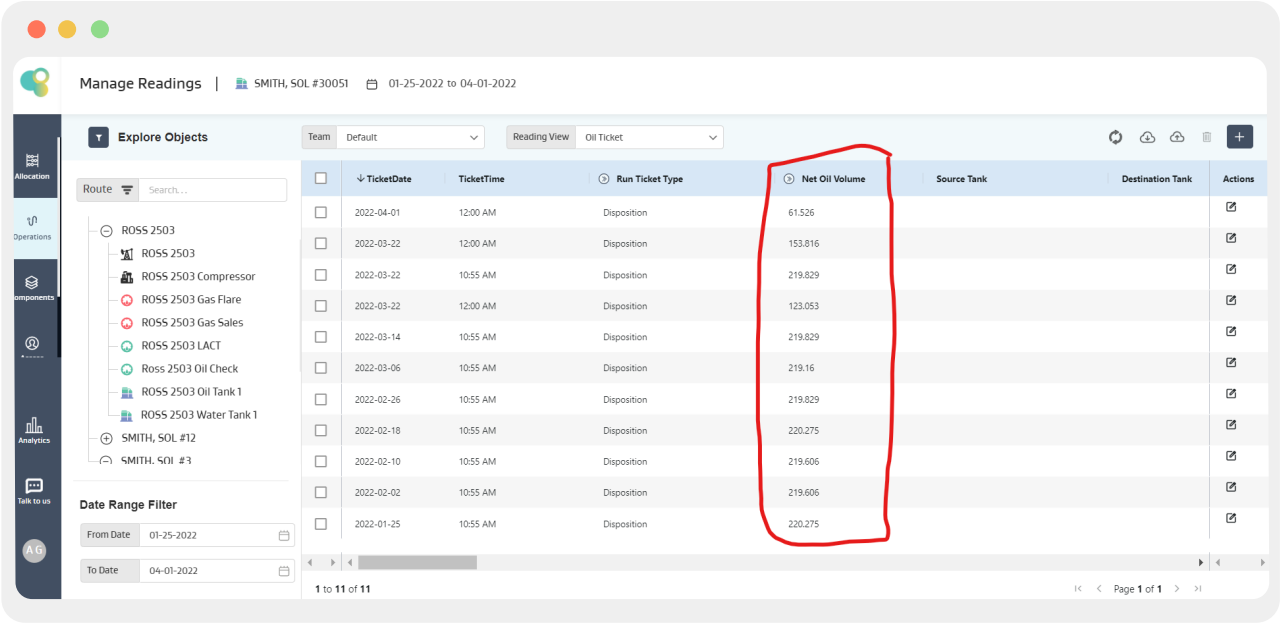
On the tank SMITH, SOL#30051

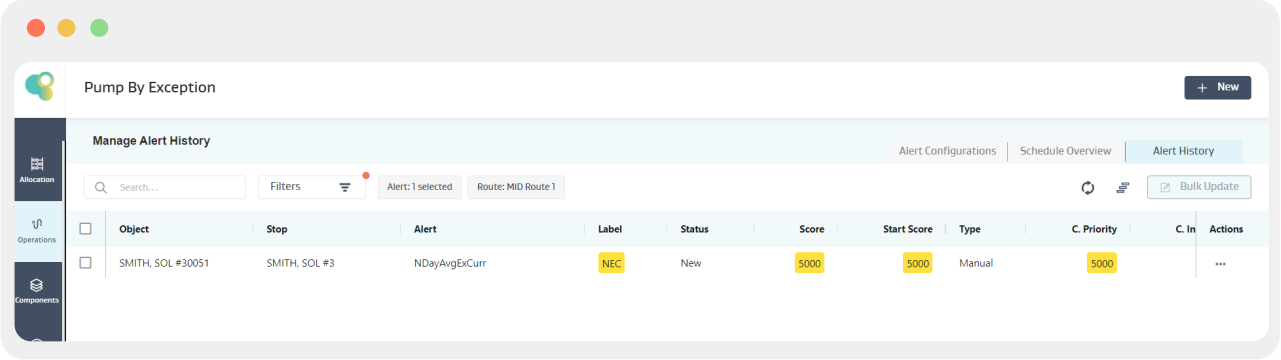
Assuming Current Date as 1st April

The last 10 readings are available, so those 10 readings will be taken for calculation of NReadingAvgExCurr, i.e., **(153.816, 219.829, 123.053, 219.829, 219.16, 219.829, 220.275, 219.606, 219.606, 220.275) = 203.5278**

For NDayAvgExCurr, there are 3 readings in the last 10 Days available readings, i.e., **(153.816, 219.829, 123.053) = 165.566**

Given ***203.5278*** is Not Equal to **165.566**, the condition is satisfied, and an alert is created for SMITH, SOL#30051 Well, as shown below





Note:

- If there are no readings on the object, then the expression evaluation on that particular object fails, and the object is skipped, but for the other objects, the expression is evaluated, and an alert is generated if the condition is true
- If there are less number of readings available on an object than what the function demands, but there are no NULL values in between, then the expression evaluation proceeds with the available data and evaluates the expression.
- If multiple NULL values exist for an object attribute in an expression, the expression evaluation fails, and no alert is created for that object.

CurrentDate(), Day(D1), Month (D1)

Description:

Current Date function uses the Current Date in expression evaluation

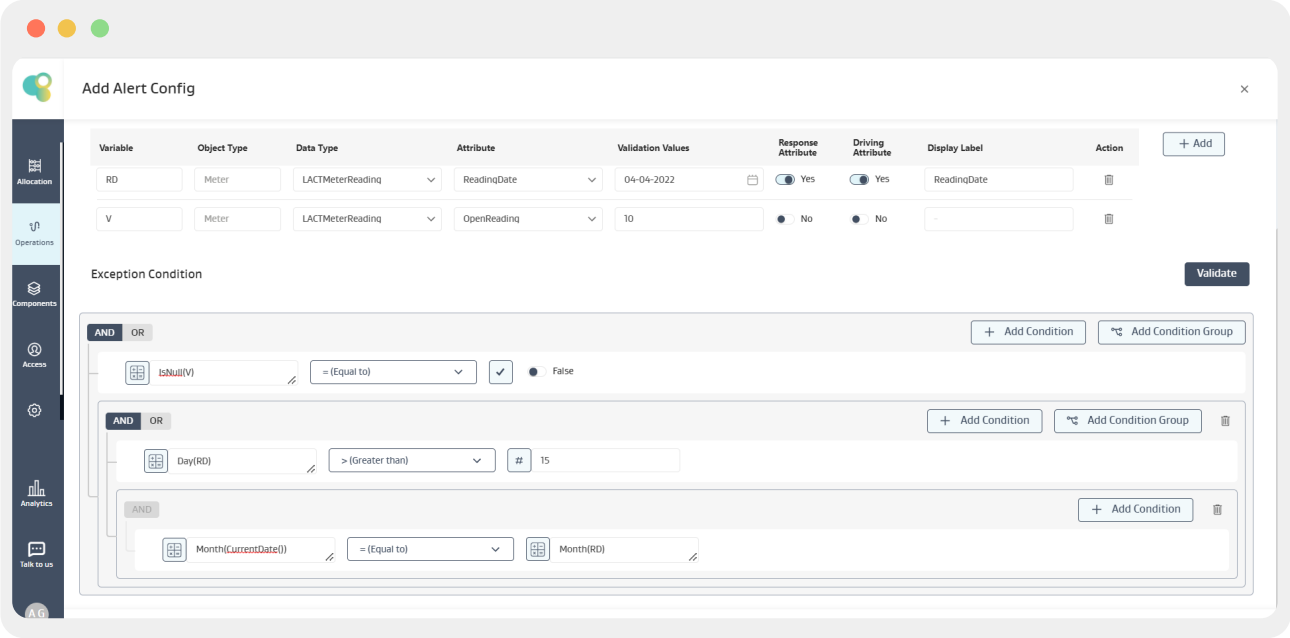
Day(D1) returns the Date in integer format

Month(D1) returns the Month in integer format

Example:

Alert Requirement: Show an Alert for "LACT Meter Reading Rule" when the Open Reading is not NULL and the Day is Greater than 15 and also the last available "Reading Date" Month is same as Current Date month

Exception Condition: The below Exception Condition shows the syntax and logic used



Mathematical logic:

