

Overlay Real-time Operations Data onto  
Esri ArcGIS Platform for live Situational  
Awareness and Perform Analysis with  
Historical Playback



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## Table of Contents

Introduction .....	1
1. Verify that Prerequisites and Configuration Steps are Complete.....	7
2. Verify that the PI AF Database is ready.....	11
3. Create a Service and Layers via the PI Integrator for Esri ArcGIS .....	14
Create a feature service to bring-in all the Oil Wells based-on AF element template .....	14
4. Create a WebMap and add OSIsoft Visualization integration to the Portal for ArcGIS Web Map.....	25
Create a feature service to bring-in all the Maintenance Vehicles based on AF element template.....	35
5. Create an Operations View with PI Vision Integration .....	41
6. Demonstration of the feature in the PI Integrator for Esri ArcGIS 2017 SP1 that would delete the associated GeoEvent Server connectors.....	52
7. Create Time-enabled Feature Layer for the Oil Wells & Maintenance Vehicles .....	55
8. Create an Augmented Time-enabled Feature Layer that contains data from both the PI System and the existing feature layer that contains geometry, without modifying the existing feature layer.....	67
Conclusion.....	79
Save the Date!.....	81

## Introduction

PI Integrator for Esri ArcGIS is a versatile platform that enables real-time geographic data visualization by connecting the PI System with the Esri ArcGIS platform, where you can add dynamic features to functional and geographic maps and continuously update these features as states, values, and location change. In short, PI Integrator for Esri ArcGIS combines the "time" aspect of the PI System with the "space" aspect of the Esri ArcGIS platform to enhance insight over infrastructure processes and increase operational awareness.

This integration has successfully been implemented in many different industry verticals. For example:

- Utilities: For utility companies, keeping customers happy means keeping the power on. That's a delicate balance between a host of interwoven factors such as safety, compliance, coordination of mobile assets, and preventive maintenance. Having insight into asset history and performance, environmental and proximity effects, and analytic tools, will enable your organization to meet these demands.
- Facilities: Initial efforts to develop “smarter” cities may have consisted of a collection of uncoordinated projects. By combining data from buildings, transportation and environment with a single view through digital maps, city leaders, government authorities, business owners and tenants have an instant grasp of information they need to navigate a complex urban environment.
- Oil and Gas: In the Oil and Gas industry, both location of assets and their performance status are critical for operations. Layering a map of assets with real-time and historical data enables an evolution toward reliability-centered operations.

This session explores the partnership between Esri's ArcGIS powerful mapping platform and the real-time PI System infrastructure. In this session, you will discover how easy it is to connect your PI System to your Esri ArcGIS platform to create an operational view of critical metrics on your enterprise in a geospatial way. To this end, you will be guided through a few different scenarios to discover the power of real-time data in a mapped world. Together, we will explore how to create insightful WebMap with live PI System data, create the time-enabled feature layer, and create the Augmented time-enabled feature layer that contains data from both the PI System and the existing feature layer that contains geometry, without modifying the existing feature layer. Furthermore, you will learn how you can leverage custom OSIsoft Visualization displays from Esri Webmaps to drill-down into your data.

We have prepared an environment for you that contains both a PI System and the Esri ArcGIS platform installed. Specifically, you will each have access to a virtual machine that consists of a self-contained PI System, PI Integrator for Esri ArcGIS 2017 SP1, ArcGIS Server, Portal for ArcGIS, and ArcGIS GeoEvent Server. You will use this machine to walk through the workflow of creating a dashboard with a live map, populated with live data from the PI System.

Regarding the virtual machine that you will be using: on the OSIsoft side, we've installed the PI System 2018, which includes both the PI Data Archive and the PI Asset Framework. Additionally, that machine is running OSIsoft Visualization, for visualizing data. We have preinstalled and configured the PI Integrator for Esri ArcGIS 2017 SP1 for you, as well, and finally in order to make using the Integrator easier, we have preloaded a PI AF Database for you that already contains PI AF Templates, in addition to preloading all of the required PI points as well, and the requisite simulated data for the scenario. Of course, we will

also learn how to create an asset structure from-scratch in PI AF using an already existing layers in Esri's GIS platform and updating the AF template to bring-in live PI System data to Esri. Lastly, we will also see how to create an augmented time-enabled feature layer that contains data from both the PI System and the existing feature layer that contains geometry, without modifying the existing feature layer.

On the Esri side, on that VM we have installed ArcGIS Server 10.7.1, along with Portal for ArcGIS, and GeoEvent Server 10.7.1.

Your instructors will inform you how to access these machines; after you have access to them, as a class you'll be guided through the following steps:

1. Verify that the requisite configuration steps have been performed on the GeoEvent Server and on the PI Integrator for Esri ArcGIS 2017 SP1
2. Verify that the PI AF Database is ready
3. Create a Layer based-on the Wells PI AF template on Esri ArcGIS via the PI Integrator for Esri ArcGIS
  - Create the feature service in Portal for ArcGIS for the oil wells and connect through the GeoEvent Server
4. Create a WebMap with both the above feature layers and show how to change symbologies
  - Create the feature service in Portal for ArcGIS for the Maintenance vehicles and connect through the GeoEvent Server
5. Add PI Vision display for a Well and show its integration with WebMap
6. Create an Operations Dashboard view with the above WebMap and integrate it with PI Vision custom dashboard
7. Demonstrate the feature in the PI Integrator that would clean-up the GeoEvent connectors and hosted feature layer when the layer is deleted in the integrator
8. Create a time-enabled feature layer using the Oil Wells & Maintenance vehicles
9. Create an augmented time-enabled feature layer for the coal plants

If you ever have any questions, feel free to ask an instructor.

Below are the names of the machines that you can use for this class, along with the credentials that you'll use for signing into them and ArcGIS Online. We've included the names and credentials twice, and we recommend tearing out one of the below sections from the book and keeping it close so you can be quickly reminded of what credentials and machine names to use.

### **Windows Credentials (Useful for accessing PI Vision and the PI Integrator)**

Username	pischool\student01
----------	--------------------

Password	< <i>password would be provided by your instructor</i> >
----------	--

### **ArcGIS GeoEvent Server Credentials**

Username	siteadmin
----------	-----------

Password	vlesiteadmin
----------	--------------

### **Portal for ArcGIS Credentials**

Username	siteadmin
----------	-----------

Password	vlesiteadmin
----------	--------------

### **Servers**

PI/AF Server Name	PISRV01
-------------------	---------

OSIsoft Visualization Server	<a href="https://pisrv01.pischool.int:446/pivision/#/">https://pisrv01.pischool.int:446/pivision/#/</a>
------------------------------	---

PI Integrator for Esri ArcGIS Server	<a href="https://pisrv01.pischool.int:448/configuration/#/services">https://pisrv01.pischool.int:448/configuration/#/services</a>
--------------------------------------	---

GeoEvent Server Manager	<a href="https://pisrv01.pischool.int:6143/geoevent/manager">https://pisrv01.pischool.int:6143/geoevent/manager</a>
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Tear out this page and keep it nearby as a handy reference.

### **Windows Credentials** (Useful for accessing PI Vision and the PI Integrator)

Username	pischool\student01
----------	--------------------

Password	
----------	--

### **ArcGIS GeoEvent Server Credentials**

Username	siteadmin
----------	-----------

Password	vlesiteadmin
----------	--------------

### **Portal for ArcGIS Credentials**

Username	siteadmin
----------	-----------

Password	vlesiteadmin
----------	--------------

### **Servers**

PI/AF Server Name	PISRV01
-------------------	---------

OSIsoft Visualization Server	<a href="https://pisrv01.pischool.int:446/pivision/#/">https://pisrv01.pischool.int:446/pivision/#/</a>
------------------------------	---

PI Integrator for Esri ArcGIS Server	<a href="https://pisrv01.pischool.int:448/configuration/#/services">https://pisrv01.pischool.int:448/configuration/#/services</a>
--------------------------------------	---

GeoEvent Server Manager	<a href="https://pisrv01.pischool.int:6143/geoevent/manager">https://pisrv01.pischool.int:6143/geoevent/manager</a>
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## 1. Verify that Prerequisites and Configuration Steps are Complete

We have already installed all the required software components for you, and after doing that, we have completed the prerequisite configuration steps on both the ArcGIS GeoEvent Server and the PI Integrator for Esri ArcGIS.

The steps that we have already completed for you are:

1. Register at least one OSIssoft Visualization Server, Portal for ArcGIS if you are publishing the feature layer to the same, and ArcGIS GeoEvent Server endpoint in the PI Integrator for Esri ArcGIS.
2. Register at least one valid data store on the GeoEvent Server .

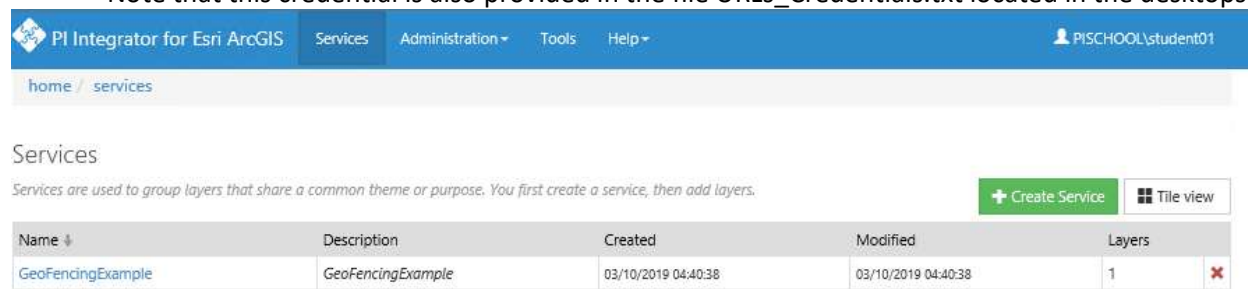
We'll together walk through those configuration steps, even though they are already finished, so that you'll be familiar with what will need to be done on a completely new installation.

