

PI World 2019 Lab

Creating SPC Golden Batch Event Frames



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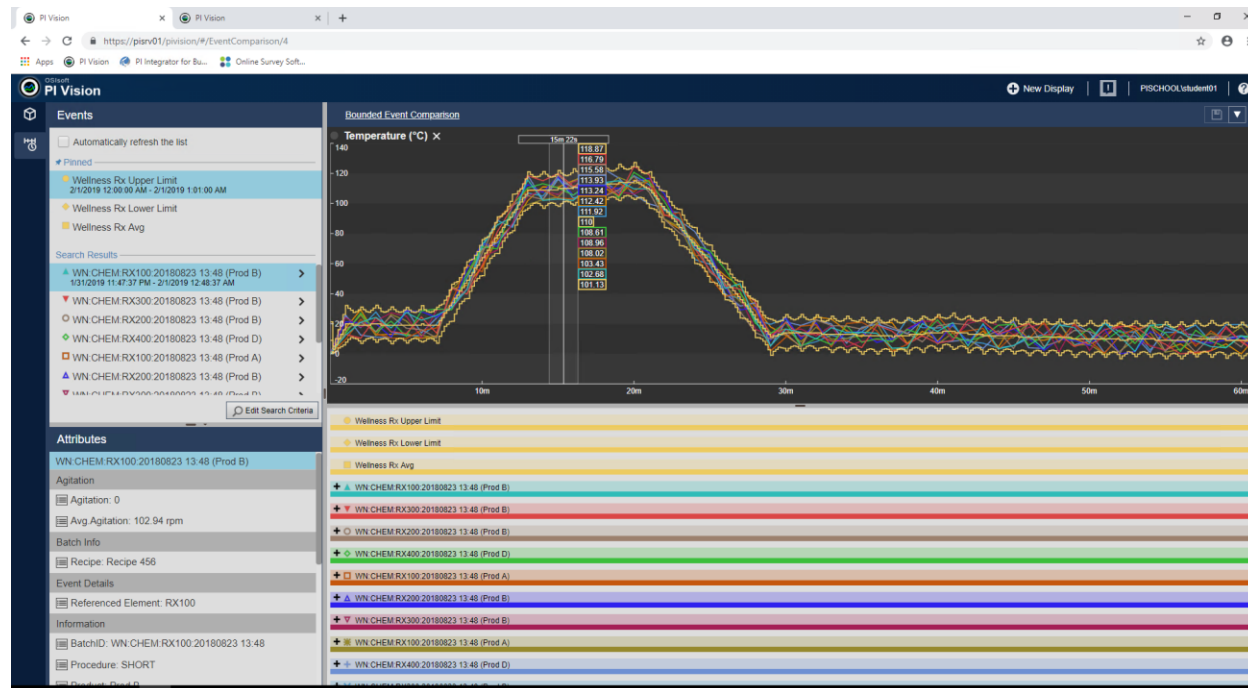
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1. Introduction

1.1 Overview of Lab

The goal of this lab is to take Event Frames that represent batch runs, create upper and lower bounds for those runs, and to create a calculation to alert us to when a new batch is out of range.



1.2 Tasks

We start this lab with our Event Frames for a batch run in a reactor, all beginning with “WN:CHEM:RX.” The steps we will take are as follows:

1. Publish PI Event Frames to a statistical engine
 - Using the PI Integrator for Business Analytics
2. Calculate Statistics
 - Using Microsoft SQL Server Management Studio
 - Output data to csv file and pipe data back into PI
3. Create Upper and Lower Limit Event Frames
 - Manually using PI System Explorer or automatically with PI Builder
4. Visualize
 - Create a PI Vision overlay display where we can track live batches against historical SPC values
5. Alarm
 - Create a PI Analysis that will trigger a notification if the values fall outside of control

1.3 Identify Breakdown of Lab Content

Your objectives in this section are:

Objective 1. Learn how to publish data using the PI Integrator for Business Analytics

Objective 2. Learn how to create statistical data with Microsoft SQL Server

Objective 3. Do basic modelling in PI Asset Framework and learn how to create Event Frames

Objective 4. Visualize Event Frames in PI Vision

Objective 5. Create a PI Analysis to compare live running batches to the statistical limits

Objective 6. Create a PI Notification based on the previous PI Analysis (if there's time)

2. Directed Activity – Investigate Event Frames

2.1 Objective of Activity

Look at the event frames that we already have in the PI System using PI Vision and investigate the AF database

2.2 Identify the Tasks

- Open PI Vision
- Do an Event Comparison

2.3 Step by Step

a. **Open Google Chrome** Once Google Chrome is open, navigate to <https://pisrv01/pivision/#/>. Feel free to use the bookmark or quick link.

b. **Click on the display titled “Reactor”**

c. **Click on events**



d. **Right click > select ‘Compare Similar Events by Type’**

e. **Save our new event comparison display**



Best Practice

Make this display public so that others in the organization can also use it

3. Directed Activity – Publish Data using the PI Integrator for Business Analytics

3.1 Objective of Activity

In order to create the high and low limit EFs, we'll need to cleanse the data, augment it, shape it into a table, and transmit to a calculation engine. The PI Integrator for Business Analytics will allow us to do this.

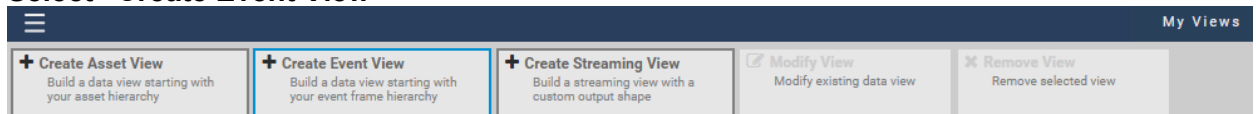
3.2 Identify the Tasks

- Open the PI Integrator for Business Analytics
- Select the Event Frames and Attributes of Interest
- Edit Value Mode to Sampled Values, sampling every 10 seconds
- Add column Event Frame Relative Time Seconds to the dataset
- Publish to SQL