On the Meter ROSS 2503 LACT

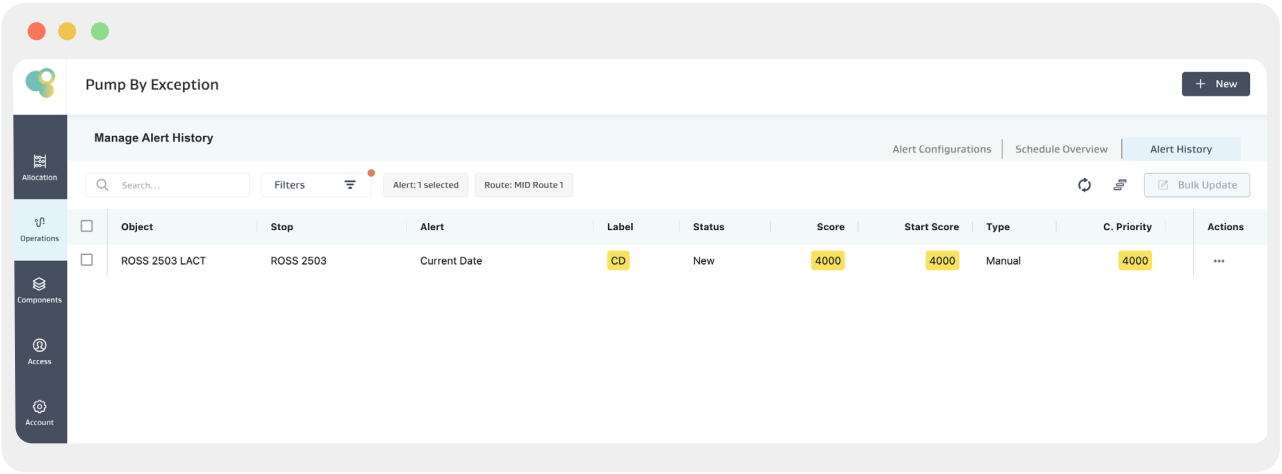
Assuming Current Date as March 30th

Given the Open Reading is not NULL

Given that the Reading Date is greater than 15

Given that the Current Date and Reading Date month is same

Given RD ie 03/16/2022 > 15 , the condition is satisfied, and an is created as shown below


Pump By Exception
New
Manage Alert History
Alert Configurations
Schedule Overview
Alert History
Allocation
Operations
Components
Access
Account
Search...
Filters
Alert: 1 selected
Route: MID Route 1
Bulk Update
Object
Stop
Alert
Label
Status
Score
Start Score
Type
C. Priority
Actions
ROSS 2503 LACT
ROSS 2503
Current Date
CD
New
4000
4000
Manual
4000

AddDays(D1,d)

Description:

Adds “d” No. of Days to the Date (D1)

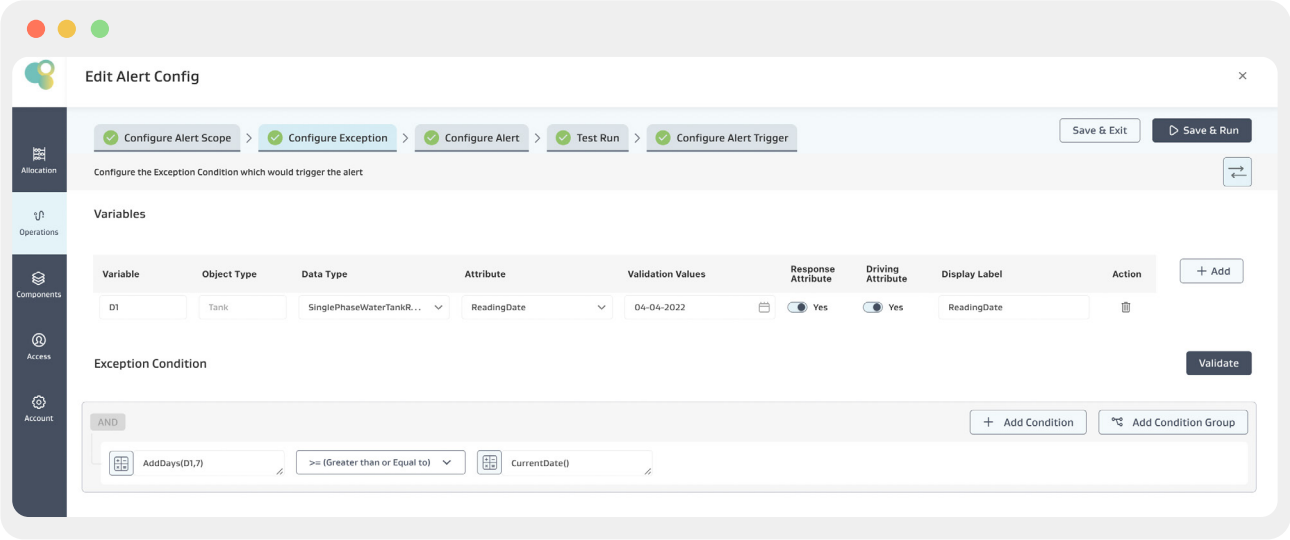
Input: D1 (Date), d (Positive Integer >=1), Output: Decimal

Note: Nested Functions can also be used which are of appropriate data-type

Example:

Alert Requirement: Show a Tank Visit Alert when 7 Days has passed since the Last Reading Date

Exception Condition: The below Exception Condition shows the syntax and logic used



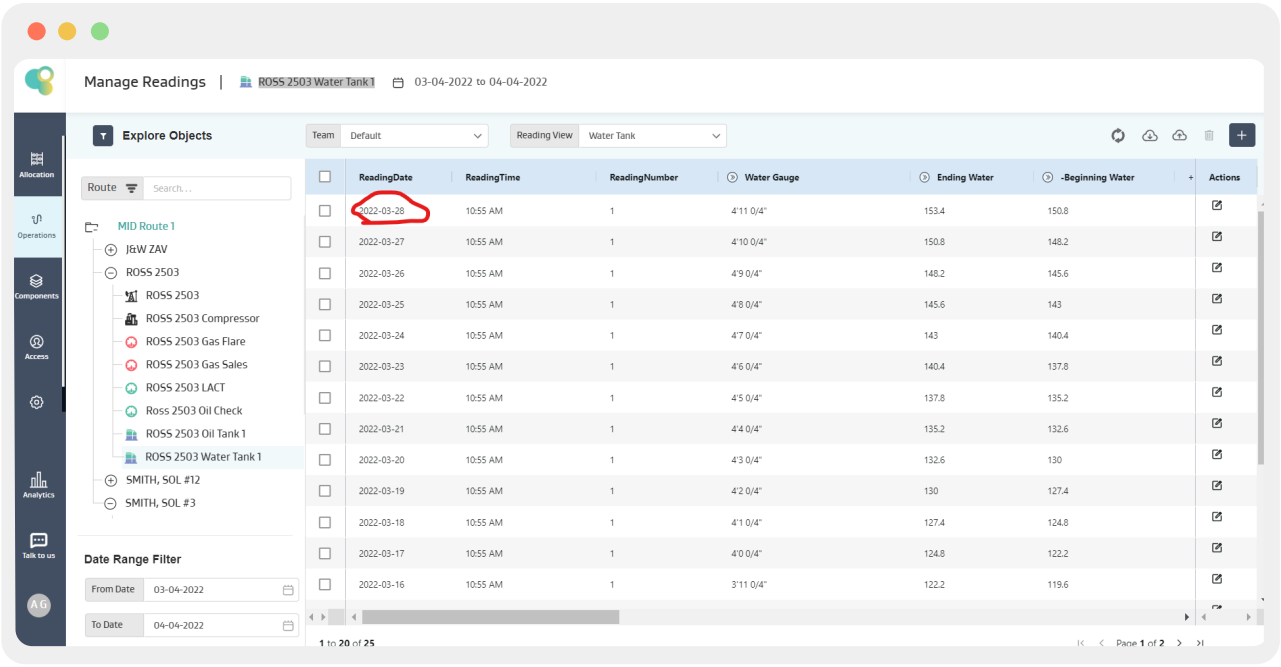
Mathematical logic:

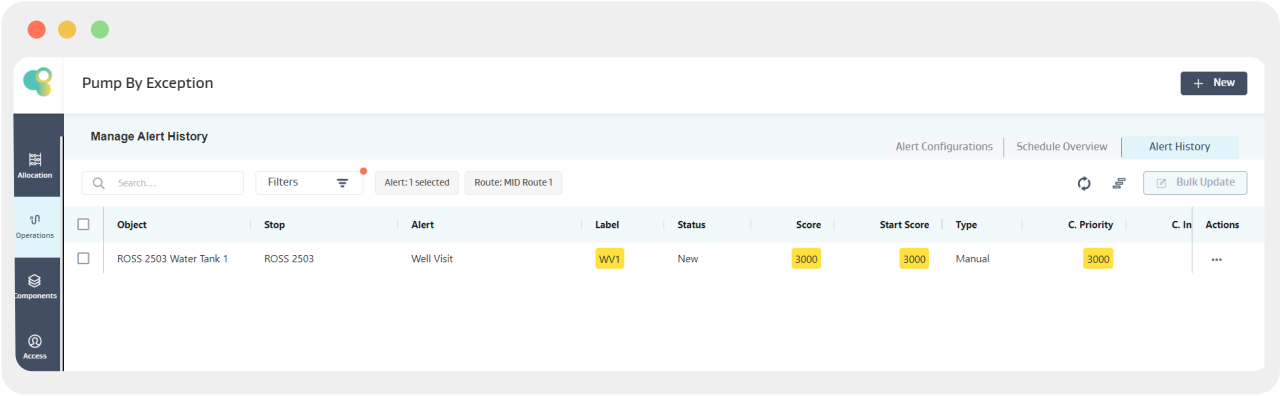
On the tank ROSS 2503 Water Tank 1

The last available reading is 03/28/2022 , **3/28/2022 + 7 Days** is 4/4/2022

Also the Current Date is 4/4/2022

Given **4/4/2022** is equal to 4/4/2022 , the condition is satisfied, and an alert for the ROSS 2503 Water Tank 1 Tank is created, as shown below.