### a) Confirm at least one OSIssoft Visualization Server & ArcGIS GeoEvent Server endpoints in the PI Integrator for Esri ArcGIS

The PI Integrator for Esri ArcGIS allows an OSIssoft Visualization link to be generated for each Layer that is created in the PI Integrator for Esri ArcGIS. That link allows an ad hoc and custom OSIssoft Visualization display to be automatically generated for a specific Esri map Feature. For example, if this link is used in a Feature pop-up, when a user clicks on a particular Feature, then clicks on the Visualization link, the identifying information for that particular clicked Feature will be passed to the PI Integrator for Esri ArcGIS, and the user will be redirected to an automatically generated ad hoc or custom OSIssoft Visualization display for that specific map Feature.

In order for this functionality to work, an OSIssoft Visualization server must be registered in the Integrator PI Integrator for Esri ArcGIS; moreover, that OSIssoft Visualization server must have access to the PI AF Element data that corresponds to the Esri Features in question. For example, if a Layer was created from a PI AF Element Template for oil wells, then the OSIssoft Visualization server should allow access to the PI AF Element database that contains those oil well elements. In our case, we have already registered an OSIssoft Visualization server for you, so we'll check now to show you what that should look like.

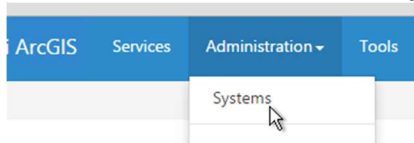
1. Open Internet Explorer web browser and log in to PI Integrator for Esri ArcGIS 2017 SP1 by navigating to, for example, <https://pisrv01.pischool.int:448/configuration/#/services> or by clicking on the bookmark. It should be a bookmark for you in your Internet Explorer web browser using the username and password as pischool\student01 & **<password>**, respectively. Note that this credential is also provided in the file URLs\_Credentials.txt located in the desktops.



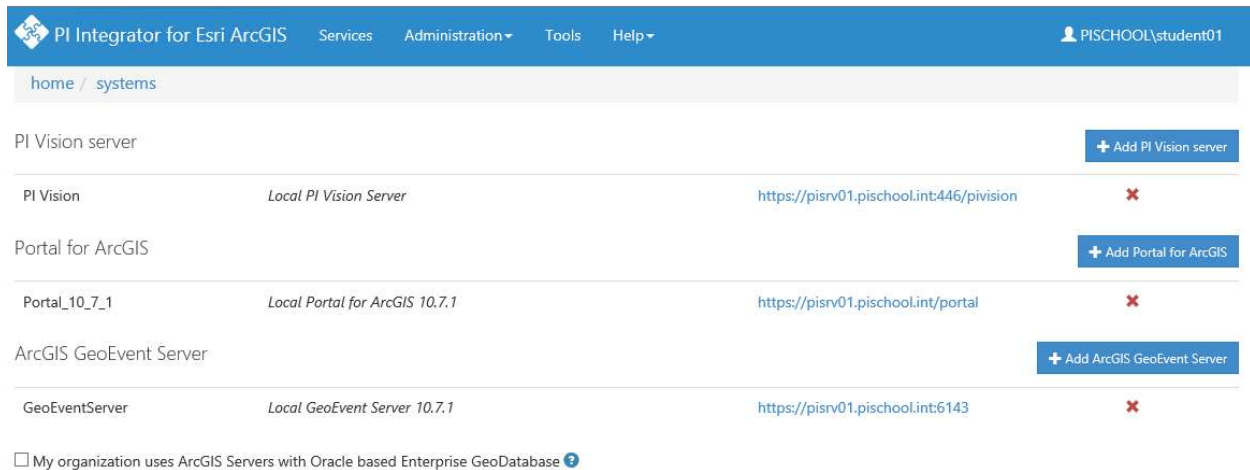
The screenshot shows the 'Services' page of the PI Integrator for Esri ArcGIS. The page has a blue header with navigation tabs: 'Services' (selected), 'Administration', 'Tools', and 'Help'. The user is logged in as 'PISCHOOL\student01'. Below the header, there is a breadcrumb 'home / services'. The main content area is titled 'Services' and includes a subtitle: 'Services are used to group layers that share a common theme or purpose. You first create a service, then add layers.' There is a green '+ Create Service' button and a 'Tile view' button. Below this is a table with the following data:

Name	Description	Created	Modified	Layers
GeoFencingExample	GeoFencingExample	03/10/2019 04:40:38	03/10/2019 04:40:38	1

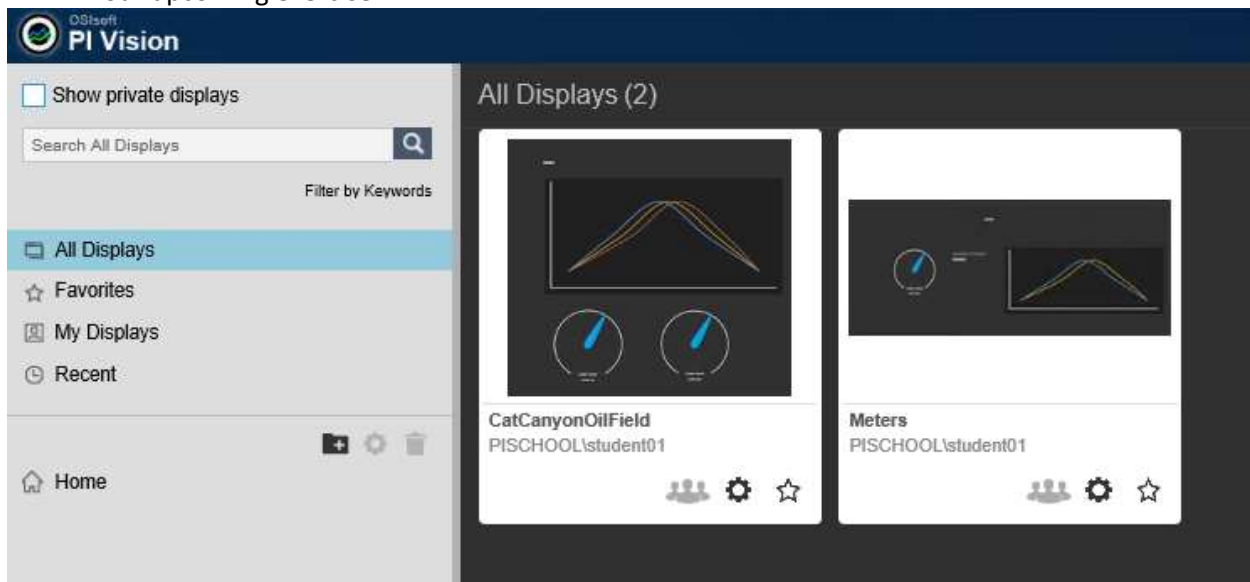
2. Select **Administration > Systems**.

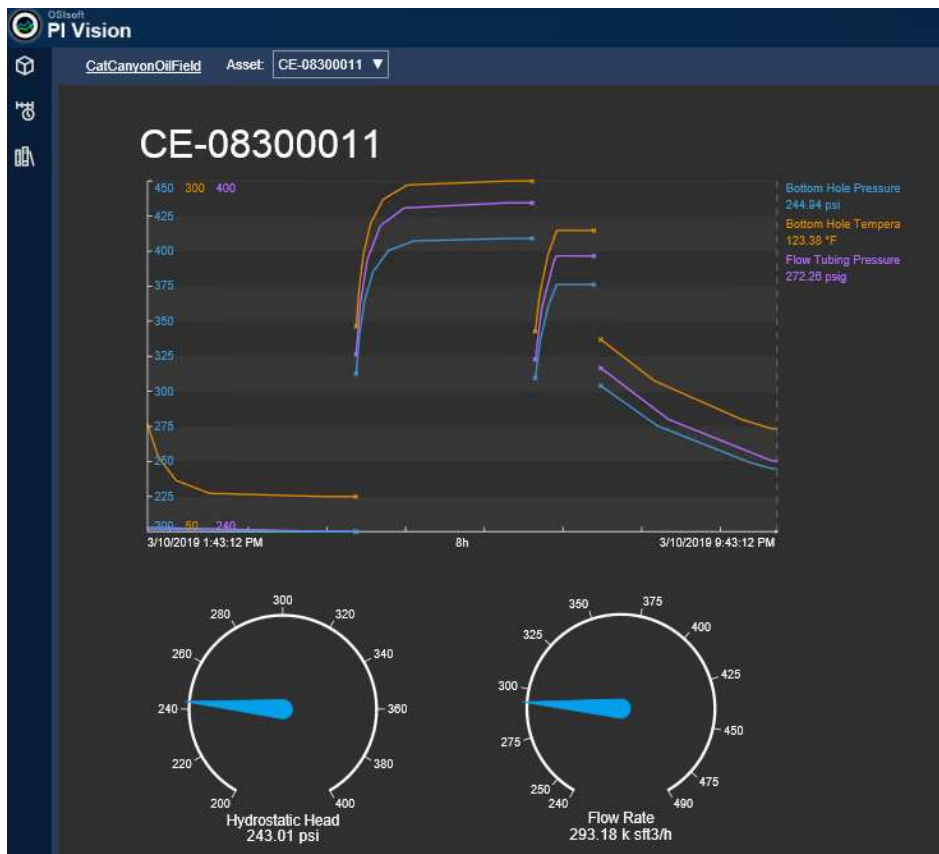


3. Confirm a https based OSInfo Visualization endpoint, Portal for ArcGIS, and ArcGIS GeoEvent Server are registered in the PI Integrator for Esri ArcGIS.