3.3 Select Data

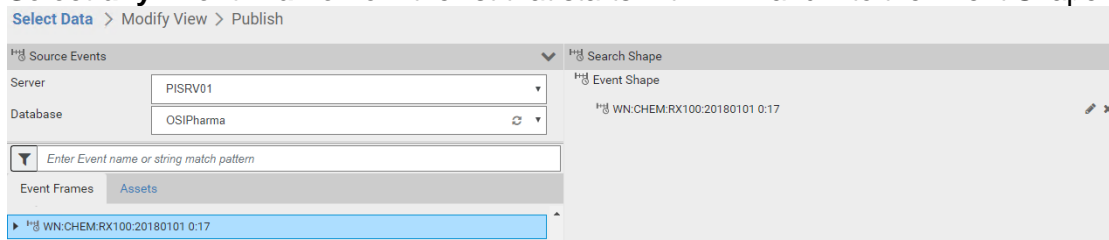
a. In Google Chrome, click the PI Integrator for Business Analytics bookmark

b. Select “Create Event View”

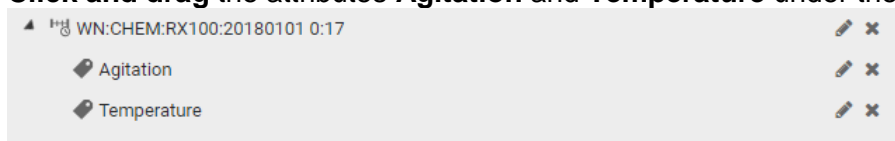



c. Make sure the Database is set to “OSIPharma”

d. Select any Event Frame from the list that starts with WN* and into the Event Shape



e. Click and drag the attributes **Agitation** and **Temperature** under the event



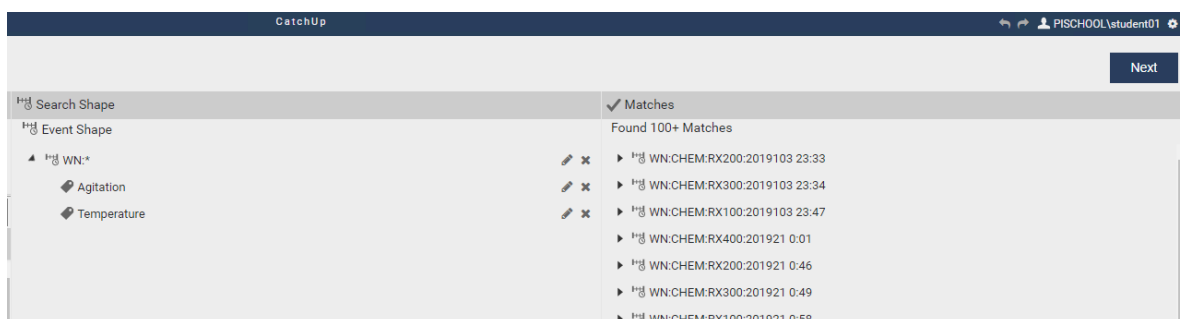
- f. Select the  button next to the Event Frame to Edit Filters



- g. Change Event Frame name to search for WN:* and click save



- h. We should now see “Found 100+ Matches” on the right. Click “Next” in the top right



3.4 Modify View

- a. Change the Start time and End Time to 1/1/2019 and 3/1/2019 and click Apply

Start Time	End Time	
1/1/2019	3/1/2019	Apply

- b. Click

1. Add Column
2. Time Column
3. The Dropdown
4. Event Frame Relative Time

The screenshot shows the 'Add Column' dialog with the 'Time Column' tab selected. The 'Select Time Column Options for Local' dropdown is open, showing a list of time-related options. 'Event Frame Relative Time' is highlighted with a blue arrow. The background shows a data table with columns for 'VN.*' and 'Time'.

- c. Select “Seconds” from the list on the left and click the ➡ button to add it

- d. The List of Time Columns should now look like this:

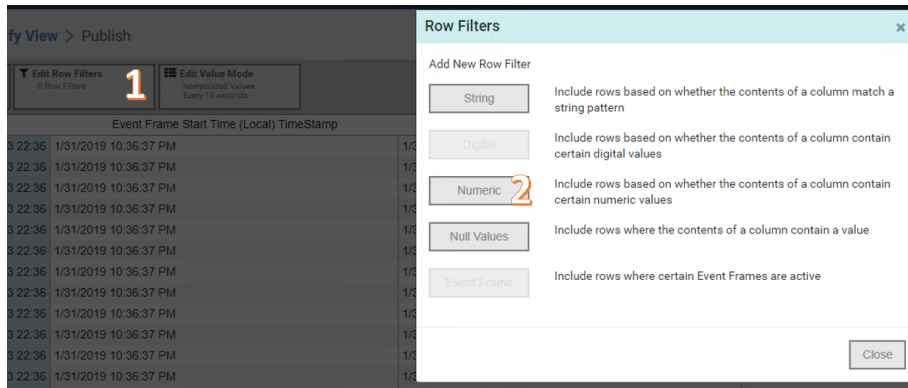
The screenshot shows the 'Time Columns' list in the data tool. The list contains five items: 'Event Frame Start Time (Local) TimeStamp (Event Frame Start Ti...', 'Event Frame End Time (Local) TimeStamp (Event Frame End Tim...', 'Local TimeStamp (Local)', 'Event Frame Duration Hour (Event Frame Duration)', and 'Event Frame Relative Time Second (Event Frame Relative Time)'.

Cancel	Display 5 time columns
--------	------------------------

- e. Click “Display 5 Time Columns”

- f. Click
1. Edit Row Filter

2. Select “Numeric” Filter



3. Use the drop downs to set a filter to Include rows where **Event Frame Relative Time Second is less than or equal to 3660**

Add Numeric Row Filter [Close]

☒ Include rows where **all** of these conditions are true
☐ Include rows where **any** of these conditions are true

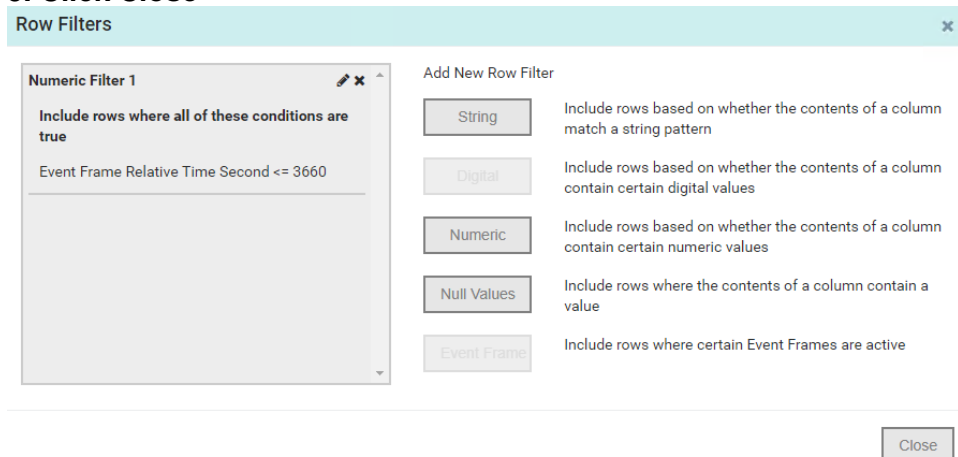
Event Frame Relative Time [Dropdown] less than or equal to [Dropdown] 3660