Manage Readings | ROSS 2503 Water Tank 1 03-04-2022 to 04-04-2022
Explore Objects
Team Default
Reading View Water Tank
Route Search...
MID Route 1
J&W ZAV
ROSS 2503
ROSS 2503
ROSS 2503 Compressor
ROSS 2503 Gas Flare
ROSS 2503 Gas Sales
ROSS 2503 LACT
Ross 2503 Oil Check
ROSS 2503 Oil Tank 1
ROSS 2503 Water Tank 1
SMITH, SOL #12
SMITH, SOL #3
Date Range Filter
From Date 03-04-2022
To Date 04-04-2022
ReadingDate
ReadingTime
ReadingNumber
Water Gauge
Ending Water
-Beginning Water
Actions
2022-03-28 10:55 AM 1 4'11 0/4" 153.4 150.8
2022-03-27 10:55 AM 1 4'10 0/4" 150.8 148.2
2022-03-26 10:55 AM 1 4'9 0/4" 148.2 145.6
2022-03-25 10:55 AM 1 4'8 0/4" 145.6 143
2022-03-24 10:55 AM 1 4'7 0/4" 143 140.4
2022-03-23 10:55 AM 1 4'6 0/4" 140.4 137.8
2022-03-22 10:55 AM 1 4'5 0/4" 137.8 135.2
2022-03-21 10:55 AM 1 4'4 0/4" 135.2 132.6
2022-03-20 10:55 AM 1 4'3 0/4" 132.6 130
2022-03-19 10:55 AM 1 4'2 0/4" 130 127.4
2022-03-18 10:55 AM 1 4'1 0/4" 127.4 124.8
2022-03-17 10:55 AM 1 4'0 0/4" 124.8 122.2
2022-03-16 10:55 AM 1 3'11 0/4" 122.2 119.6
1 to 20 of 25
Page 1 of 2


Pump By Exception
+ New
Manage Alert History
Alert Configurations
Schedule Overview
Alert History
Search...
Filters
Alert: 1 selected
Route: MID Route 1
Bulk Update
Object
Stop
Alert
Label
Status
Score
Start Score
Type
C. Priority
C. In
Actions
ROSS 2503 Water Tank 1
ROSS 2503
Well Visit
WV1
New
3000
3000
Manual
3000

AddMonths(D1,m)

Description:

Adds “m” No. of Months to the Date (D1)

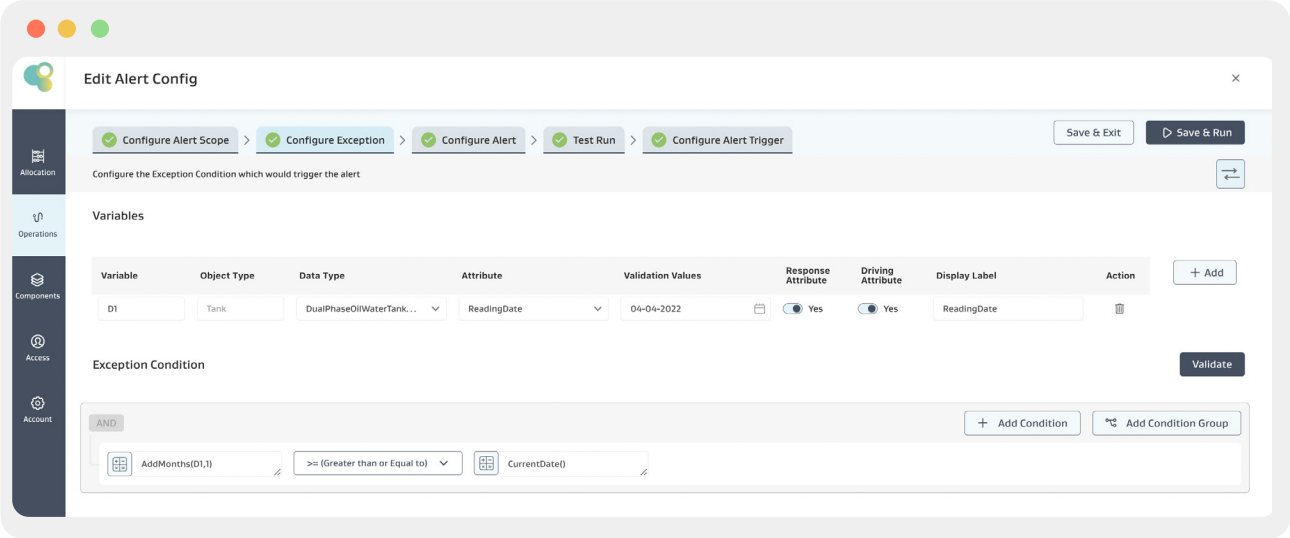
Input: D1 (Date), m (Positive Integer >=1), Output: Decimal

Note: Nested Functions can also be used which are of appropriate data-type

Example:

Alert Requirement: Show an Alert when the 1 month or more has passed since Last Available Reading Date

Exception Condition: The below Exception Condition shows the syntax and logic used



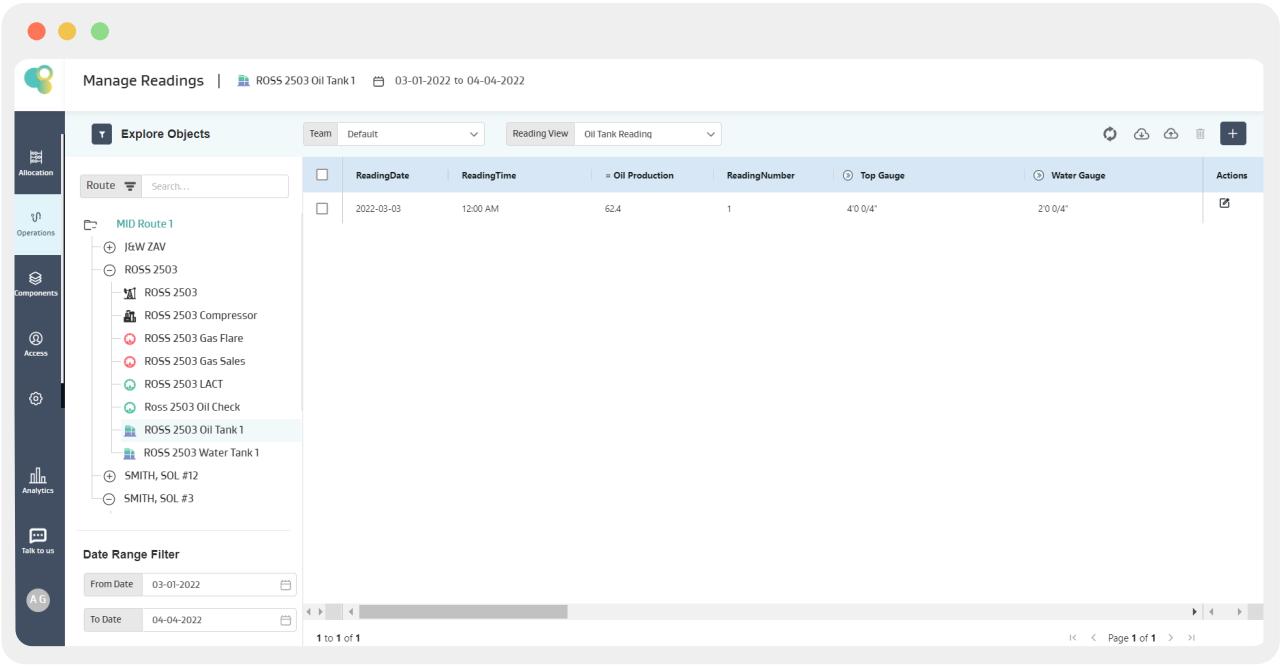
Mathematical logic:

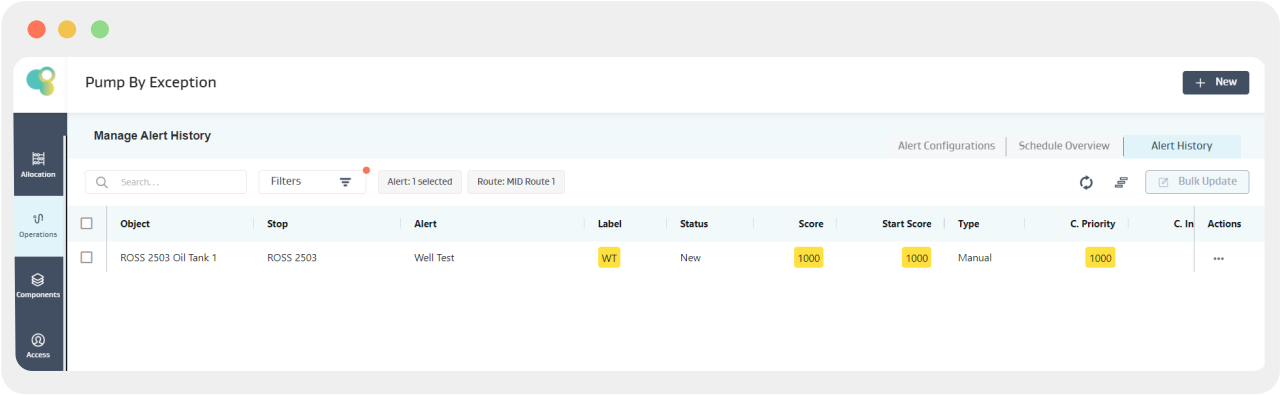
On the tank ROSS 2503 Oil Tank 1

The last available reading is **3/3/2022 + 1 Month** is 4/3/2022

Assuming the Current Date is 4/3/2022

Given the condition is satisfied, an alert for the ROSS 2503 Oil Tank 1 Tank is created, as shown below.