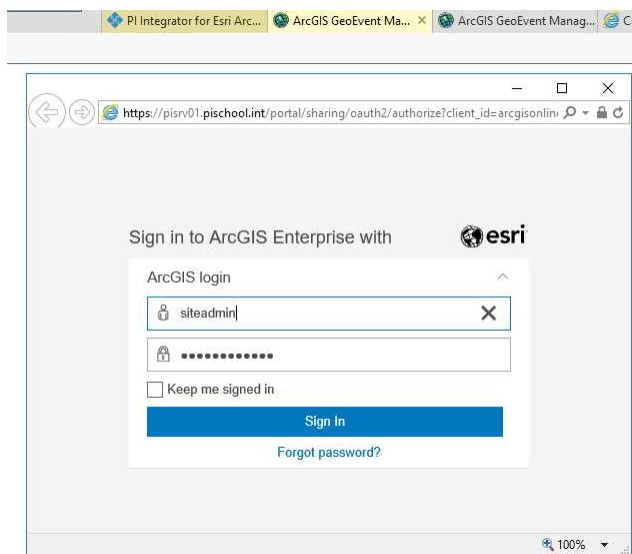


4. Click on the URL for your registered OSInfo Visualization server in order to launch OSInfo Visualization. If you are prompted you can enter the same active directory credentials, namely, pischool\student01 & **<password>** for the username and password, respectively. As shown below, you would note two custom OSInfo Visualization displays that we would be leveraging in our upcoming exercise.





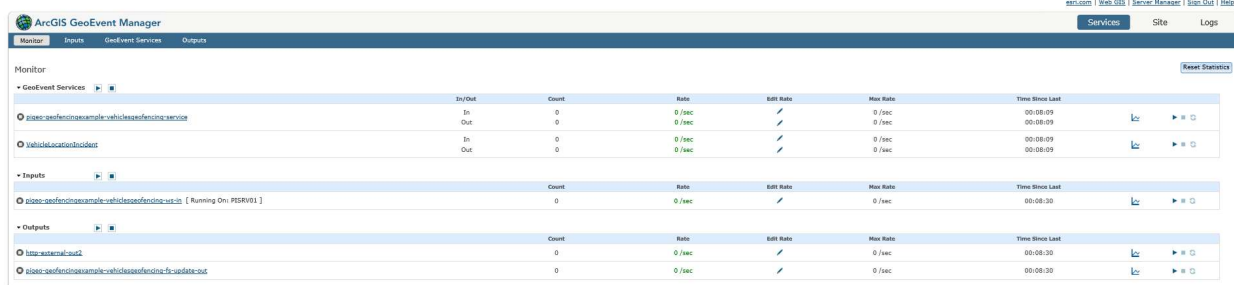
- Now click the url for the GeoEvent Server that was registered in the PI Integrator for Esri ArcGIS, namely, <https://pisrv01.pischool.int:6143> or click the bookmark in the IE browser. If the URL resolves to the GeoEvent Server login screen, then you've indeed successfully registered your GeoEvent Server endpoint.



## b) Register at least one valid data store on the GeoEvent Server

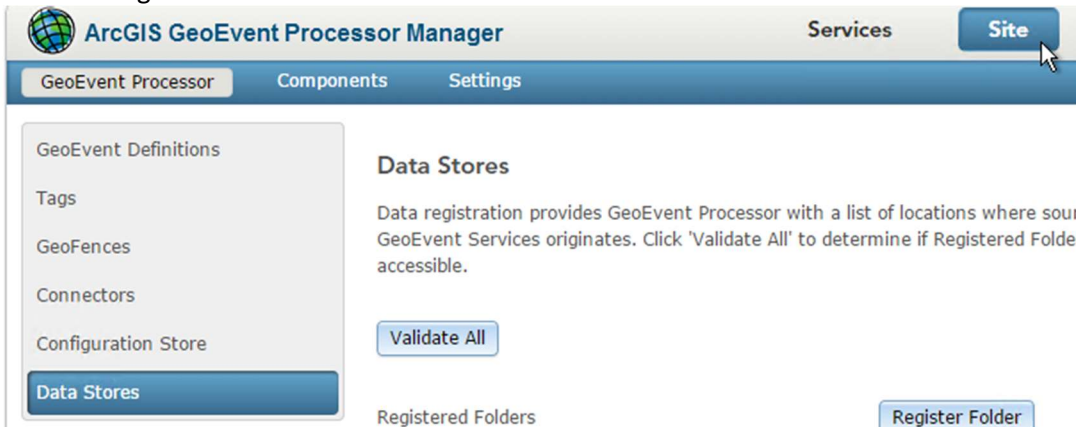
GeoEvent Server data stores are pointers to ArcGIS servers and ArcGIS online accounts and allow the GeoEvent Server to connect to ArcGIS and read contents such as feature services. The location (ArcGIS server or ArcGIS online account) where the new feature service will be created must be registered as a data store in GeoEvent Server.

1. Sign into your GeoEvent Server manager (<https://pisrv01.pischool.int:6143/geoevent/manager>); a link should already be in the bookmarks bar of your web browser or you can click the URL for the GeoEvent Server from the PI Integrator for Esri ArcGIS 2017 SP1. Use the credentials provided, namely, siteadmin & vlesiteadmin for username and password, respectively.



The screenshot shows the 'Monitor' tab of the ArcGIS GeoEvent Manager. It displays three sections: 'GeoEvent Services', 'Inputs', and 'Outputs'. Each section contains a table with columns for In/Out, Count, Rate, Bulk Rate, Max Rate, and Time Since Last. The 'GeoEvent Services' section shows two services: 'gisec-geofencesample-vehiclesefencing-service' and 'vehiclesefencing-service'. The 'Inputs' section shows one input: 'gisec-geofencesample-vehiclesefencing-service'. The 'Outputs' section shows two outputs: 'http://external-out' and 'gisec-geofencesample-vehiclesefencing-service-update-out'.

2. Navigate to **Site > GeoEvent > Data Stores**



The screenshot shows the 'Site' tab of the ArcGIS GeoEvent Processor Manager. The left sidebar contains a list of navigation items: 'GeoEvent Definitions', 'Tags', 'GeoFences', 'Connectors', 'Configuration Store', and 'Data Stores'. The main content area is titled 'Data Stores' and contains the text: 'Data registration provides GeoEvent Processor with a list of locations where source GeoEvent Services originates. Click 'Validate All' to determine if Registered Folder accessible.' Below this text is a 'Validate All' button. At the bottom of the page, there is a 'Registered Folders' section with a 'Register Folder' button.

3. You should see, under **Registered server connections**, the button **Register server connection**; go ahead and click it, which will allow us to begin adding a data store. Note that in this case, the data store for the Portal for ArcGIS has already been created successfully.



The screenshot shows the 'Registered server connections' table. It has columns for Status, Name, Type, Sync, Edit, and Delete. There are two rows: one for 'Default' with a red status icon, and one for 'PORTAL' with a green status icon. A 'Register server connection' button is located at the top right of the table.

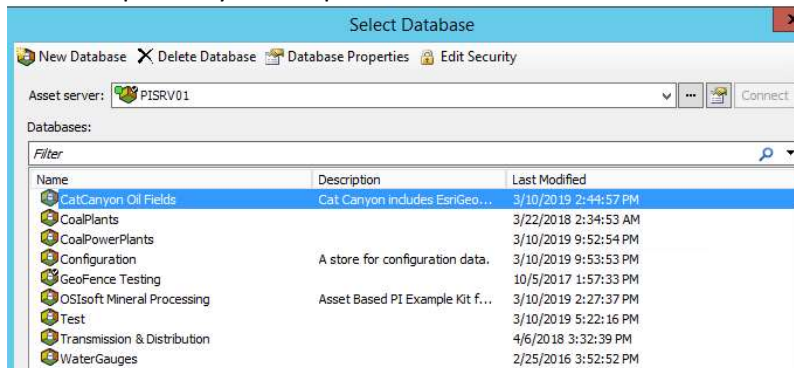
Status	Name	Type	Sync	Edit	Delete
	Default	ArcGIS Enterprise			
	PORTAL	ArcGIS Enterprise			

If a green checkmark appears next to your data store, then you're all ready to proceed to the next section. In this case a green checkmark should appear next to PORTAL as in the screenshot above.

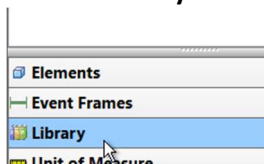
## 2. Verify that the PI AF Database is ready

We have loaded a PI AF Database for you that already contains Elements, based on PI AF Element Templates (which are required by the PI Integrator for Esri ArcGIS) for both wells and maintenance vehicles. We are going to examine what we have created for you.

1. Open PI System Explorer and connect to the AF Database called **Cat Canyon Oil Fields**.



2. We'll start by looking at our Element Templates. Via the navigator pane in the lower left, select **Library**.



3. Examine one of the two Templates that we'll use to create a live-updating Esri Feature Service; click on it, and then on the right, click the **Attribute Templates** tab.

Notice (spoiler alert) that the Wells Element Template contain Attributes that are of type "Double", for **Longitude** and **Latitude**. These will allow instances of this Template to be positioned correctly on a map. Notice that besides that, there is nothing at all special about these Elements—that's right; any PI AF Element Template can be used, so long as it supplies location information<sup>1</sup>.

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<sup>1</sup> And technically, the PI AF Element template doesn't need to provide location information at all. Using the Augmented feature layer functionality in the PI Integrator for Esri ArcGIS, we can create the time-enabled augmented feature layer that contains data from both PI System and the existing feature layer that contains geometry, without modifying the existing feature layer.

Library

CatCanyon Oil Fields

- Templates
  - Element Templates
    - Vehicle Template
    - Wells**
  - Event Frame Templates
  - Model Templates
  - Transfer Templates
- Enumeration Sets
- Reference Types
- Tables
- Table Connections
- Categories
  - Analysis Categories
  - Attribute Categories
  - Element Categories
  - Notification Rule Categories
  - Reference Type Categories
  - Table Categories

Wells

General
Attribute Templates
Ports
Analysis Templates
Notification Rule Templates

Filter

	Name	Description	Default Value
Category: Geometry			
	ArcGIS feature shape		
	ArcGIS feature shape type		Point
	Coordinate projection ID		102100
	Coordinate system ID		4326
	Coordinate system name		GCS_WGS_1984
	Latitude		0 °
	Longitude		0 °
Category: Metadata			
	ActiveWell	ActiveWell	
	API	APINumber	
	Asset Name	AssetName	
	County	CountyName	
	Field	FieldName	
	Lease	LeaseName	
	OBJECTID	OBJECTID	0
	Operator	OperatorNa	
	Type	TypeText	
	Well Type	Well_Type	
Category: PI Data			
	Bottom Hole Pressure		0 psi
	Bottom Hole Temperature		0 °F
	Flow Rate		0
	Flow Tubing Pressure		0
	Hydrostatic Head		0

- Now use the navigator pane to click **Elements** and browse down to the Wells -> CE-08300011 Element. Examine its Attributes under the **Attributes** tab and verify the values of the **Latitude**, **Longitude** and the **PI Data** attributes. The **PI Data** attributes should be updating every few minutes while the location attributes should be static (you can click the **Refresh** button on the top toolbar;).