+ Add Another Filter Criteria

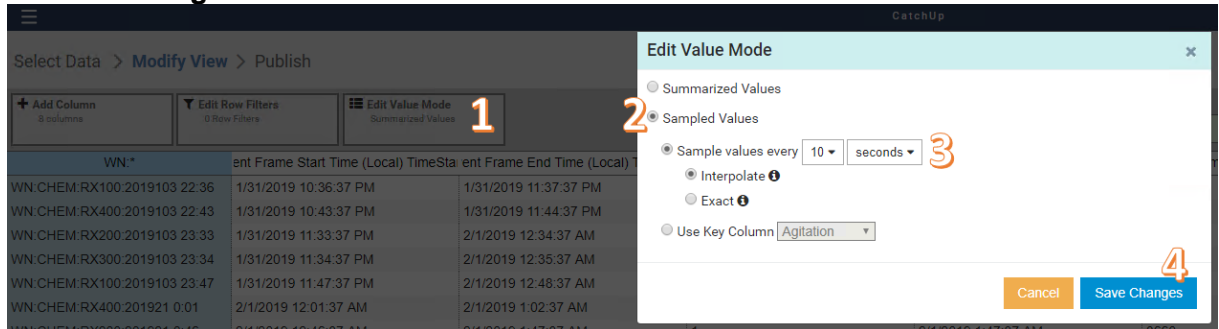
Cancel Save Numeric Row Filter

4. Save Numeric Row Filter

5. Click Close



- g. Click
1. Edit Value Mode
 2. Sampled Values
 3. Set to Sample Every 10 Seconds
 4. Save Changes



- h. We should now see the Event Frame Relative Time Second incrementing by 10 for each row

Event Frame Relative Time Second	
0	0
10	1
20	3
30	5
40	7
50	9
60	1
70	1

- i. Select "Next" in the top right

3.5 Publish

- a. Use the Dropdown Under “Target Configuration” and Select “SQL Server”

Select Data > Modify View > **Publish**

Target Configuration

- SQL Server
- PI View
- SQL Server**
- Text Output

Summary

Shape and Matches

- There are 100+ Matching Instances

Timeframe and Interval

- Your Start Time is 2/1/2019
- Your End Time is 3/1/2019
- Your Time Interval gets an interpolated measurement Every 10 seconds

Publish

- b. Ensure the Summary shown looks identical to the one above

- c. Click “Publish”



- d. This will take you back to the home screen where we can monitor the progress of our publication

Run Status

Name	Run Status	Type	Run Mode	Start Time	End Time	Last Run Time
BatchRuns	Not Yet Published	Event	Once	1/2/19	2/1/2019	Never
CatchUp	Publishing 32%	Event	Once	2/1/2019	3/1/2019	Mar 8, 2019 9:06:33 AM
test1	Published	Event	Once	1/2/19	2/1/2019	Feb 27, 2019 11:12:09 AM

Publishing 32%

Publish Actions

- Resume
- Stop**
- Update Data

Search Shape

Event Shape

- Agitation
- Temperature

Asset Shape

3.6 Notes on this Activity and Options

This Section focuses on getting our data to a point that we can do some analytics on the data. We used the PI Integrator for Business Analytics because it is the easiest method to get our batch data with relative timestamps and the associated temperature and agitation data into a state where they can be calculated on. This is also possible to do with PI DataLink, although there are more steps involved and it is more time consuming. In broad terms, the steps are:

1. Get the pertinent batches' (Event Frames') start time and end time.
2. Find the associated attributes
3. Do a 'Sampled Data' PI Data Link query using the start time, end time, and 10s as the interval, being sure to check the box to Show Timestamps
4. Take the timestamps and subtract them by the batch's start time in order to get Event Frame Relative Time

Also, we are publishing this data to MS SQL in order to do statistical calculations. Once again, this was chosen as the easiest tool with which to do these calcs, but there are also options for this as well that are enumerated in the next section.

Filtering:

For this lab, we are getting data on all Reactors for all Products. In a more real-world scenario, we would likely want to use more of the "Edit Row Filters" options on the Modify View page to ensure that we are only publishing the appropriate batches. For instance, setting Product = "Prod A" or Primary Element = "RX100" could be used. However, this can also be done in the next section, when statistics are being created.

4. Directed Activity – Create SPC Event Frame Data

4.1 Objective of Activity

In this activity, we'll use Microsoft SQL to calculate statistical data for our lower, upper, and average SPC Event Frames' data. We can also use MSSQL to output these values to a file, that can be ingested into the PI System

4.2 Identify the Tasks

- View published data
- Create statistical data
- Ingest into the PI System

4.3 Step by Step – Calculate Statistics and place into PI

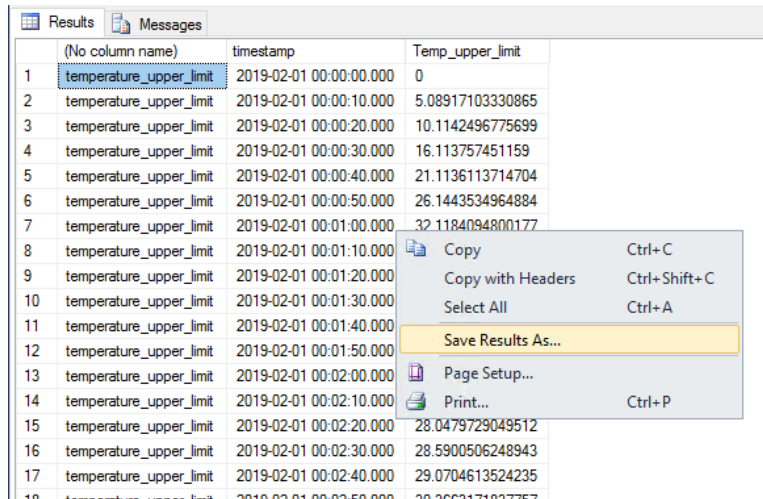
- a. Open SQL Server Management Studio (pinned to taskbar)
- b. Find the publication that we just created under the Databases > PIData > Tables
- c. Right click and choose the “Select top 1000” option
- d. View the results:

Id	WN*	Event Frame Start Time (Local) TimeStamp	Event Frame End Time (Local) TimeStamp	Event Frame Duration Hour	Local TimeStamp	Event Frame Relative Time Second	Agitation	Temperature	PlantSTicks	PlantShapeID
1	WINCHEM-RX200	2019-01-31 23:33:37.000	2019-02-01 00:34:37.000	1	2019-01-31 23:33:37.000	0	0	0	636846032170000000	0
2	WINCHEM-RX200	2019-01-31 23:33:37.000	2019-02-01 00:34:37.000	1	2019-01-31 23:33:47.000	10	20.0342330932617	3	636846032270000000	0
3	WINCHEM-RX200	2019-01-31 23:33:37.000	2019-02-01 00:34:37.000	1	2019-01-31 23:33:57.000	20	40.0684661965234	6	636846032370000000	0
4	WINCHEM-RX200	2019-01-31 23:33:37.000	2019-02-01 00:34:37.000	1	2019-01-31 23:34:07.000	30	60.1026992787852	8	636846032470000000	0
5	WINCHEM-RX200	2019-01-31 23:33:37.000	2019-02-01 00:34:37.000	1	2019-01-31 23:34:17.000	40	80.1569323730469	11	636846032570000000	0

- e. Next, open Folder on the Desktop titled “SQL_Queries”
- f. Open all files within that folder
- g. Start by looking at “Ave Temp-Std Dev-by EF relative.sql” and replace “PublicationName” with the actual name of our publication
- h. **TIP:** Use Ctrl+H to find and replace. Click  and View the results:

	AVG_TEMP	StDev_Temp	event frame relative time second
1	0	0	0
2	3	1.04458551665433	10
3	6	2.05712483878494	20
4	10	3.0568787255795	30
5	13	4.05680568573518	40
6	16	5.07217674824419	50
7	20	6.05920474000884	60
8	20	5.15837334178147	70
9	19	4.51189927165881	80
10	19	4.28108528001835	90

- i. Select the tab titled “Temperature Upper...” and again replace “PublicationName” with our publication name
- j. Click Execute
- k. In the Results Area, Right click and Select “Save Results As...” and give it a unique name, like “Upper” to the Desktop



	(No column name)	timestamp	Temp_upper_limit
1	temperature_upper_limit	2019-02-01 00:00:00.000	0
2	temperature_upper_limit	2019-02-01 00:00:10.000	5.08917103330865
3	temperature_upper_limit	2019-02-01 00:00:20.000	10.1142496775699
4	temperature_upper_limit	2019-02-01 00:00:30.000	16.113757451159
5	temperature_upper_limit	2019-02-01 00:00:40.000	21.1136113714704
6	temperature_upper_limit	2019-02-01 00:00:50.000	26.1443534964884
7	temperature_upper_limit	2019-02-01 00:01:00.000	32.1184094800177
8	temperature_upper_limit	2019-02-01 00:01:10.000	
9	temperature_upper_limit	2019-02-01 00:01:20.000	
10	temperature_upper_limit	2019-02-01 00:01:30.000	
11	temperature_upper_limit	2019-02-01 00:01:40.000	
12	temperature_upper_limit	2019-02-01 00:01:50.000	
13	temperature_upper_limit	2019-02-01 00:02:00.000	
14	temperature_upper_limit	2019-02-01 00:02:10.000	
15	temperature_upper_limit	2019-02-01 00:02:20.000	28.0479729049512
16	temperature_upper_limit	2019-02-01 00:02:30.000	28.5900506248943
17	temperature_upper_limit	2019-02-01 00:02:40.000	29.0704613524235
18	temperature_upper_limit	2019-02-01 00:02:50.000	29.3662171937767

- l. Repeat steps l, j ,and k for files “” and “”. When finished we should have 3 new files saved to the desktop.

Click and drag these files into the folder on the desktop labeled

“SQL_Input_Files.” A PI UFL Interface has already been configured to take files from this location and ingest them into the PI System. The file extension will change from .csv to ._OK once the file has been read



Tip

UFL was used to ingest this data into the PI Data Archive, but there are certainly other ways to get the data into PI. The most prominent being PowerShell tools for the PI System and piconfig



Tip

Microsoft SQL was the chosen tool for this Lab, but many other tools can be used to create this data, including Microsoft Excel



Tip

From an Analytics point of view, we have made two critical choices for this lab: We chose to use the Average as a midpoint for the data. In a real setting, we may want to use the median instead, as this is considered more robust. Also, we have chosen to use two standard deviations to create our upper and lower limits. The number of standard deviations to use is ultimately up to you.

5. Directed Activity – Create SPC Event Frames


5.1 Objective of Activity

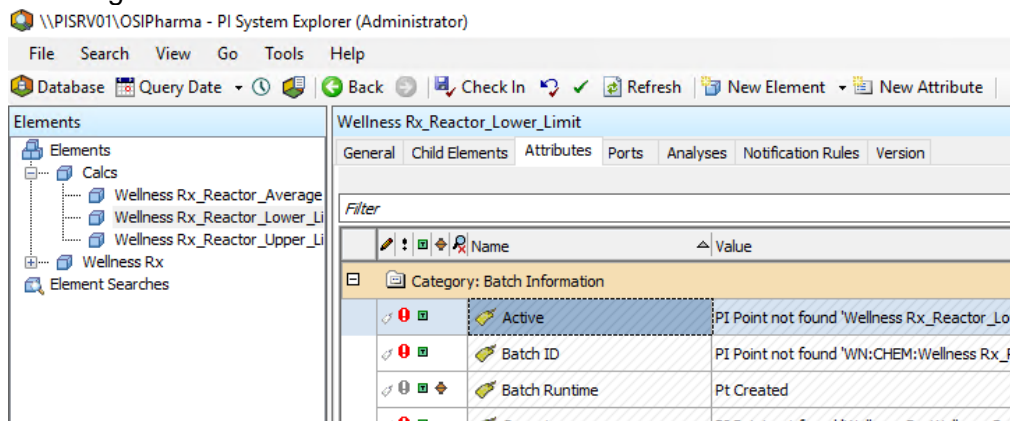
Now that we have the data in the PI System, we need to map our new tags to Elements, and create Event Frames for them

5.2 Identify the Tasks

- View Elements in PI AF using PI System Explorer
- Create Event Frames for the golden batches