Manage Readings | ROSS 2503 Oil Tank 1 03-01-2022 to 04-04-2022
Explore Objects
Team Default
Reading View Oil Tank Reading
Route Search...
MID Route 1
J&W ZAV
ROSS 2503
ROSS 2503
ROSS 2503 Compressor
ROSS 2503 Gas Flare
ROSS 2503 Gas Sales
ROSS 2503 LACT
Ross 2503 Oil Check
ROSS 2503 Oil Tank 1
ROSS 2503 Water Tank 1
SMITH, SOL #12
SMITH, SOL #3
Date Range Filter
From Date 03-01-2022
To Date 04-04-2022
ReadingDate
ReadingTime
Oil Production
ReadingNumber
Top Gauge
Water Gauge
Actions
2022-03-03
12:00 AM
62.4
1
4'0 0/4"
2'0 0/4"
1 to 1 of 1
Page 1 of 1
Allocation
Operations
Components
Access
Analytics
Talk to us


Pump By Exception
New
Manage Alert History
Alert Configurations
Schedule Overview
Alert History
Search...
Filters
Alert: 1 selected
Route: MID Route 1
Bulk Update
Object
Stop
Alert
Label
Status
Score
Start Score
Type
C. Priority
C. In
Actions
ROSS 2503 Oil Tank 1
ROSS 2503
Well Test
WT
New
1000
1000
Manual
1000
Allocation
Operations
Components
Access

AddYears(D1,y)

Description:

Add “y” No. of years (y) to the Reading Date (D1)

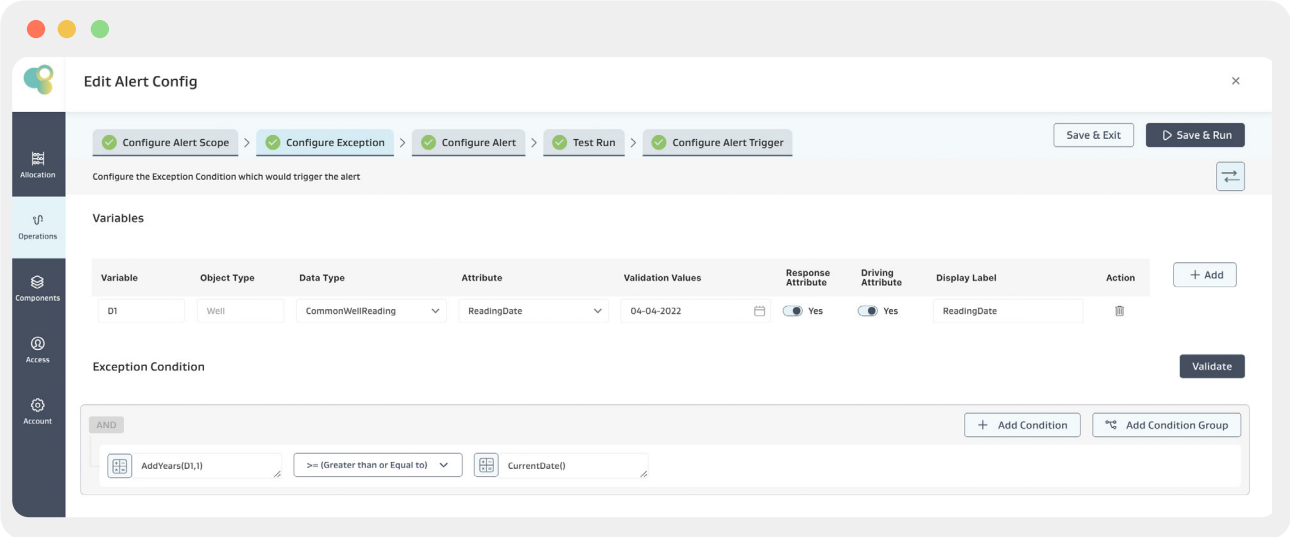
Input: D1 (Date, y (Positive Integer >=1), Output: Decimal

Note: Nested Functions can also be used which are of appropriate data-type

Example:

Alert Requirement: Show an Alert when more than 1 year has passed since the Last Available Reading Date

Exception Condition: The below Exception Condition shows the syntax and logic used



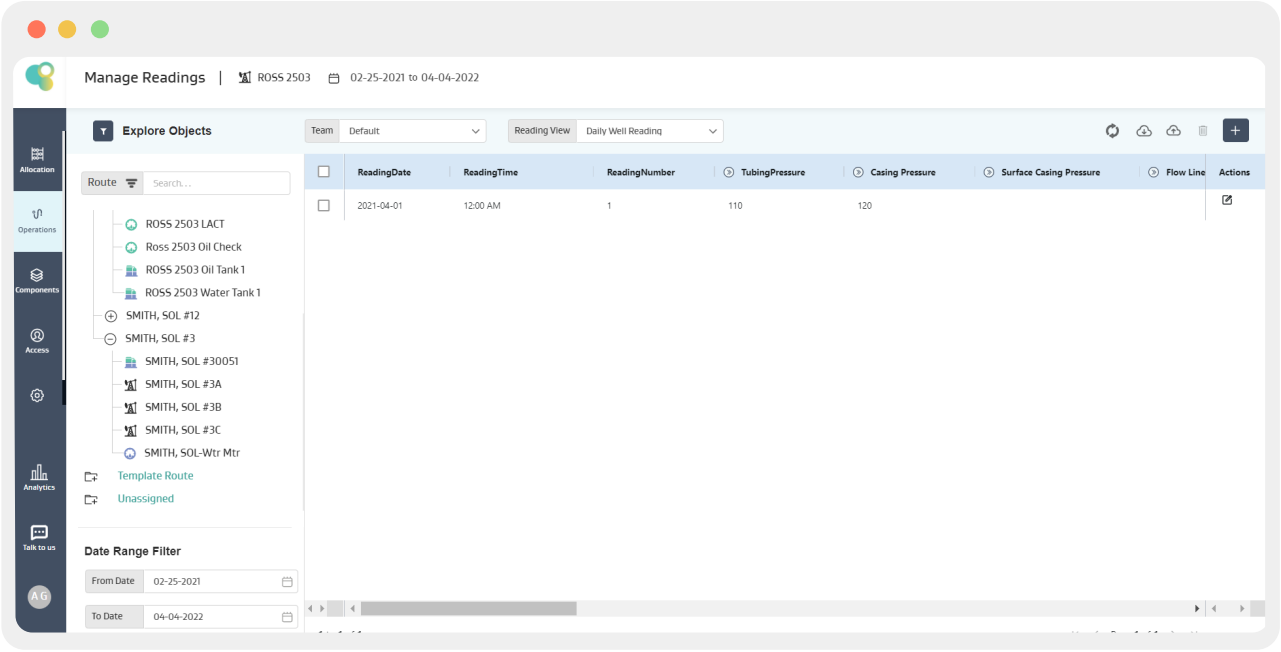
Mathematical logic:

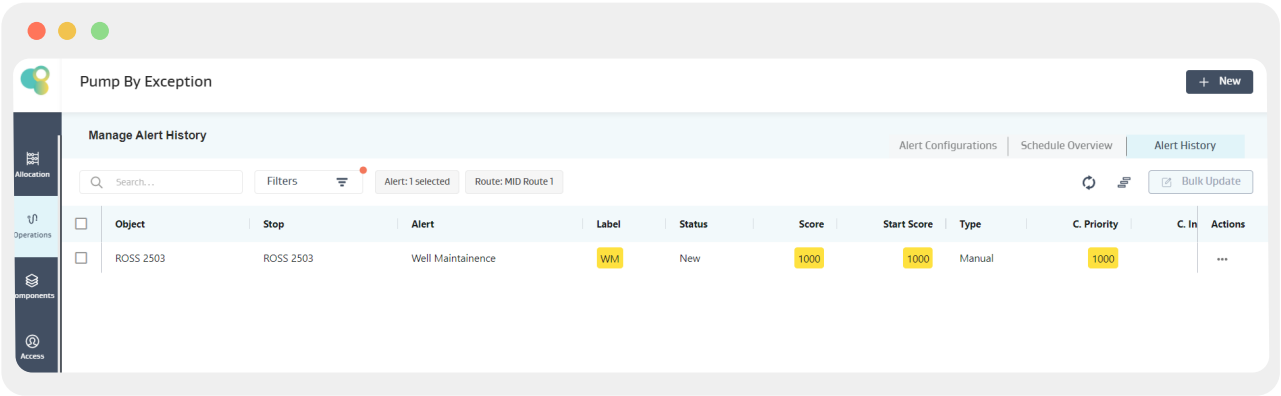
On the tank ROSS 2503 Well

The last available reading is **4/1/2021 + 1 Year** is 4/1/2022

Assuming the Current Date is 4/1/2022

Given the condition is satisfied, an alert for the ROSS 2503 Well is created, as shown below.