Elements

Wells

CE-08300011

General Child Elements Attributes Ports Analyses Notification Rules Version

Filter

Name	Value
Category: Geometry	
ArcGIS feature shape	{ "x": -13392076.892835012, "y": 4140968.8589975387 }
ArcGIS feature shape type	Point
Coordinate projection ID	102100
Coordinate system ID	4326
Coordinate system name	GCS_WGS_1984
Latitude	34.8312248174666 °
Longitude	-120.303073589376 °
Category: Metadata	
ActiveWell	Y
API	08300011
Asset Name	CE-08300011
County	Santa Barbara
Field	Cat Canyon
Lease	Williams Holding
OBJECTID	1
Operator	Clancy Energy
Type	Oil & Gas Show
Well Type	SC,OG
Category: PI Data	
Bottom Hole Pressure	241.685623168945 psi
Bottom Hole Temperature	119.167152404785 °F
Flow Rate	289.86318969726562
Flow Tubing Pressure	270.15805053710938
Hydrostatic Head	239.89054870605469

Elements

Elements

Maintenance Vehicles

T-101

T-102

T-103

T-104

T-105

Wells

Element Searches

T-101

General Child Elements Attributes Ports Analyses Notification Rules Version

Filter

Name	Value
Category: Location	
Latitude	34.8669059114516 °
Longitude	-120.332806004934 °
Category: Vehicle Information	
Driver	J. Lee
Truck ID	T-101

It's worth noting again that you don't have to use just latitude and longitude as geometry; you can instead, for example, create a brand new Feature Service that has complex geometry, such as for a meandering pipeline, by specifying that geometry in an AF attribute. In short, in this scenario, we are using latitudes and longitudes, but complex geometries like polylines and polygons are supported too.

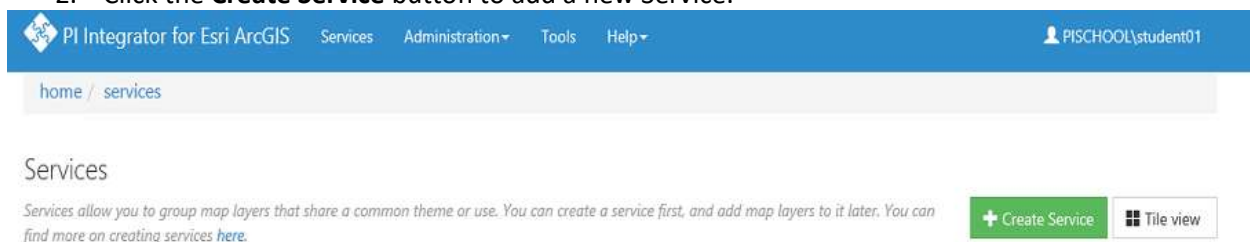
### 3. Create a Service and Layers via the PI Integrator for Esri ArcGIS

The software has been installed, the configuration steps are done, and our PI AF Database (**Cat Canyon Oil Fields**) is ready for us to use as a data source to create live Esri Feature Services. Next, we'll proceed through the steps to use all that we have created and prepared: actually using the PI Integrator for Esri ArcGIS to create Esri Feature Services that update in real-time with PI System data. Later on, we'll create a map-based dashboard using those Feature Services. For now, let's get started in the PI Integrator for Esri ArcGIS—that's where all this work is done.

First, let's create a Service to hold both of the Layers that we will create (note: this "Service", which we will create in the PI Integrator for Esri ArcGIS, is different from an ArcGIS "Feature Service", which is what we'll later add to a map).

Create a feature service to bring-in all the Oil Wells based-on AF element template

1. Access the link to the PI Integrator for Esri ArcGIS home screen using the bookmark link to <https://pisrv01.pischool.int:448/configuration/#/services>.
2. Click the **Create Service** button to add a new Service.



The **Create new service** page opens. Fill in the fields as shown below. Please note that you cannot use special characters in the name field.

The screenshot shows the 'Create new service' form. The top navigation bar is identical to the previous screenshot. The breadcrumb trail now includes 'new', showing 'home / services / new'. The form has two input fields: 'Name\*' with the value 'CatCanyonOilCo' and 'Description\*' with the value 'CatCanyonOilCo'. Below these fields are two buttons: 'Create' and 'Cancel'.

Having finished this step, we will create a layer within this Service based-on a PI AF Element Template, namely, **Wells**. We will first begin with the *creation of the layer for the wells by connecting through the GeoEvent Server*.

3. Examine the Service details page. Click the **Create Layer** button.
4. In the **Name** Field, enter a name for the new Layer. The name is required and must be unique. In addition, the name must contain a minimum of five characters, may contain only lowercase and uppercase alphanumeric characters, hyphens, and underscores, and cannot include spaces or special characters. Uncheck **Time-enabled feature layer** and check **Connect through ArcGIS GeoEvent Server** option and then click the **Continue** button.

PI Integrator for Esri ArcGIS Services Administration Tools Help PISCHOOL\student01

home / services / CatCanyonOilCo / new

### Creating new layer (*CatCanyonOilWells*) in service CatCanyonOilCo

Basic information Step 1 of 4

**Name\*** CatCanyonOilWells

**Description\*** CatCanyonOilWells

☐ **Time-enabled Feature Layer.** This option creates an item in Portal for ArcGIS or in ArcGIS Online. These layers support historical data access.

Create item in

☐ ArcGIS Online ☐ ArcGIS Enterprise

☒ **Connect through ArcGIS GeoEvent Server.** This option allows you to publish data to a feature service in ArcGIS Online or Portal for ArcGIS. These layers enable real-time spatial analytics in ArcGIS GeoEvent Server.

[Continue](#)

5. For the Data Source, kindly choose **PISRV01**, **CatCanyon Oil Fields**, and **Wells Template** as the AF Server, AF Database, and Template, respectively.

### Creating new layer (*CatCanyonOilWells*) in service CatCanyonOilCo

Data source Step 2 of 4

**AF Server\*** PISRV01

**AF Database\*** CatCanyon Oil Fields

**Template\*** Wells

**Category**

**Max count** 1000000

**Search root** CatCanyon Oil Fields [Select](#)

[Preview](#) [Back](#) [Continue](#)

6. There is also a **Preview** button that you can click to see the results of your Layer search.

Using the Preview is an important step that you should always do, as it helps you verify that your layer is indeed referencing data from the intended PI AF Elements. Click **Preview** and make sure that the PI AF data that you expect is returned by your Layer.

Selection preview ( PI AF Elements )

Filter preview:

preview limited to first 10 elements found  
currently showing 10 PI AF Elements

<b>CE-08300011</b>		<b>CE-08300073</b>	
API	08300011	API	08300073
ActiveWell	Y	ActiveWell	Y
ArcGIS feature shape	("X":-13392076.892835012,"Y":4140968.8589975387)	ArcGIS feature shape	("X":-13391832.323874447,"Y":4140960.9932389036)
ArcGIS feature shape type	Point	ArcGIS feature shape type	Point
Asset Name	CE-08300011	Asset Name	CE-08300073
Bottom Hole Pressure	240.59408569335937	Bottom Hole Pressure	241.17677307128906
Bottom Hole Temperature	118.1285629272461	Bottom Hole Temperature	94.55162048339844
Coordinate projection ID	102100	Coordinate projection ID	102100
Coordinate system ID	4326	Coordinate system ID	4326
Coordinate system name	GCS_WGS_1984	Coordinate system name	GCS_WGS_1984
County	Santa Barbara	County	Santa Barbara
Field	Cat Canyon	Field	Cat Canyon
Flow Rate	287.79449462890625	Flow Rate	278.235595703125
Flow Tubing Pressure	269.134521484375	Flow Tubing Pressure	269.134521484375
Hydrostatic Head	238.84600830078125	Hydrostatic Head	238.84600830078125
Latitude	34.8312248174666	Latitude	34.8311668175934
Lease	Williams Holding	Lease	Williams Holding
Longitude	-120.303073589376	Longitude	-120.300876589023
OBJECTID	1	OBJECTID	2
Operator	Clancy Energy	Operator	Clancy Energy
Type	Oil & Gas Show	Type	Oil & Gas Show
Well Type	SC,OG	Well Type	SC,OG
<b>CE-08300083</b>		<b>CE-08300101</b>	
API	08300083	API	08300101
ActiveWell	Y	ActiveWell	Y
ArcGIS feature shape	("X":-13391702.080058172,"Y":4141078.7092430666)	ArcGIS feature shape	("X":-13394080.309984719,"Y":4140376.0931738541)
ArcGIS feature shape type	Point	ArcGIS feature shape type	Point

7. Click the **Continue** button.

8. Next, we will configure all the Fields for this Layer. You configure Fields for a Layer to determine which AF Attributes will be published as Fields in your Layer. To begin, the **Template Attribute Fields** section of the Layer definition screen shows all the attributes found using the AF Template. Select only the fields check on the screenshot.