5.3 Create Event Frames

- Open PI System Explorer (pinned to taskbar)**  and see that we're connected to AF Server PISRV01 and AF Database OSIPharma
- Expand out Calcs and investigate the 3 elements beneath it, and select the attributes tab
- We can see that the tags we just created are mapped to the temperature attribute, but other tags still have not been created



- Now that we have data and AF Elements, we need to create the Event Frames around the data
CHOICE 1: Create Manually in PI System Explorer's Event Frames Section. Right click, New Event Frame, set Wellness Rx UnitBatch as the EF Template, 2/1/2019 12:00:00 AM as Start Time, 2/1/2019 1:01:00 AM as End Time, and setting the reference element to one of the 3 above. Repeat for the other two reference elements

CHOICE 2: Create Automatically by opening the folder on the desktop titled "Catch up Files", Opening "EF_Creation.xlsx", and selecting PI Builder tab and Publish

6. Directed Activity – Create a Bounded Event Frame Comparison view


6.1 Objective of Activity

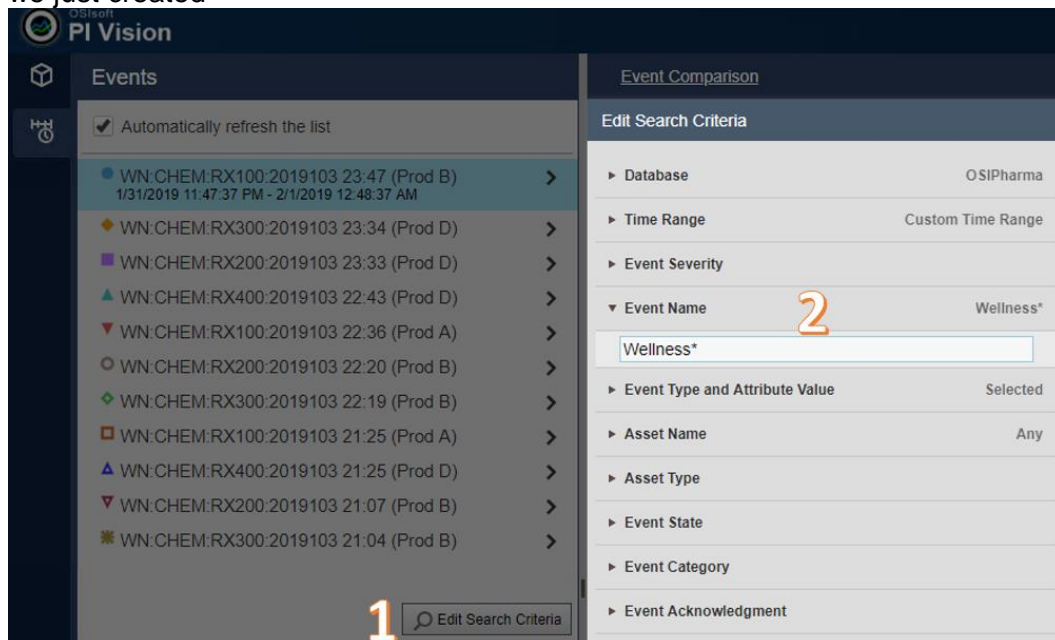
Look at the event frames that we just created in PI Vision, and create a display for them

6.2 Identify the Tasks

- Open PI Vision
- Add SPC Event frames to an Event Comparison view

6.3 Augment existing event comparison display

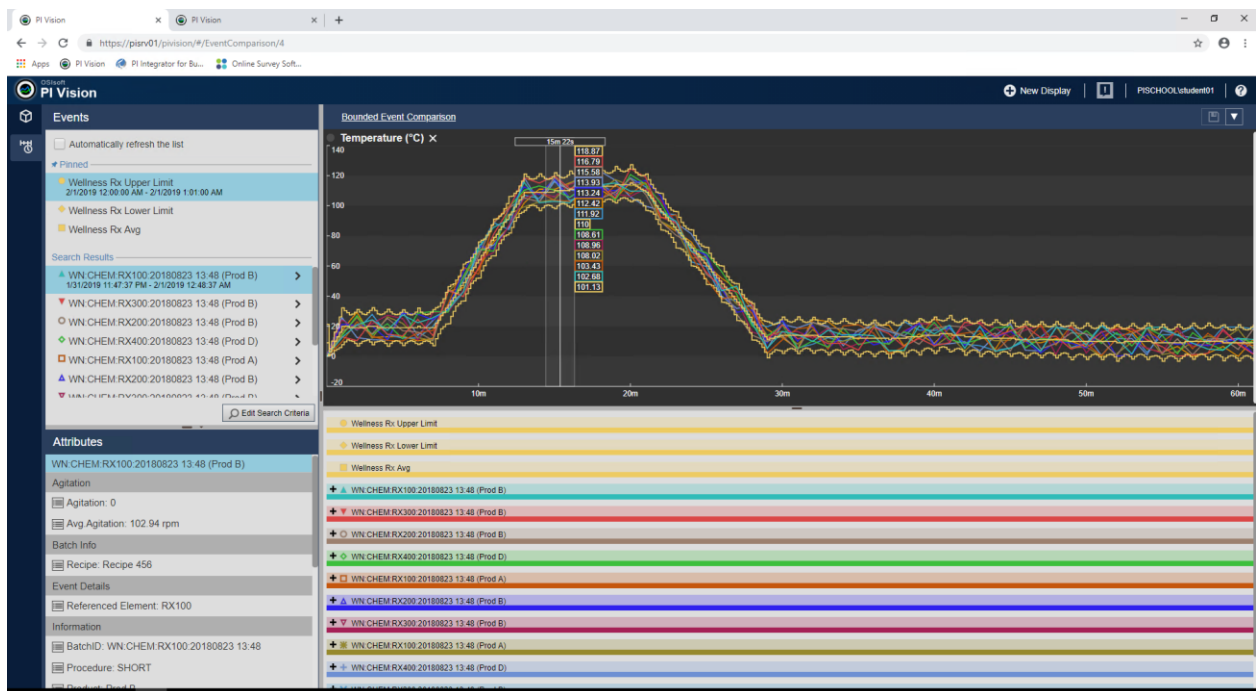
- Open Google Chrome** Once Google Chrome is open, navigate to <https://pisrv01/pivision/#/>. Feel free to use the bookmark or quick link.
- Click on the Event Comparison display** we created earlier
- Click on events** 
- Select “Edit Search Criteria”**
- Click on **“Event Name”** and **Filter using Wellness*** or the name of the Event Frames we just created



- f. When the SPC Event Frames we created are in the search bar, right click and select **“Pin Event”** for each of the three.