Manage Readings | ROSS 2503 02-25-2021 to 04-04-2022
Explore Objects
Team Default
Reading View Daily Well Reading
Route
ROSS 2503 LACT
Ross 2503 Oil Check
ROSS 2503 Oil Tank 1
ROSS 2503 Water Tank 1
SMITH, SOL #12
SMITH, SOL #3
SMITH, SOL #30051
SMITH, SOL #3A
SMITH, SOL #3B
SMITH, SOL #3C
SMITH, SOL-Wtr Mtr
Template Route
Unassigned
Date Range Filter
From Date 02-25-2021
To Date 04-04-2022
ReadingDate
ReadingTime
ReadingNumber
TubingPressure
Casing Pressure
Surface Casing Pressure
Flow Line
Actions
2021-04-01
12:00 AM
1
110
120
Allocation
Operations
Components
Access
Analytics
Talk to us


Pump By Exception
New
Manage Alert History
Alert Configurations
Schedule Overview
Alert History
Search...
Filters
Alert: 1 selected
Route: MID Route 1
Bulk Update
Object
Stop
Alert
Label
Status
Score
Start Score
Type
C. Priority
Actions
ROSS 2503
ROSS 2503
Well Maintainence
WM
New
1000
1000
Manual
1000
Allocation
Operations
Components
Access

Min(V1,V2,V3..)

Description:

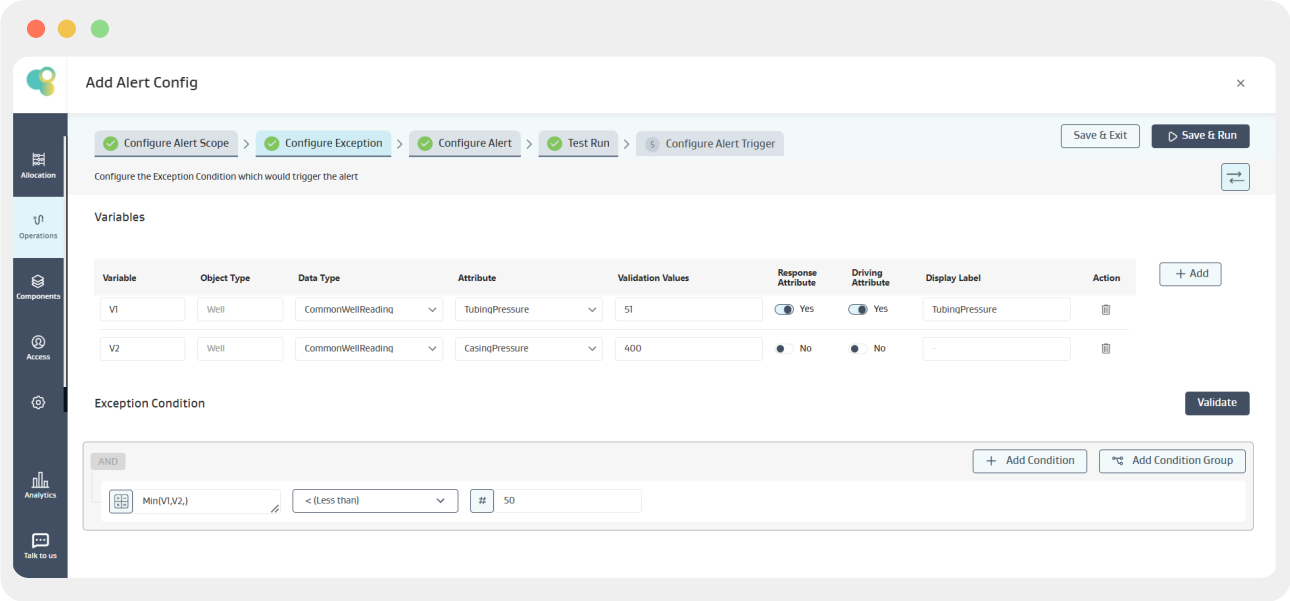
Minimum value of the Variables **(V1,V2,V3)** is calculated from the Last Reading on the object

Input: V1,V2,V3 (Decimal), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Minimum value for Casing pressure or Tubing Pressure is less than 50

Exception Condition: The below Exception Condition shows the syntax and logic used

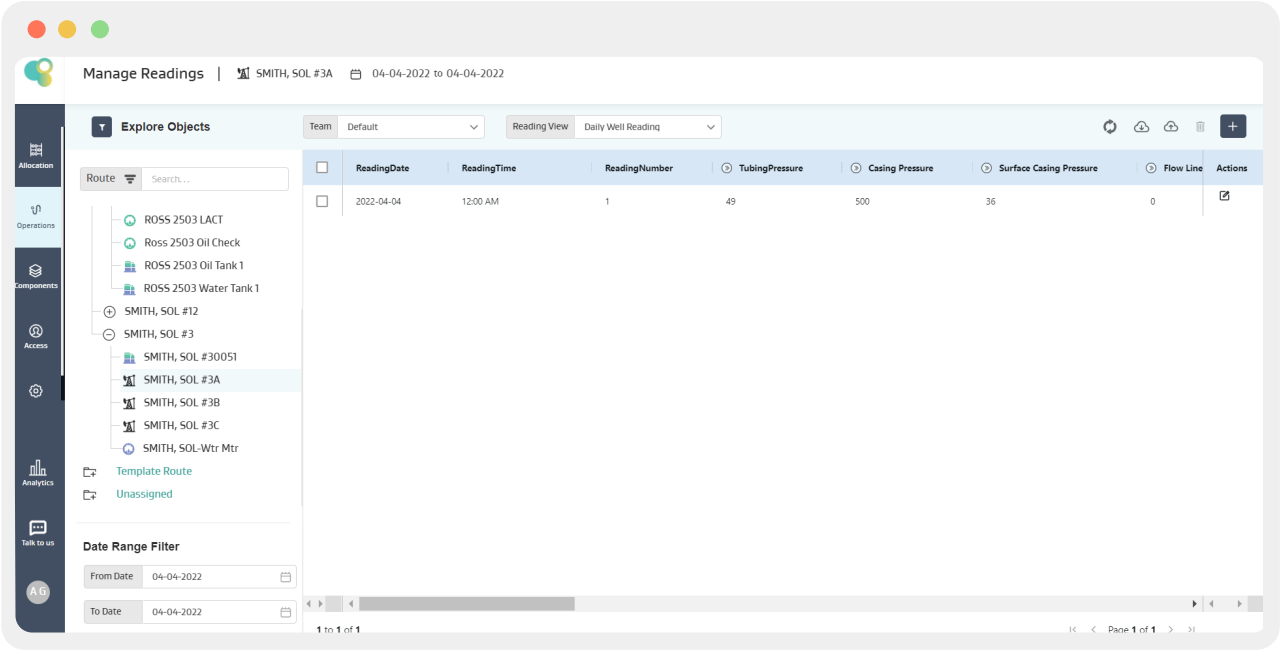


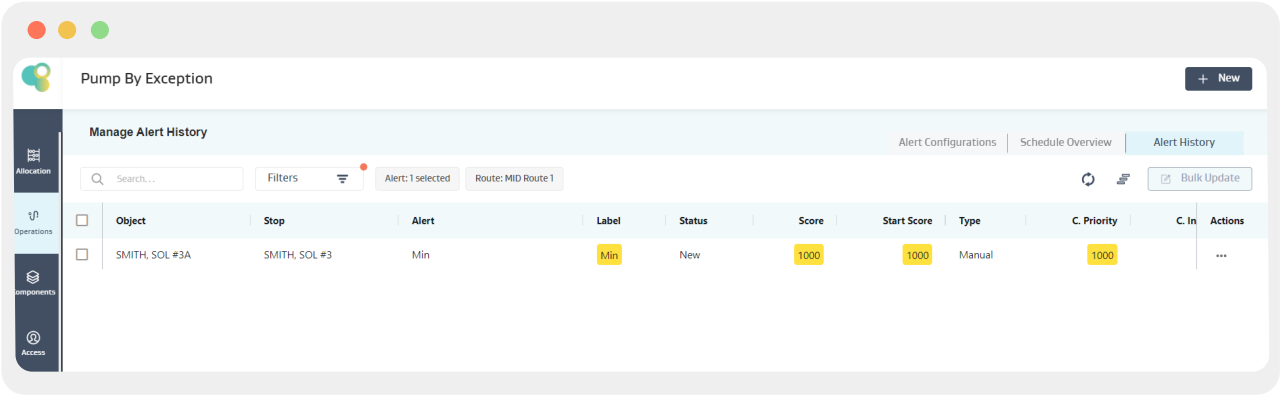
Mathematical logic:

On the Well SMITH, SOL #3A

Given the Tubing Pressure and Casing Pressure is respectively 49, 500

Given 49 < 50, the condition is satisfied, and an alert for SMITH, SOL #3A Well is created as shown below


Manage Readings | SMITH, SOL #3A 04-04-2022 to 04-04-2022
Explore Objects
Team Default
Reading View Daily Well Reading
Route
ROSS 2503 LACT
Ross 2503 Oil Check
ROSS 2503 Oil Tank 1
ROSS 2503 Water Tank 1
SMITH, SOL #12
SMITH, SOL #3
SMITH, SOL #30051
SMITH, SOL #3A
SMITH, SOL #3B
SMITH, SOL #3C
SMITH, SOL-Wtr Mtr
Template Route
Unassigned
Date Range Filter
From Date 04-04-2022
To Date 04-04-2022
ReadingDate
ReadingTime
ReadingNumber
TubingPressure
Casing Pressure
Surface Casing Pressure
Flow Line
Actions
2022-04-04
12:00 AM
1
49
500
36
0
1 to 1 of 1
Page 1 of 1


Pump By Exception
New
Manage Alert History
Alert Configurations
Schedule Overview
Alert History
Search...
Filters
Alert: 1 selected
Route: MID Route 1
Bulk Update
Object
Stop
Alert
Label
Status
Score
Start Score
Type
C. Priority
C. In
Actions
SMITH, SOL #3A
SMITH, SOL #3
Min
Min
New
1000
1000
Manual
1000

Max(V1,V2,V3..)