Creating new layer (*CatCanyonOilWells*) in service CatCanyonOilCo

Layer fields

Step 3 of 4

All field names are converted automatically to lowercase

Template attribute fields [\[Show less\]](#)

[A - Z](#) [Z - A](#) ☒ Show categories

☒ Select all

Included	Name	Attribute Name	Type	Source	Units	Function
★ Category: Metadata						
<input checked="" type="checkbox"/>	well_type	Well Type	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	type	Type	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	operator	Operator	String	static		None <input type="checkbox"/>
<input type="checkbox"/>	objectid	OBJECTID	Int64	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	lease	Lease	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	field	Field	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	county	County	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	asset_name	Asset Name	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	api	API	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	activewell	ActiveWell	String	static		None <input type="checkbox"/>
★ Category: Geometry						
<input checked="" type="checkbox"/>	longitude	Longitude	Double	static	°	X <input type="checkbox"/>
<input checked="" type="checkbox"/>	latitude	Latitude	Double	static	°	Y <input type="checkbox"/>
<input type="checkbox"/>	coordinate_system_name	Coordinate system name	String	static		None <input type="checkbox"/>
<input type="checkbox"/>	coordinate_system_id	Coordinate system ID	Int32	static		None <input type="checkbox"/>
<input type="checkbox"/>	coordinate_projection_id	Coordinate projection ID	Int32	static		None <input type="checkbox"/>
<input type="checkbox"/>	arcgis_feature_shape_type	ArcGIS feature shape type	String	static		None <input type="checkbox"/>
<input type="checkbox"/>	arcgis_feature_shape	ArcGIS feature shape	String	static		None <input type="checkbox"/>
★ Category: PI Data						
<input checked="" type="checkbox"/>	hydrostatic_head	Hydrostatic Head	Double	PI Point		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	flow_tubing_pressure	Flow Tubing Pressure	Double	PI Point		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	flow_rate	Flow Rate	Double	PI Point		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	bottom_hole_temperature	Bottom Hole Temperature	Double	PI Point	°F	None <input type="checkbox"/>
<input checked="" type="checkbox"/>	bottom_hole_pressure	Bottom Hole Pressure	Double	PI Point	psi	None <input type="checkbox"/>

Element fields [\[Show less\]](#)

Included	Name	Function
<input checked="" type="checkbox"/>	name	Key <input type="checkbox"/> Include AF Element name
<input type="checkbox"/>	elementpath	None <input type="checkbox"/> Include AF Element path
<input type="checkbox"/>	guid	None <input type="checkbox"/> Include AF Element ID (GUID)
<input type="checkbox"/>	description	None <input type="checkbox"/> Include AF Element description
<input type="checkbox"/>	template	Include AF Element Template name
<input checked="" type="checkbox"/>	retrievaltime	Include retrieval time (Always included)

[Back](#) [Continue](#)

### Specifying the coordinates

The **X** and **Y** functions are pre-selected if the application finds any Attribute name that contains the words **longitude** or **latitude**, or **X** or **Y**; if so, the application assigns them to the **X** and **Y** function (if desired, you can select a different function: **None**, **X**, **Y**, **Key** or **Geometry**). Generally, you specify **X** and **Y** functions for Attributes that indicate geographic positions, including positions that move over time. Only one **X** and **Y** pair can be specified. In our case, we will accept the default **X** and **Y** assignments.

### Specifying a geometry

Another option (which we won't use here), rather than specifying **X** and **Y**, is to specify the geometry for a map Feature by defining it in Esri Feature Geometry Json. Specifying a geometry allows for much more complex areas to be defined, such as polylines or polygons. Geometry function Fields must be of type string.

### objectid

The objectid field needs to be unselected because it is used internally in Esri and it will create a conflict.

### Specifying a key function



Included	Name	Function
<input checked="" type="checkbox"/>	name	Key

[Include AF Element name](#)

In our case, under **Element fields**, set the element **name** Field to have the **key** function. The **key** function specifies a unique identifier for a particular map Feature; the **key** function is used when updating specific map Features in a Feature Service with the right data from the corresponding AF Elements, and also when generating OSIssoft Visualization displays.

9. Press **Continue** when finished configuring Fields.

10. Set **Geometry Type to Point**.

[home](#) / [services](#) / [CatCanyonOilCo](#) / [new](#)

## Creating new layer (*CatCanyonOilWells*) in service CatCanyonOilCo

Geometry information

Step 4 of 4

Geometry type ⓘ

Point

Spatial reference ⓘ

GCS\_WGS\_1984 (4326)



Q

(5256)

[Back](#)

[Create Layer](#)

This allows you to specify a different **Geometry Type**, if you're using Features that aren't points, such as polylines; we are only using points in our case, so we'll use the defaults that appear. You can also specify the **Spatial reference**, if you know that your latitude and longitude values were obtained using a particular spatial reference model for the world. In most cases, though, the default reference, **GCS\_WGS\_1984 (4326)** should suffice, so in summary, leave all these settings as is.

Go ahead and click **Create Layer**.

## 11. Click Next.

Welcome to the ArcGIS Feature Service and GeoEvent Extension Configuration Wizard.

This wizard walks you through the steps to:

- Create a Feature Service for ArcGIS Online or for ArcGIS Portal Extension
- Configure your ArcGIS GeoEvent Extension to stream the data defined in your PI Integrator for Esri ArcGIS layer

Before starting this configuration process, you should:

1. Have an ArcGIS Online or ArcGIS Portal Extension account that has privileges to publish hosted Feature Services.
2. Verify that your ArcGIS GeoEvent Extension is running and is configured as a known ArcGIS GeoEvent Extension in PI Integrator for Esri ArcGIS.
3. Have administrator credentials for your ArcGIS GeoEvent Extension.
4. Ensure that your ArcGIS Online account or ArcGIS Portal Extension account is registered as a Data Store in ArcGIS GeoEvent Extension.

Next Cancel


## 12. Since we are going to the publishing this as a feature layer to Portal for ArcGIS, select the **ArcGIS Enterprise** button.

home / services / TransmissionAndDistribution / Meters / connect-wizard

1. Feature Service Environment 2. Create Feature Service 3. Configure GeoEvent Server 4. Advanced Settings 5. Summary

Choose where you would like to host your feature service: ?

 ArcGIS Online

 ArcGIS Enterprise

[I want to manually create a feature service](#)

## 13. When prompted for the credentials, enter the username and password *siteadmin* & *vlesiteadmin*, respectively and click **Verify Credentials**.

1. Feature Service Environment 2. **Create Feature Service** 3. Configure GeoEvent Server 4. Advanced Settings 5. Summary

Provide your Portal for ArcGIS credentials to create a feature service:

**Portal for ArcGIS** ?

Portal\_10\_7\_1

**User name**

siteadmin

**Password**

.....

Verify credentials

14. Once your Portal for ArcGIS credentials are validated, the wizard shows a suggested Service and Layer name, with description Fields.

home / services / CatCanyonOilCo / CatCanyonOilWells / connect-wizard

1. Feature Service Environment 2. **Create Feature Service** 3. Configure GeoEvent Server 4. Advanced Settings 5. Summary

✓ Portal for ArcGIS credentials verified. Provide feature service configuration details.

**Feature service name** ⓘ

catcanyonoilwells x

**Feature service description** ⓘ

Generated from: catcanyonoilco

**Feature layer name** ⓘ

catcanyonoilwells

**Feature layer description** ⓘ

CatCanyonOilWells

**Geometry type:**

Point (from layer configuration)

**Spatial reference:**

GCS\_WGS\_1984 (from layer configuration)

Create

Previous Next Cancel

1. Leave the default Service description (you could, if you want, enter a new description).
2. Leave the default Layer name and description (you could, if you want, enter a new name and description).
3. Make sure that the Feature service name is the same as Feature layer name.
4. Click **Create**. When you select **Create**, the Service and Layer are created in Portal for ArcGIS.

If successful, the “Feature Service Created” message is displayed.



15. **Note:** you could then, in a separate browser window tab, log in to Portal for ArcGIS to view and verify the creation of the feature service. To do this, you can click on the Portal for ArcGIS bookmark, as shown below.



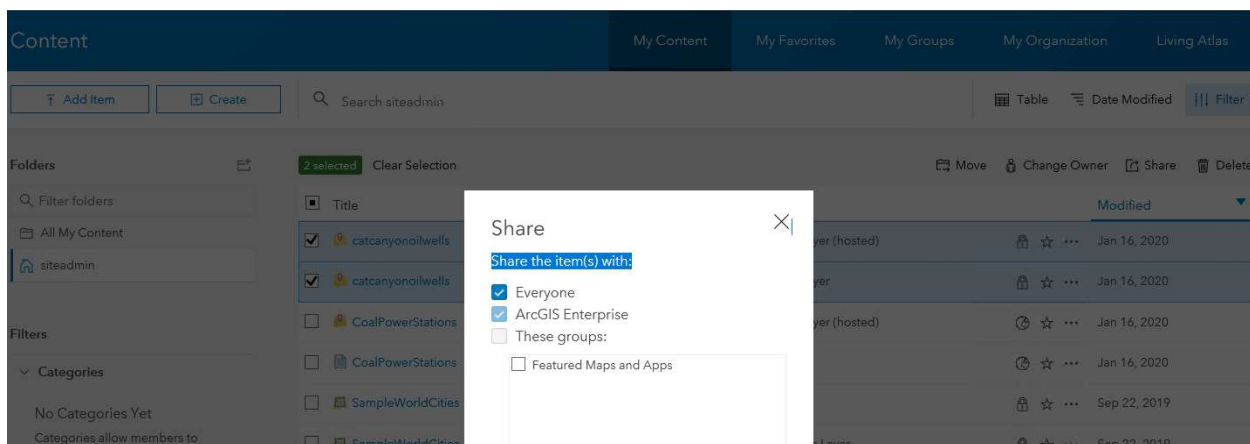
16. Enter the Portal for ArcGIS user credentials, namely, enter the username and password *siteadmin* & *vlesiteadmin*, respectively. Note that if you had already logged-on to GeoEvent Server in another tab, you would be auto logged-in using the above-mentioned credential.



17. Clicking on **My Content** would show you the feature layer that was created. You would note there are 2 with the same name. One is a feature service and the other is a feature collection.



Check both the layers, click Share and share it with Everyone.



18. Now go back to your PI Integrator for Esri ArcGIS 2017 SP1, which you would have on another tab. Having created your Feature Service, click **Next** to display the Configure GeoEvent Server screen; that will allow you to configure the GeoEvent Server to accept the streamed data from the PI Integrator for Esri ArcGIS 2017 SP1 and output it to the Feature Service that you just created. Enter the User ID and password for the GeoEvent Server (username and password *siteadmin* & *vlesiteadmin*, respectively) and click **Verify credentials**.