- g. Once that is completed, erase the Event Name filter that we put into place in Step E.
- h. We should now see real production batches and our SPC Event Frames on the same display



7. Directed Activity – Create a PI Analysis comparing current runs to SPC limits

7.1 Objective of Activity

Now that we have a visual view of the current batches, it would be great to have something automated that would tell us if the current running batch is out of specifications

7.2 Identify the Tasks

- Open PI System Explorer
- Add a PI Analysis to the Wellness Rx_Reactor Template to write the status of the current running batch, relative to the high and low limits
- Set to trigger when the 'Temperature' attribute updates
- Create output point

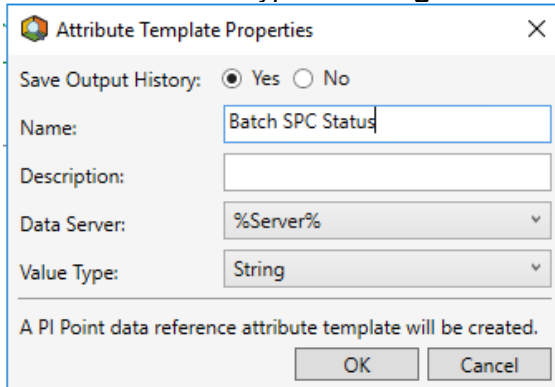
7.3 Add PI Analysis to Template

- a. Open PI System Explorer
- b. Navigate to Library > Element Templates > Wellness Rx > Wellness Rx_Reactor Template and select the Analysis Templates tab.
- c. Right click and select New
- d. Give the Analysis a name like “Batch Temp Deviation”
- e. Click the “Add a new variable” button so there are two places for expressions
- f. Open the desktop folder “Catch up Files” and open file “7_3_Analysis.txt”
- g. Copy/Paste/Edit until the equation looks like this:

Add a new variable		Evaluate		
Name	Expression	Value at Evaluation	Value at Last Trigg	Output Attribute
Revertime	'2/1/2019 12:00:00 AM' + SecSinceChange('Active')	2/1/2019 12:18:13	2/1/2019 12:18:00	Map
Variable2	<pre>IF 'Active' = "Active" then (IF 'Temperature' > TagVal('\Calcs\Wellness Rx_Reactor_Upper_Limit Temperature',Reltime) then "Above Control" ELSE IF 'Temperature' < TagVal('\Calcs\Wellness Rx_Reactor_Lower_Limit Temperature',Reltime) then "Below Control" ELSE "In Range") Else "Not Running"</pre>			Map

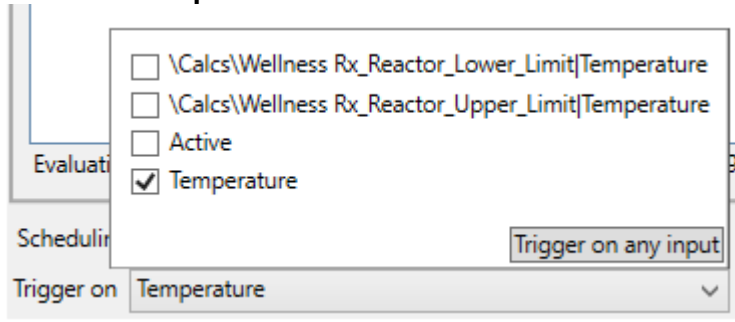
*Note “Variable1” has been replaced with “Reltime”

- h. Click **Map** on the second line and map it to a new attribute called **“Batch SPC Status”** and set the Value Type to **String**



The dialog box is titled "Attribute Template Properties". It has a close button (X) in the top right corner. The "Save Output History" section has "Yes" selected. The "Name" field contains "Batch SPC Status". The "Description" field is empty. The "Data Server" dropdown shows "%Server%". The "Value Type" dropdown shows "String". At the bottom, there is a message: "A PI Point data reference attribute template will be created." and two buttons: "OK" and "Cancel".

- i. At the bottom left, change the scheduling so that it is set to event triggered only on the attribute **“Temperature”**

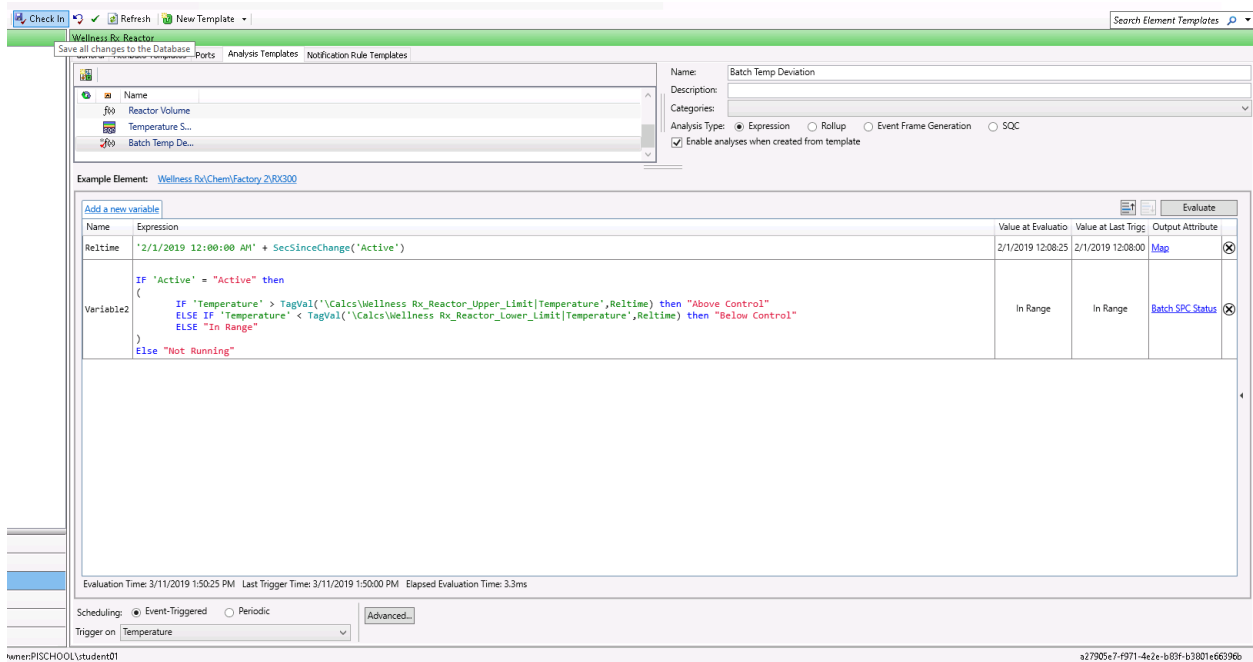


The dialog box shows a list of attributes with checkboxes:

- ☐ \Calcs\Wellness Rx_Reactor_Lower_Limit|Temperature
- ☐ \Calcs\Wellness Rx_Reactor_Upper_Limit|Temperature
- ☐ Active
- ☒ Temperature

 At the bottom right, there is a button labeled "Trigger on any input". Below the dialog box, the "Trigger on" dropdown is set to "Temperature".