Description:

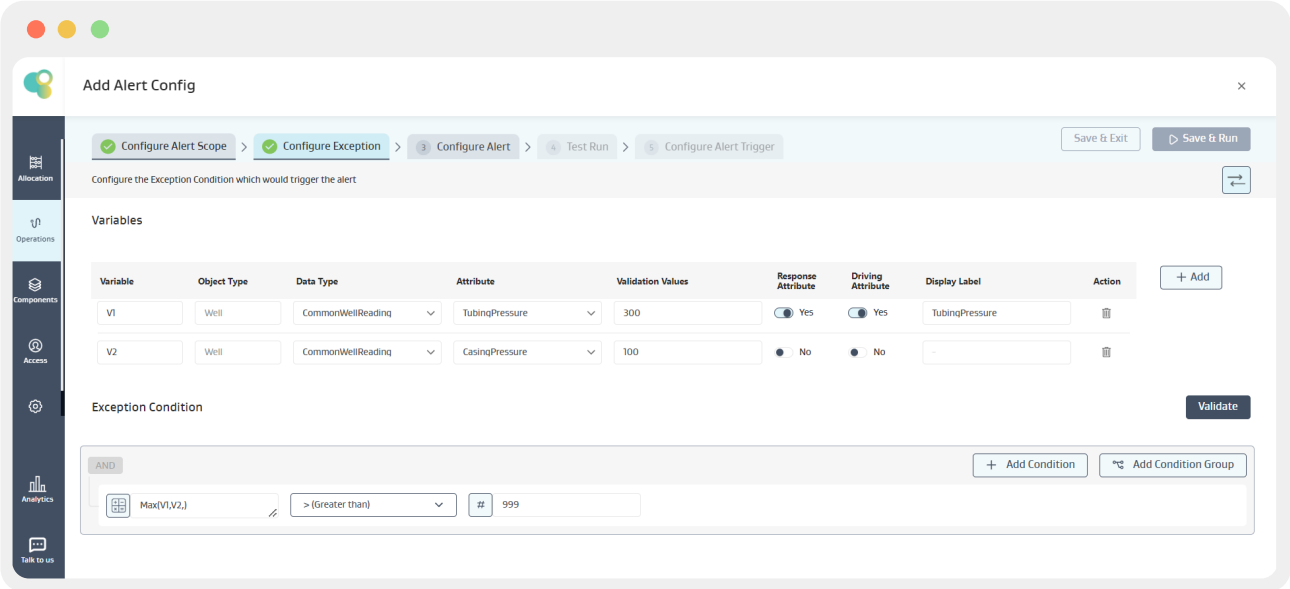
Maximum value of the Variable **(V1,V2,V3)** is calculated from the Last Reading on the Object

Input: V1,V2,V3 (Decimal), Output: Decimal

Example:

Alert Requirement: Show an Alert when the Maximum value for Casing pressure or Tubing Pressure is greater than 999

Exception Condition: The below Exception Condition shows the syntax and logic used

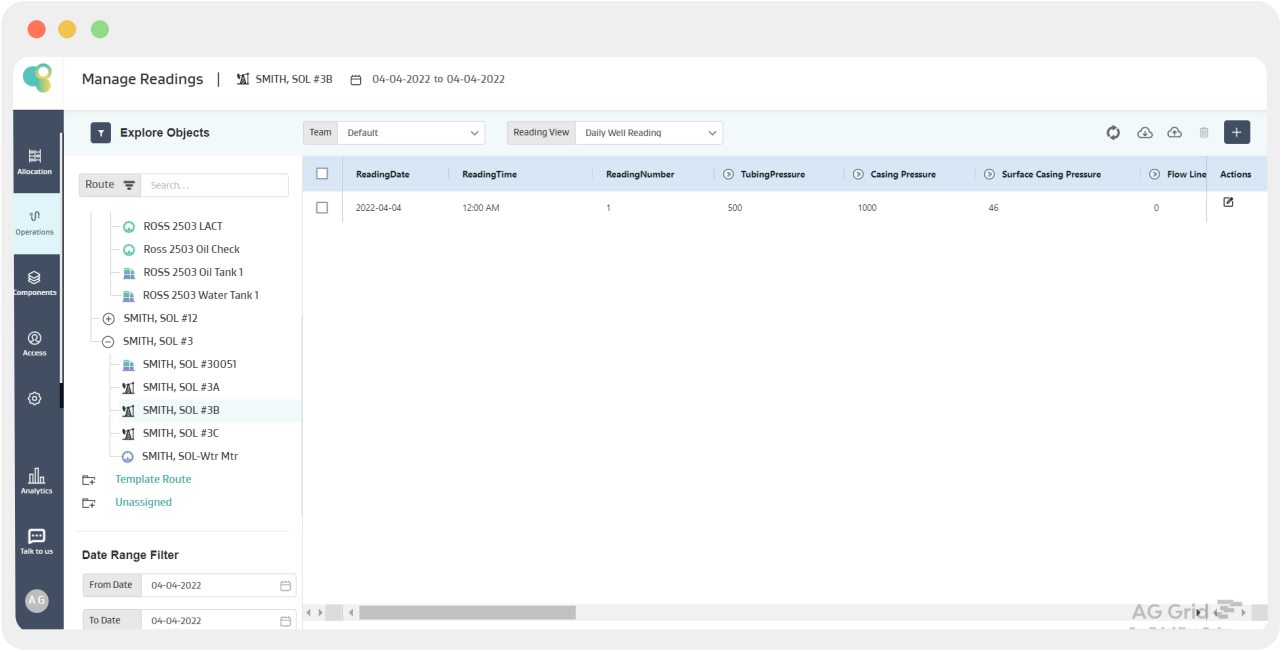


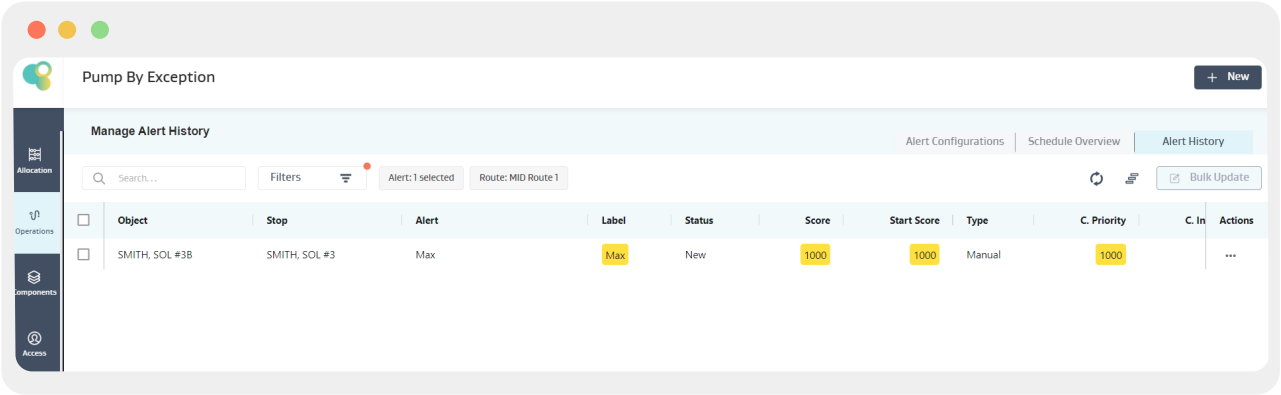
Mathematical logic:

On the Well SMITH, SOL #3B

Given the Tubing Pressure and Casing Pressure is respectively 500,1000

Given 1000>999, the condition is satisfied, and an alert for SMITH, SOL #3B Well is created as shown below


Manage Readings | SMITH, SOL #3B 04-04-2022 to 04-04-2022
Explore Objects
Team Default
Reading View Daily Well Reading
Allocation
Operations
Components
Access
Analytics
Talk to us
Route
Search...
ROSS 2503 LACT
Ross 2503 Oil Check
ROSS 2503 Oil Tank 1
ROSS 2503 Water Tank 1
SMITH, SOL #12
SMITH, SOL #3
SMITH, SOL #30051
SMITH, SOL #3A
SMITH, SOL #3B
SMITH, SOL #3C
SMITH, SOL-Wtr Mtr
Template Route
Unassigned
Date Range Filter
From Date 04-04-2022
To Date 04-04-2022
ReadingDate
ReadingTime
ReadingNumber
TubingPressure
Casing Pressure
Surface Casing Pressure
Flow Line
Actions
2022-04-04
12:00 AM
1
500
1000
46
0
AG Grid