---

home / services / CatCanyonOilCo / CatCanyonOilWells / connect-wizard

1. Feature Service Environment 2. Create Feature Service 3. **Configure GeoEvent Server** 4. Advanced Settings 5. Summary

**GeoEvent Server**

GeoEventServer ▼ [manager](#)

Use the same credentials that you use for logging into Portal for ArcGIS:  
<https://pisrv01.pischool.int/portal> ?

**User name**

siteadmin

**Password**

●●●●●●●●

Verify credentials

19. Since you used the Wizard to create your Feature Service, then after clicking **Verify credentials**, the Wizard begins polling the GeoEvent Server to detect the newly created Feature Service in one of the GeoEvent Server's data stores (which you verified earlier), which can take a few minutes. You will be notified when the process is complete, after which you may proceed to the next step. Click **Next**.

1. Feature Service Environment 2. Create Feature Service 3. **Configure GeoEvent Server** 4. Advanced Settings 5. Summary

✓ You are connected to GeoEvent Server **GeoEventServer**. Click [here](#) to change your connection.

✓ Success; GeoEvent Server has registered the target feature service. Continue to the **next** step.

20. In the **Input**, **Output**, and **Service** Fields, verify that the appropriate input, output, and Service values are displayed.

---

[home](#) / [services](#) / [CatCanyonOilCo](#) / [CatCanyonOilWells](#) / [connect-wizard](#)

1. Feature Service Environment 2. Create Feature Service 3. Configure GeoEvent Server 4. **Advanced Settings** 5. Summary

Review the advanced settings. Generally, changes are needed only when multiple GeoEvent Servers are configured to use this PI Integrator for Esri ArcGIS layer.

**Input** ⓘ

pigeo-catcanyonoilco-catcanyonoilwells-ws-in

**Output** ⓘ

pigeo-catcanyonoilco-catcanyonoilwells-fs-update-out

**Service** ⓘ

pigeo-catcanyonoilco-catcanyonoilwells-service

**Identity (Key) Field** ⓘ

name (String) ▼

**Refresh Interval (seconds)** ⓘ

5

**Session Inactivity Timeout (seconds)** ⓘ

330

☒ **Use HTTPS (secure)** ⓘ

Create Service Connected

Previous Next Cancel

21. Click **Create Service**. If the Service was created without errors, the following message is displayed: **Service Created – Done!**



22. Click **Next**. The following message is displayed: **You have successfully configured GeoEvent Server to receive data from PI Integrator for Esri ArcGIS.**

---

1. Feature Service Environment 2. Create Feature Service 3. Configure GeoEvent Server 4. Advanced Settings 5. **Summary**

✔ You have successfully configured ArcGIS GeoEvent Server to receive data from PI Integrator for Esri ArcGIS.

Ensure the following:

- A connection exists between your ArcGIS GeoEvent Server and this PI Integrator for Esri ArcGIS layer.
- Your ArcGIS GeoEvent Server is receiving events from PI Integrator for Esri ArcGIS. To verify, go to the [ArcGIS GeoEvent Manager](#)

23. Click **Finish**. You will return to the Layer details page.

24. You should next ensure the following:

- a. Click on the **GeoEvent Connections** tab and verify that an opened connection from your ArcGIS GeoEvent Server is made to this layer, which is displayed when the wizard is closed.

home / services / CatCanyonOilCo / CatCanyonOilWells

Layer CatCanyonOilWells ✖

CatCanyonOilWells

Created on 01/16/2020 10:38:29 (29 minutes ago)

All Features Fields **GeoEvent connections** Visualization ArcGIS

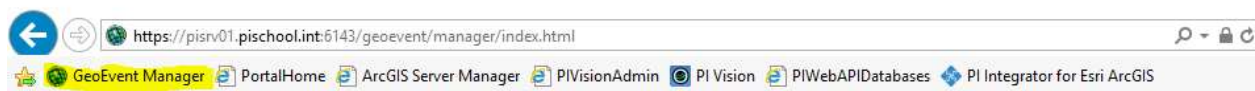
⚡ Test connection

Layer connections

Show: All Time: \*-1d Automatic refresh

Status	Updates	Total data	Address	Scheme	Secure	Created	Updated	Total time	Time since last	Avg update rate	Avg data rate	
✓ Opened	268	167.1 kB	192.168.0.5	https	✓	2 minutes ago	just now	00:01:31	00:00:02	2.92 updates/s	1.8 kB/s	Close

- b. Your ArcGIS GeoEvent Server is receiving events from PI Integrator for Esri ArcGIS. If you have closed the GeoEvent Manager tab on your browser, use the ArcGIS GeoEvent Manager to check whether events are received by clicking the bookmark in IE for the same.



After signing in, click on **Services** at the top then you can scroll down to find the Input, GeoEvent Service, and Output; their names are the values you saw in step 1. You should verify that the **Count** of updates for those objects is indeed increasing. If they are, then you can proceed further.

ArcGIS GeoEvent Manager

Monitor Inputs GeoEvent Services Outputs

Refresh Interval Reset Statistics

Monitor

GeoEvent Services	In/Out	Count	Rate	Edit Rate	Max Rate	Time Since Last
xloeo-catcanyonoilco-catcanyonoilwells.service	In	536	2 /sec	/	9 /sec	00:02:36
	Out	536	2 /sec	/	9 /sec	00:02:36

Inputs	Count	Rate	Edit Rate	Max Rate	Time Since Last
pgeo-catcanyonoilco-catcanyonoilwells-vs-in [ Running On: PISRV01 ]	536	2 /sec	/	9 /sec	00:02:37

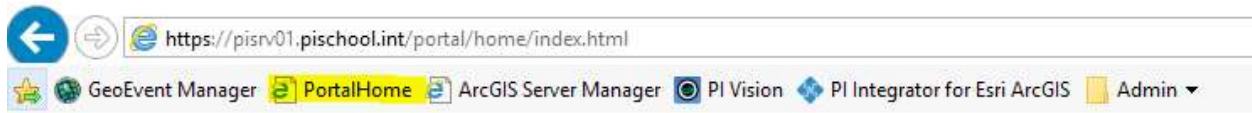
Outputs	Count	Rate	Edit Rate	Max Rate	Time Since Last
pgeo-catcanyonoilco-catcanyonoilwells-fs-update-out	536	2 /sec	/	9 /sec	00:02:36

Congratulations! It's worth mentioning that what we have done is an incredibly powerful ability of the Integrator. You can actually click on each of these objects that was created, and you can see that a lot of configuration values have been automatically entered in for you by the Integrator.

## 4. Create a WebMap and add OSIssoft Visualization integration to the Portal for ArcGIS Web Map

Next, we'll add OSIssoft Visualization integration, so that in addition to seeing a map with live locations, and with pop-ups that feature live values from the PI System, you can also click a pop-up image to automatically open an ad hoc OSIssoft Visualization display.

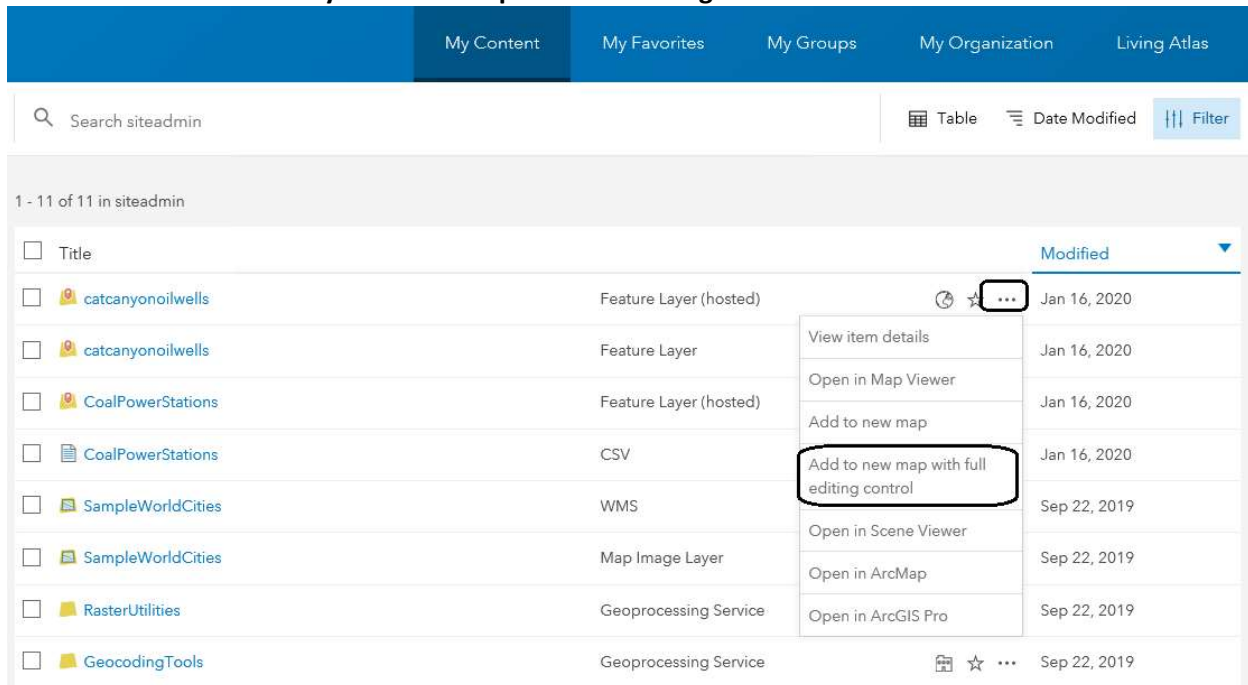
1. On a separate browser tab, connect to the Portal for ArcGIS by clicking on the bookmark.