- j. Click **Evaluate** to test the Analysis Configuration and **Check In** once it is complete



The screenshot shows the "Wellness Rx Reactor" analysis configuration window. The "Name" field is "Batch Temp Deviation". The "Description" field is empty. The "Categories" dropdown is set to "Expression". The "Analysis Type" is "Expression". The "Enable analyses when created from template" checkbox is checked. The "Example Element" is "Wellness Rx(Chem)Factory_2/RX300".

The "Add a new variable" section shows a table with the following variables:

Name	Expression	Value at Evaluation	Value at Last Trng	Output Attribute
Realtine	'2/1/2019 12:00:00 AM' + SecSinceChange('Active')	2/1/2019 12:08:25	2/1/2019 12:08:00	Map
Variable2	<pre> IF 'Active' = "Active" then (IF 'Temperature' > TagVal('\Calcs\Wellness Rx_Reactor_Upper_Limit Temperature',Realtine) then "Above Control" ELSE IF 'Temperature' < TagVal('\Calcs\Wellness Rx_Reactor_Lower_Limit Temperature',Realtine) then "Below Control" ELSE "In Range") Else "Not Running" </pre>	In Range	In Range	Batch SPC Status

The "Evaluation Time" is 3/11/2019 1:50:25 PM. The "Last Trigger Time" is 3/11/2019 1:50:00 PM. The "Elapsed Evaluation Time" is 3.3ms. The "Scheduling" is set to "Event-Triggered". The "Trigger on" dropdown is set to "Temperature".

8. Directed Activity – Create an Event Frame and Notification

8.1 Objective of Activity

Lastly, now that we have a tag for the SPC status, let's create an Event Frame and Notification to automatically contact us when the temperature is out of bounds.

8.2 Identify the Tasks

- Open PI System Explorer
- Add a PI Analysis for high and low excursions
- Add a PI Notification Rule to the Wellness Rx_Reactor template to trigger when the results of the previous analysis are out of spec

8.3 Create Event Frames

- While we're still in PI System Explorer, Wellness RX_Reactor Template, add a new Analysis Template**
- Label it something like “Batch SPC Excursion”**
- This time make the rule an “Event Frame Generation” Analysis Type**
- Set Event Frame Template to “Batch SPC Deviation”**
- Set the equation to trigger if the attribute we just created is in the “Above Control” or “Below Control” states:**

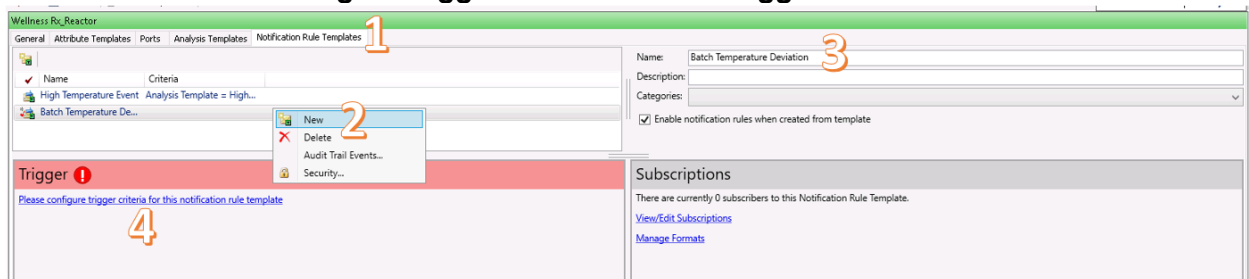
‘Batch SPC Status’ = “Above Control” or ‘Batch SPC Status’ = “Below Control”

- Check In.** The page should look like this:

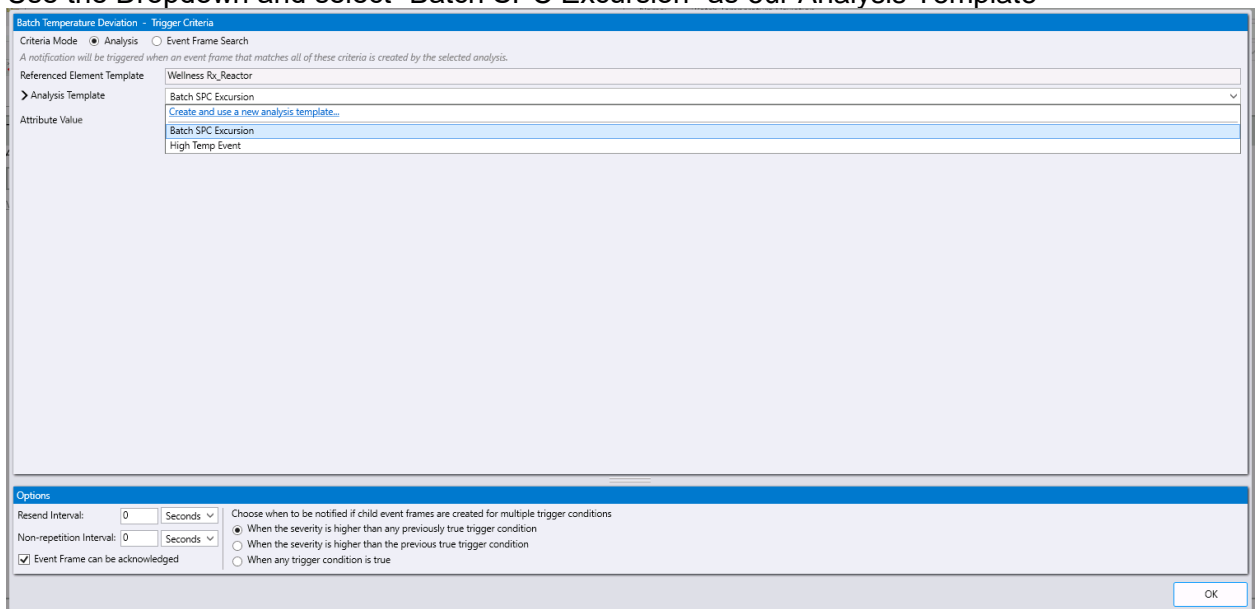
The screenshot displays the 'Wellness Rx_Reactor' configuration window in PI System Explorer. The 'Analysis Templates' tab is active, showing a list of templates on the left: 'Batch Runtime', 'Batch SPC Excursion' (selected), 'Batch Temp Deviation', and 'Batch Deviation'. The right pane shows the configuration for 'Batch SPC Excursion'. The 'Name' field is 'Batch SPC Excursion'. The 'Description' field is empty. The 'Categories' field is empty. The 'Analysis Type' is set to 'Event Frame Generation' (selected). The 'Enable analyses when created from template' checkbox is checked. A link 'Create a new notification rule template for Batch SPC Excursion' is visible. Below this, the 'Example Element' is 'Wellness Rx\ChemFactory 2\RX300'. The 'Generation Mode' is 'Explicit Trigger'. The 'Event Frame Template' is 'Batch SPC Deviation'. The 'Add...' button is visible. The 'Expression' field contains the formula: 'Batch SPC Status' = "Above Control" or 'Batch SPC Status' = "Below Control". The 'True for' field is 'Set (optional)'. The 'Severity' field is 'Major'. The 'Value at Evaluation' and 'Value at Last Trigger' fields are empty. The 'Evaluate' button is visible.