Pump By Exception
New
Manage Alert History
Alert Configurations
Schedule Overview
Alert History
Search...
Filters
Alert: 1 selected
Route: MID Route 1
Bulk Update
Allocation
Operations
Components
Access
Object
Stop
Alert
Label
Status
Score
Start Score
Type
C. Priority
C. In
Actions
SMITH, SOL #3B
SMITH, SOL #3
Max
Max
New
1000
1000
Manual
1000

Power(V,P)

Description:

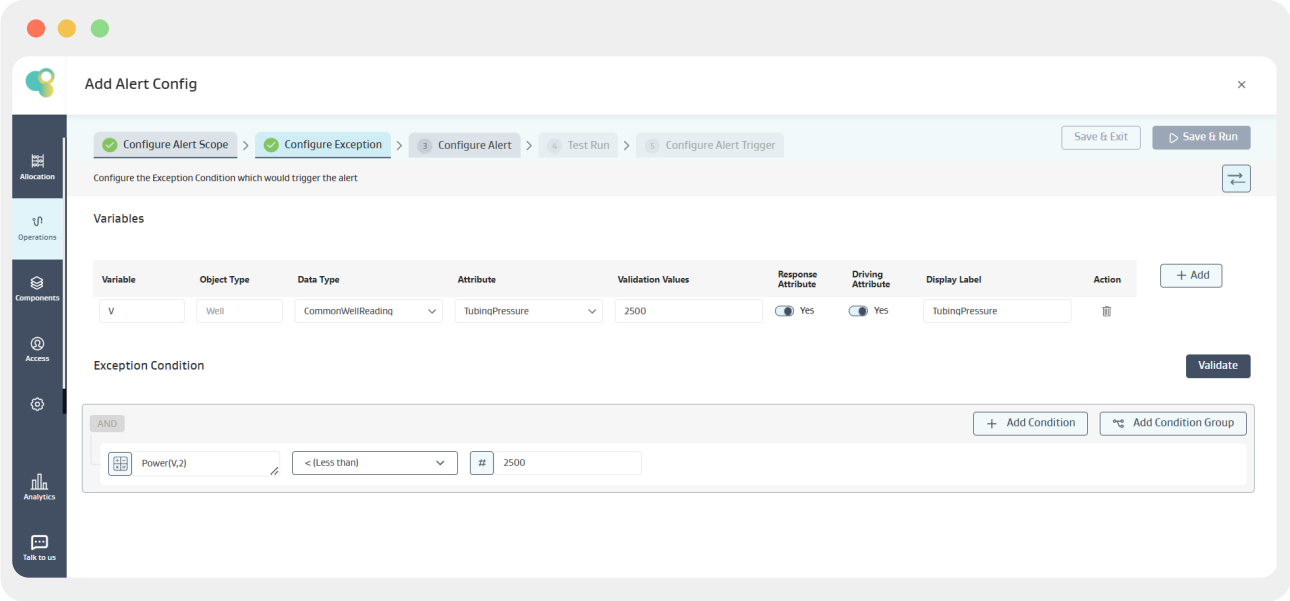
The value of the Variable **(V)** is calculated using number raised to a power.

Input: V= Base (Integer, Decimal), P = Power (Integer, Decimal), Where V is a positive decimal greater than zero, Output: Decimal

Example:

Alert Requirement: Show an Alert when the Tubing Pressure raise to 2 is less than 250

Exception Condition: The below Exception Condition shows the syntax and logic used



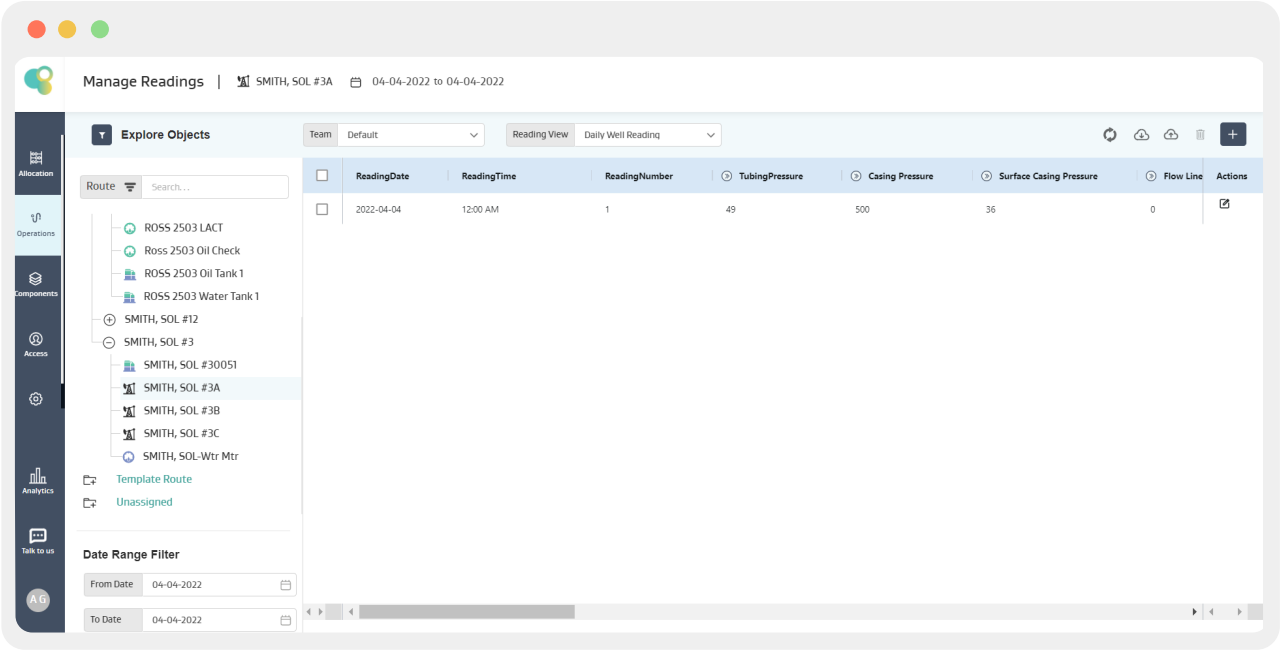
Mathematical logic:

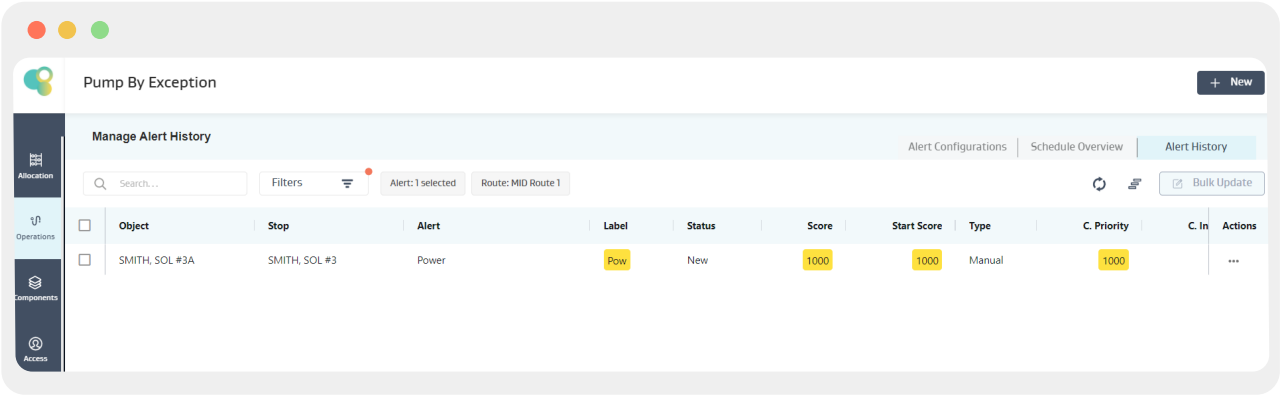
On the Well SMITH, SOL #3A

Given the Tubing Pressure is 49

And 49 power 2 = 2401

Given 2401 < 2500, the condition is satisfied, and an alert for SMITH, SOL #3A Well is created as shown below


Manage Readings | SMITH, SOL #3A 04-04-2022 to 04-04-2022
Explore Objects
Team Default
Reading View Daily Well Reading
Allocation
Operations
Components
Access
Analytics
Talk to us
Route
Search...
ROSS 2503 LACT
Ross 2503 Oil Check
ROSS 2503 Oil Tank 1
ROSS 2503 Water Tank 1
SMITH, SOL #12
SMITH, SOL #3
SMITH, SOL #30051
SMITH, SOL #3A
SMITH, SOL #3B
SMITH, SOL #3C
SMITH, SOL-Wtr Mtr
Template Route
Unassigned
Date Range Filter
From Date 04-04-2022
To Date 04-04-2022
ReadingDate
ReadingTime
ReadingNumber
TubingPressure
Casing Pressure
Surface Casing Pressure
Flow Line
Actions
2022-04-04
12:00 AM
1
49
500
36
0


Pump By Exception
New
Manage Alert History
Alert Configurations
Schedule Overview
Alert History
Search...
Filters
Alert: 1 selected
Route: MID Route 1
Bulk Update
Allocation
Operations
Components
Access
Object
Stop
Alert
Label
Status
Score
Start Score
Type
C. Priority
C. In
Actions
SMITH, SOL #3A
SMITH, SOL #3
Power
Pow
New
1000
1000
Manual
1000