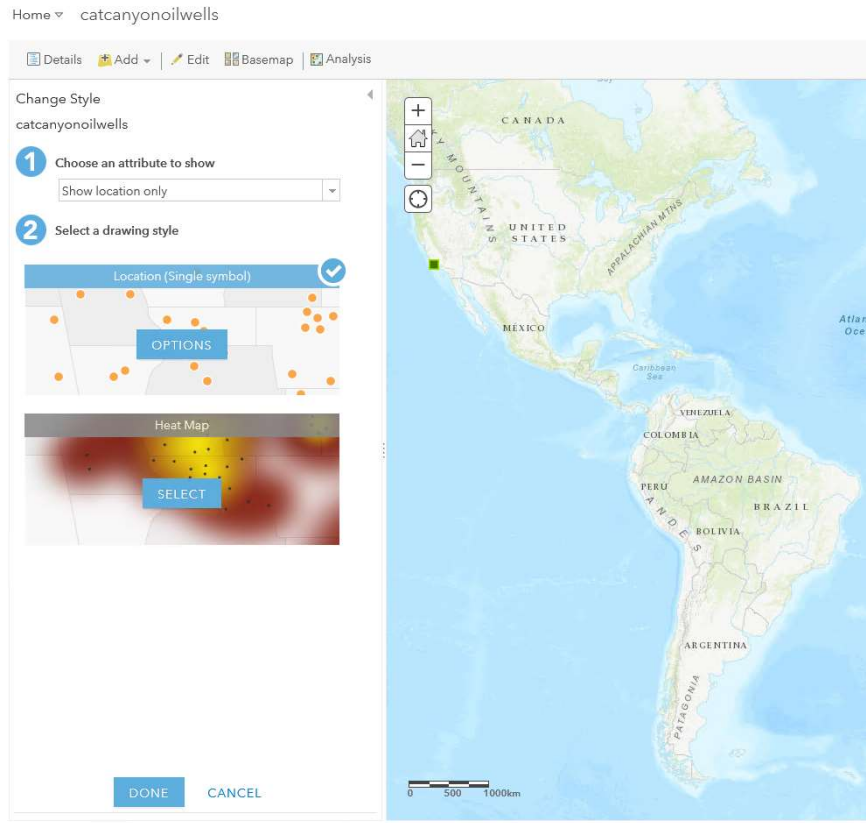
2. Then click **Content**



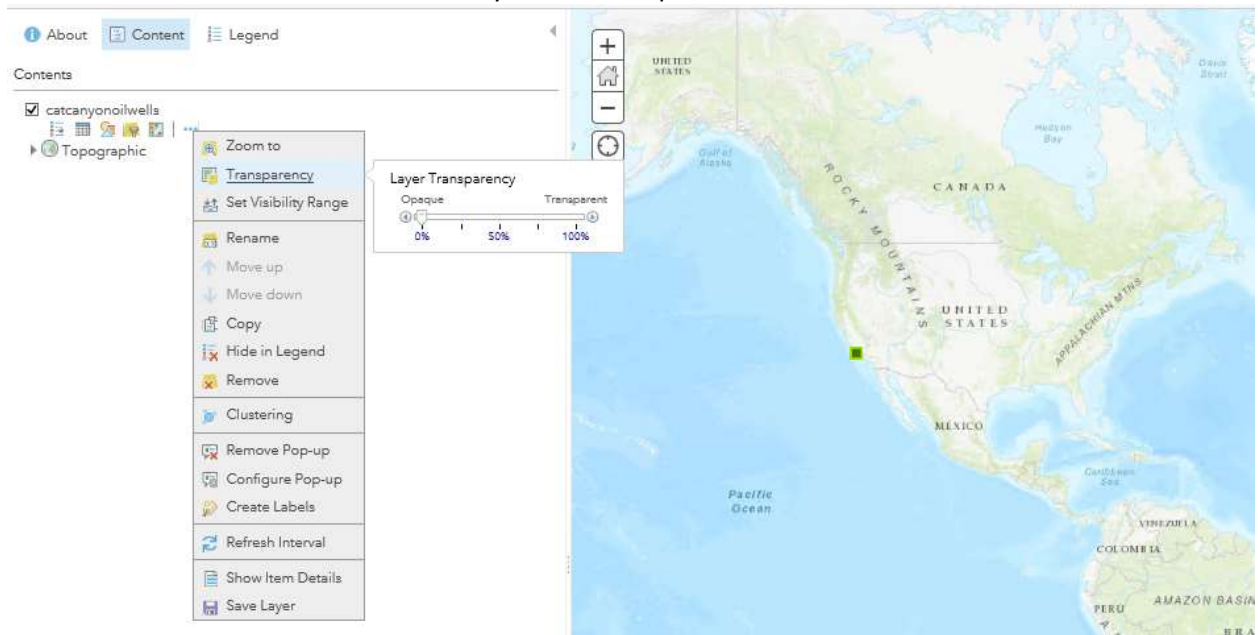
3. You would note two items called **Catcanyonoilwells**. Click on the dropdown arrow next to one of them. The feature layer that shows 7 options is the feature service that we are interested in. Then select **Add layer to new map with full editing control**.



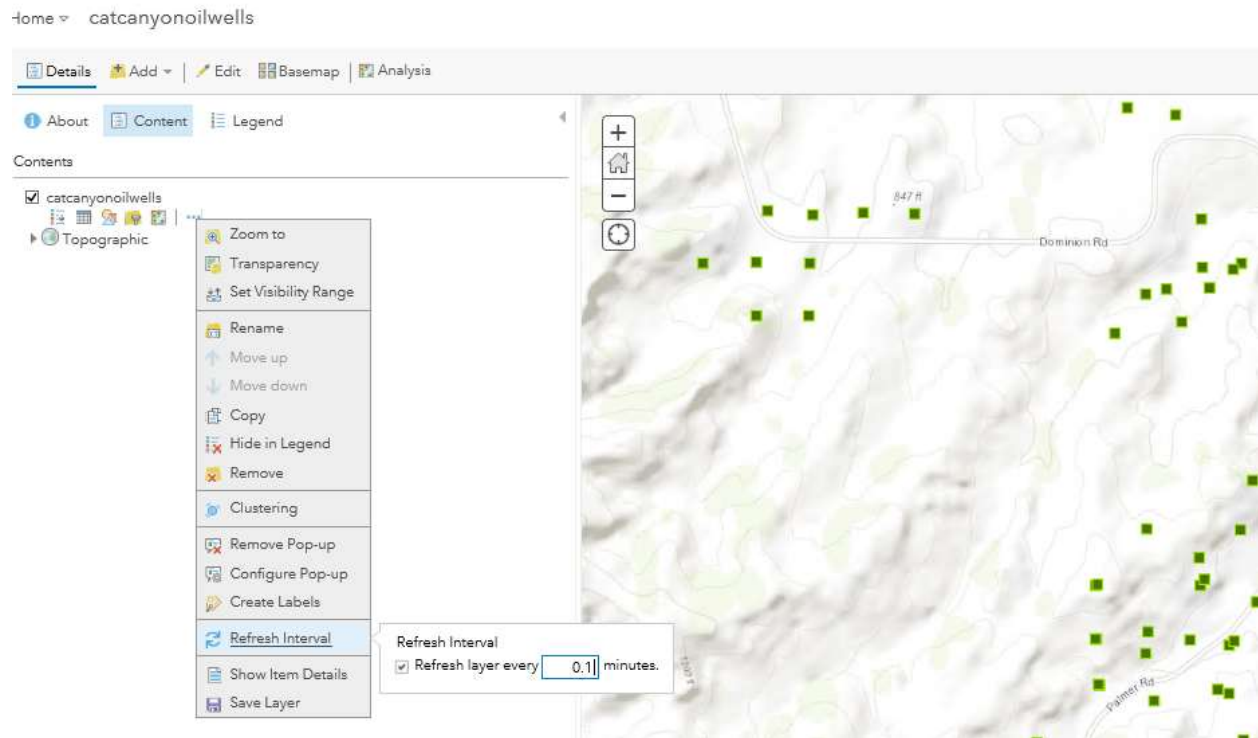
4. Click No if you see a warning and then click DONE in the lower left.



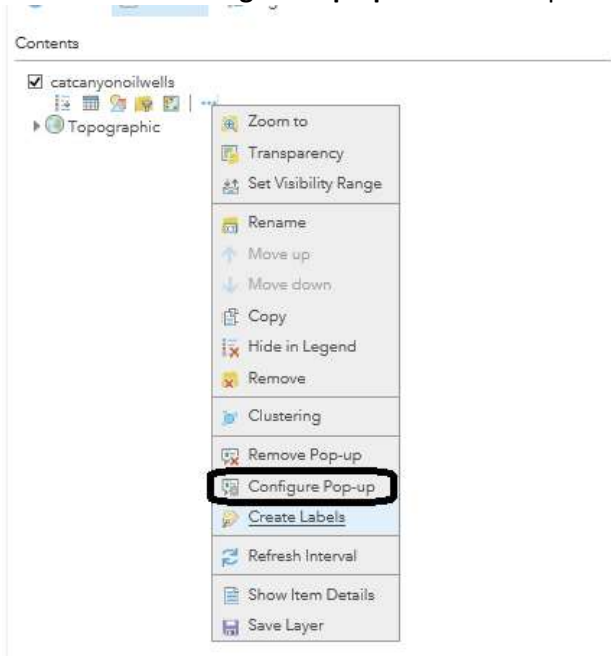
5. Now click on the ... next to the layer on the map and select **Zoom to**.



6. Similarly, select the Refresh Interval and specify 0.1 minutes.



7. Select **Configure Pop-up** from the drop-down list.



8. Select **Image** from the **ADD** drop-down list in the **Pop-up Media** section.

Configure Pop-up

catcanyonoilwells

☒ Show Pop-ups

Pop-up Title

catcanyonoilwells: {name}

Pop-up Contents

Display: A list of field attributes

These field attributes will display:

- well\_type {well\_type}
- type {type}
- operator {operator}
- longitude {longitude}

Configure Attributes

Attribute Expressions

Adding expressions allows you to create new information from existing fields for use in pop-ups.

ADD

No expressions.  
Click 'Add' to add one.