8.4 Create Notifications

- a. While we're still in PI System Explorer, Wellness RX_Reactor Template
- b. Select the “Notification Rule Templates” Tab
- c. Right click and select “New”
- d. Give it a name like “Batch Temperature Deviation”
- e. Select the “Please configure trigger...” link beneath Trigger



- f. Use the Dropdown and select “Batch SPC Excursion” as our Analysis Template



- g. Click OK

9. Directed Activity – Backfill Data

9.1 Objective of Activity

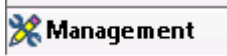
Let's take this analysis from step 7 and the event frame from step 8 and backfill data to see which batches have had issues in the past

9.2 Identify the Tasks

- Navigate to the Analysis Management plug-in in PI System Explorer
- Backfill the Analysis
- Backfill the Event Frames
- View results

9.3 Backfill Analyses

- a. In PI System Explorer, select the **Management** tab from the bottom left



- b. Select the four “**Batch Temp Deviation**” Analyses for the Reactors by checking the boxes next to them

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Wellness Rx\Chem\Factory 2\RX400	Batch Temp Deviation	Batch Temp Deviation
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Wellness Rx\Chem\Factory 2\RX300	Batch Temp Deviation	Batch Temp Deviation
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Wellness Rx\Chem\Factory 1\RX200	Batch Temp Deviation	Batch Temp Deviation
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Wellness Rx\Chem\Factory 1\RX100	Batch Temp Deviation	Batch Temp Deviation

- c. In the upper right, select the “**Backfill/Recalculate**” link and set the start time for 1/1/2019 and leave the end time as *

Operations

[Enable](#) | [Disable](#) selected analyses

[Enable](#) | [Disable](#) automatic recalculation for selected analyses

[Backfill/Recalculate](#) selected analyses

Start

End

What should we do with existing data?

☒ Leave existing data and fill in gaps

☐ Permanently delete existing data and recalculate

d. Press the **“Queue”** button

e. Once that has completed Backfilling, uncheck the previous four Analyses and select the four EF analyses labelled **“Batch SPC Excursion”**

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Wellness Rx\Chem\Facility 2\RX400	Batch SPC Excursion	Batch SPC Excursion
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Wellness Rx\Chem\Facility 2\RX300	Batch SPC Excursion	Batch SPC Excursion
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Wellness Rx\Chem\Facility 1\RX200	Batch SPC Excursion	Batch SPC Excursion
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Wellness Rx\Chem\Facility 1\RX100	Batch SPC Excursion	Batch SPC Excursion

f. **Backfill** these for the same amount of time, after clicking the Acknowledgement

Operations

[Enable](#) | [Disable](#) selected analyses

[Enable](#) | [Disable](#) automatic recalculation for selected analyses

[Backfill/Recalculate](#) selected analyses

Start: 1/1/2019

End: *

What should we do with existing data?

☒ Leave existing data and fill in gaps

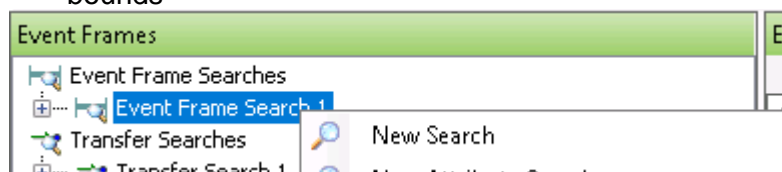
☐ Permanently delete existing data and recalculate

☒ I acknowledge that my selection contains event frame analyses. Event frames in the time range will be permanently deleted. This will result in loss of annotations and acknowledgements associated with the event frames.

Queue

g. **Navigate to the Event Frames section in the lower left**

h. **Right Click > New Search** and search for all events matching the Event Frame Template **“Batch SPC Deviation”** to see which batches in the past were outside of bounds



Event Frame Search

Template: "Batch SPC Deviation" AllDescendants:False

Criteria

Search: Active Between ☐ In Progress

Search start: *30d

Search end: *+1d

Name: Analysis Name: Element Name:

Category: <All> Template: Batch SPC Deviation

Add Criteria

Results

Group by: ☐ Category ☐ Template

Name	Gantt	Duration	Start Time	End Time	Description	Category	Severity	Template	Primary Element
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10. Self-Paced Activity – Repeat exercise for the Agitation Attribute

10.1 Objective of Activity

While we used Temperature as our model for the course so far, this same methodology can be used for any attribute. By using the methods used in sections 4-9, feel free to use whatever remaining time you have to repeat this process with the Agitation Attribute. Certain steps (Like created the event frames and the PI Vision display) have already been done and do not need to be repeated.

10.2 Identify the Tasks

- Edit the SQL Queries to use Agitation Instead of Temperature
 - Output files into the same folder
- View in Upper and Lower bounds in PI Vision
- Create a new PI Analysis Expression
- Create a new PI Event Frame Analysis
 - The same template may be used
- Backfill data and find the out of range EFs



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