Abs(V)

Description:

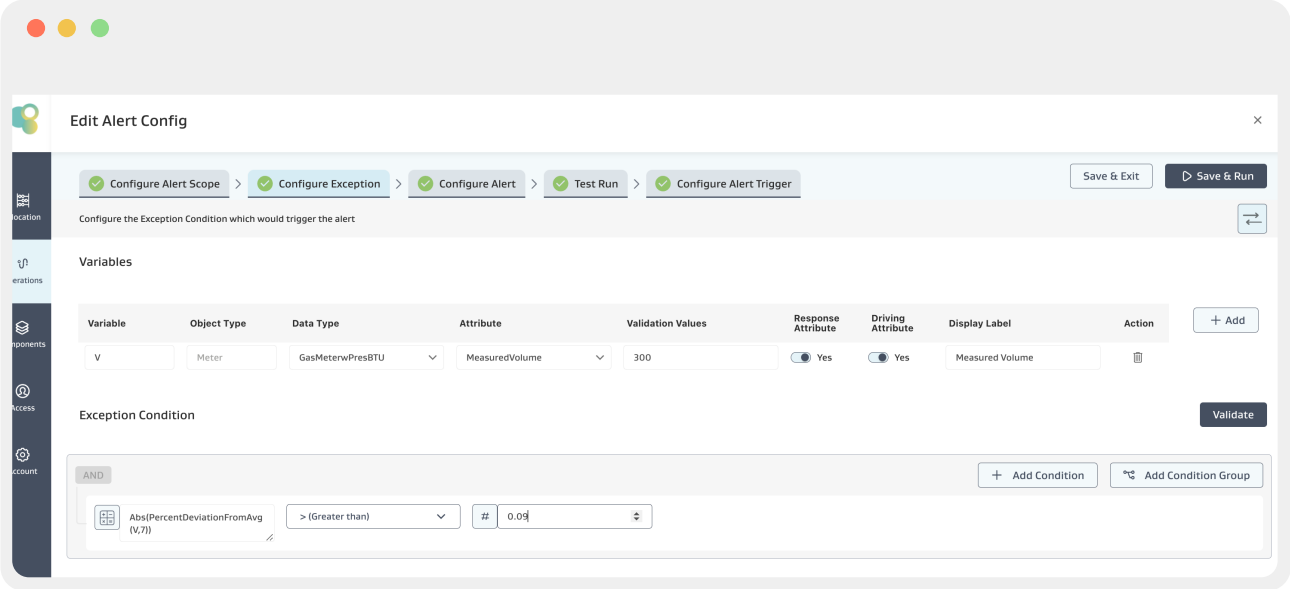
Returns the Absolute Value (positive value) of the variable **(V)**

Input: V (Decimal) , Output: Decimal

Example:

Alert Requirement: Generate an alert if the Absolute value of Percentage Deviation of Gas “Measured Volume” is greater than 9%

Exception Condition: The below Exception Condition shows the syntax and logic used



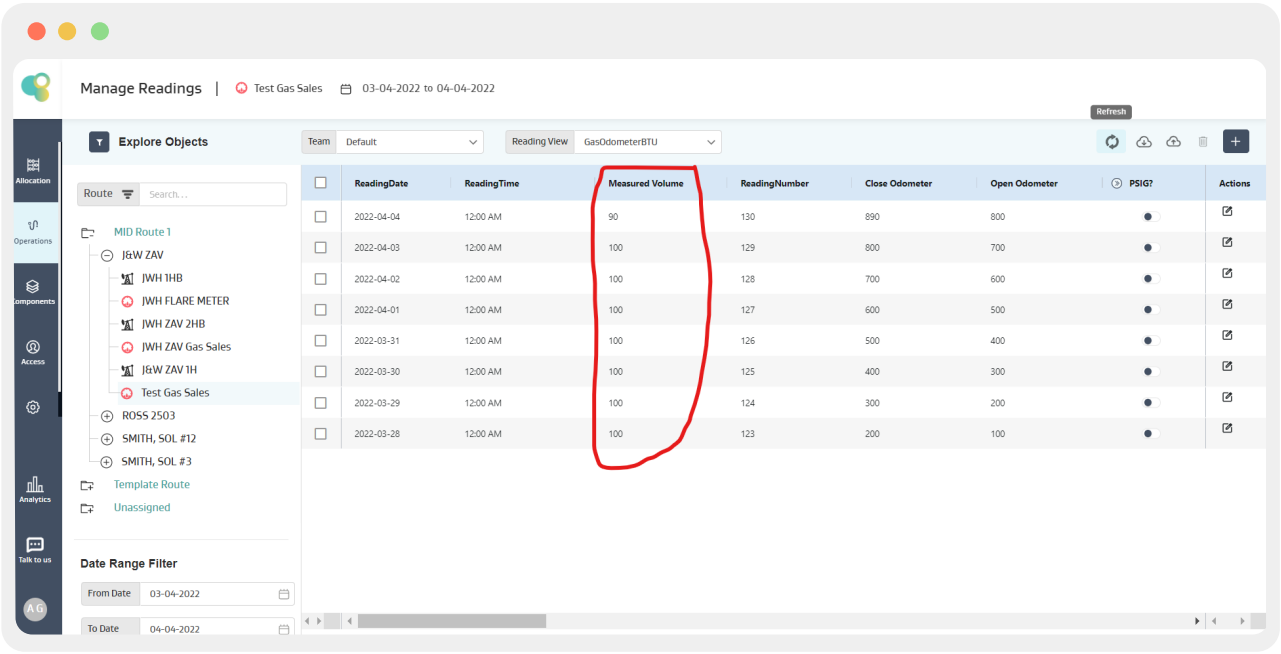
Mathematical logic:

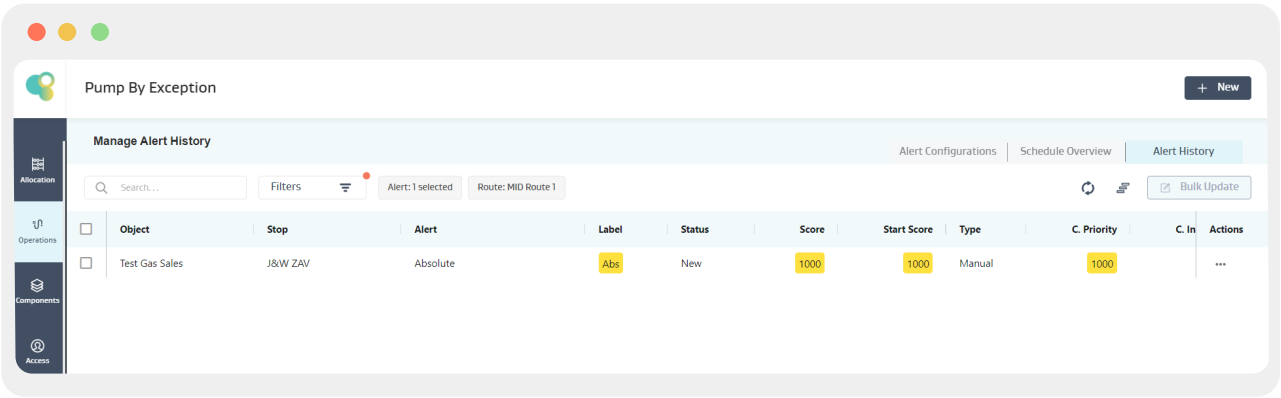
On Test Gas Sales Meter

Current Reading: 90

Last 7 readings average: **(100+100+100+100+100+100+100)/7 = 100**

Given (Current Reading- Average of 7 Readings)/Average of **7 Readings = (90-100)/100 = -0.1**, and Absolute Value of -0.1 is 0.1 which is greater than 0.09, the condition is satisfied, and an alert is created on the meter as shown below


Manage Readings | Test Gas Sales 03-04-2022 to 04-04-2022
Explore Objects
Team Default
Reading View GasOdometerBTU
Refresh
Route
MID Route 1
J&W ZAV
JWH 1HB
JWH FLARE METER
JWH ZAV 2HB
JWH ZAV Gas Sales
J&W ZAV 1H
Test Gas Sales
ROSS 2503
SMITH, SOL #12
SMITH, SOL #3
Template Route
Unassigned
Date Range Filter
From Date 03-04-2022
To Date 04-04-2022
ReadingDate
ReadingTime
Measured Volume
ReadingNumber
Close Odometer
Open Odometer
PSIG?
Actions
2022-04-04 12:00 AM 90 130 890 800
2022-04-03 12:00 AM 100 129 800 700
2022-04-02 12:00 AM 100 128 700 600
2022-04-01 12:00 AM 100 127 600 500
2022-03-31 12:00 AM 100 126 500 400
2022-03-30 12:00 AM 100 125 400 300
2022-03-29 12:00 AM 100 124 300 200
2022-03-28 12:00 AM 100 123 200 100


Pump By Exception
New
Manage Alert History
Alert Configurations
Schedule Overview
Alert History
Search...
Filters
Alert: 1 selected
Route: MID Route 1
Bulk Update
Object
Stop
Alert
Label
Status
Score
Start Score
Type
C. Priority
C. In
Actions
Test Gas Sales J&W ZAV Absolute Abs New 1000 1000 Manual 1000

JOYN

OIL & GAS PRODUCTION

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