Pop-up Media

Display images and charts in the pop-up:

ADD

- Image
- Pie Chart
- Bar Chart
- Column Chart
- Line Chart

9. In the **Configure Image** window, as a title, you can enter “Analyze!”

Configure Image

Specify the title, caption and URL for this image. Insert field names to derive the display from attribute values.

Title:

Analyze in PI Vision

Caption

URL

Link (optional)

Refresh Interval

☐ Refresh image every 0 minutes.

OK CANCEL

10. For the URL, we'll need to go back to the PI Integrator for Esri ArcGIS. Either go back to the PI Integrator tab or if you had closed that browser tab, in a separate browser tab, open the PI Integrator for Esri ArcGIS.

11. Click on Services from the PI Integrator for Esri ArcGIS 2017 SP1. Then select CatcanyonOilwells layer under CatCanyonOilCo Service.

PI Integrator for Esri ArcGIS Services Administration Tools Help PISCHOOL\student01

home / services

### Services

Services are used to group layers that share a common theme or purpose. You first create a service, then add layers.

[+ Create Service](#) [Tile view](#)

Name ↓	Description	Created	Modified	Layers	
CatCanyonOilCo	CatCanyonOilCo	03/10/2019 10:01:27	03/10/2019 10:01:27	1	✖
GeoFencingExample	GeoFencingExample	03/10/2019 04:40:38	03/10/2019 04:40:38	1	✖

12. Click on CatcanyonOilwells layer

home / services / CatCanyonOilCo

### Service CatCanyonOilCo ✖

CatCanyonOilCo  
Created on 03/10/2019 10:01:27 (20 minutes ago)

Layers (1)

Layers are used to select PI System data to connect to the ArcGIS platform. You can configure multiple layers within a single service.

[+ Create Layer](#) [Tile view](#)

Name ↓	Description	Created	Modified	Time-enabled	GeoEvent	
CatCanyonOilWells	CatCanyonOilWells	03/10/2019 10:05:24	03/10/2019 10:05:24		✓	✖

13. Click the **Visualization** tab for that Layer.

home / services / CatCanyonOilCo / CatCanyonOilWells

### Layer CatCanyonOilWells ✖

CatCanyonOilWells  
Created on 03/10/2019 10:05:24 (17 minutes ago)

All Features Fields GeoEvent connections Visualization ArcGIS

#### Configuration

PI Vision server  [▼](#)




☒ Allow ad-hoc PI Vision displays

#### Displays

Ad-hoc [Copy URL to clipboard](#)

Custom [Add](#)

#### Icons

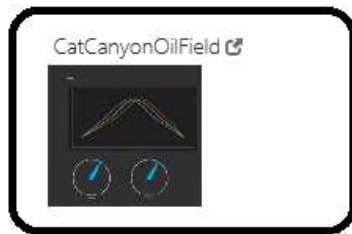
PI AF Button Image	<a href="#">Copy URL to clipboard</a>	 <b>Analyze</b>
OSisoft Button Image	<a href="#">Copy URL to clipboard</a>	 <b>Analyze</b>
PI Vision Button Image	<a href="#">Copy URL to clipboard</a>	 <b>Analyze</b>

14. Now we will use the custom OSIsoft Visualization displays as shown on page 12. Click on **Add** next to Custom.

15. Select the Custom CatCanyonOilField display and click Close.

Add PI Vision displays from server "PIVision"

<https://pisrv01.pischool.int:446/pivision>



16. Click on Copy URL to clipboard.

Layer CatCanyonOilWells ✖

CatCanyonOilWells

Created on 03/10/2019 10:05:24 (18 minutes ago)

[All](#) [Features](#) [Fields](#) [GeoEvent connections](#) [Visualization](#) [ArcGIS](#)

Configuration

PI Vision server

PIVision

☒ Allow ad-hoc PI Vision displays

Displays

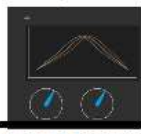
Ad-hoc

[Copy URL to clipboard](#)

Custom

[Add](#)

CatCanyonOilField ✖



[Copy URL to clipboard](#)

Icons

PI AF Button Image

[Copy URL to clipboard](#)

**Analyze**

OSIsoft Button Image

[Copy URL to clipboard](#)

**Analyze**

PI Vision Button Image

[Copy URL to clipboard](#)

**Analyze**

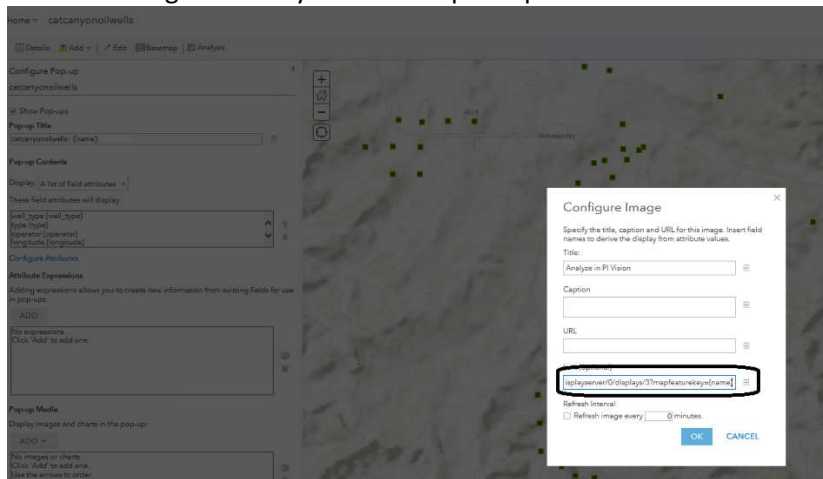
## 17. Copy the URL by CTRL+C.

Copy to Clipboard

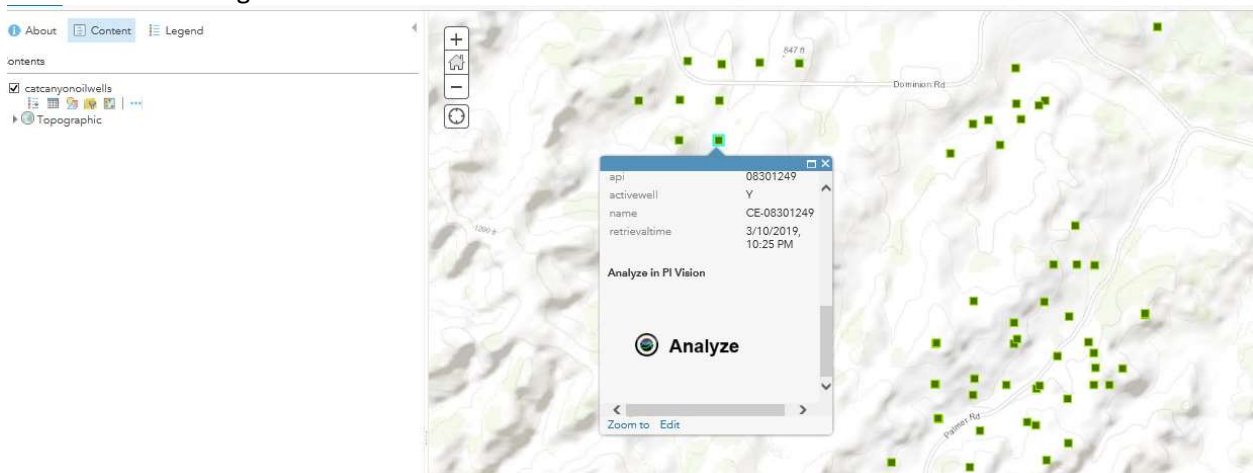
Below is a clipboard-friendly view of your selection. To copy to the clipboard, either right-click and choose 'Copy' from the browser's context menu or enter CTRL-C.

<https://p1sr01.pischool.int:444/api/v1/services/catcanyonoilco/catcanyonoilco/displayserver/0/displays/3?mapfeaturekey=name>

## 18. Now go back to your WebMap and paste the URL to the Link (Optional) field.



## 19. Now go back to your PI Integrator for Esri ArcGIS and copy the URL for the OSIssoft Visualization Button Image.



20. Paste it in the URL field and click **OK**. Then click **OK** again.

**Configure Image**

Specify the title, caption and URL for this image. Insert field names to derive the display from attribute values.

Title:  
Analyze in PI Vision

Caption

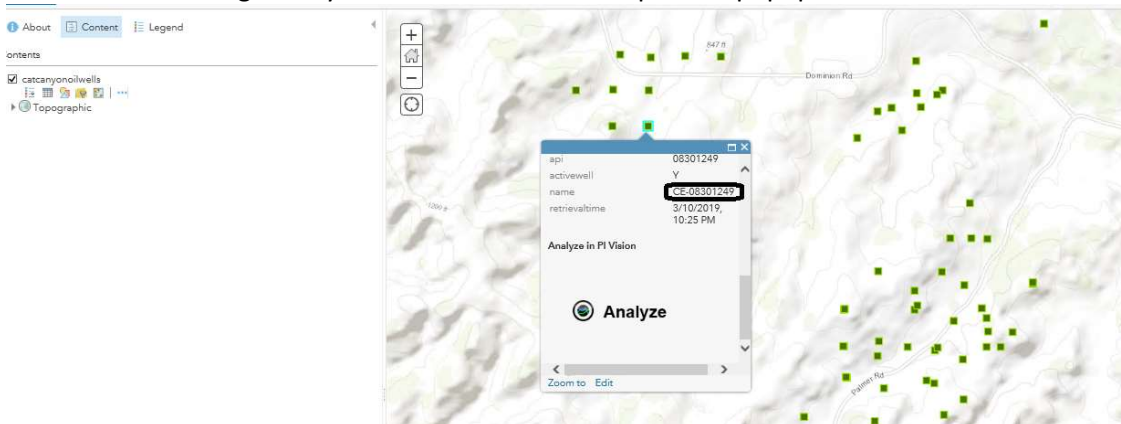
URL  
int:444/content/img/display/analyse-pivision.png

Link (optional)  
isplayserver/0/displays/3?mapfeaturekey={name}

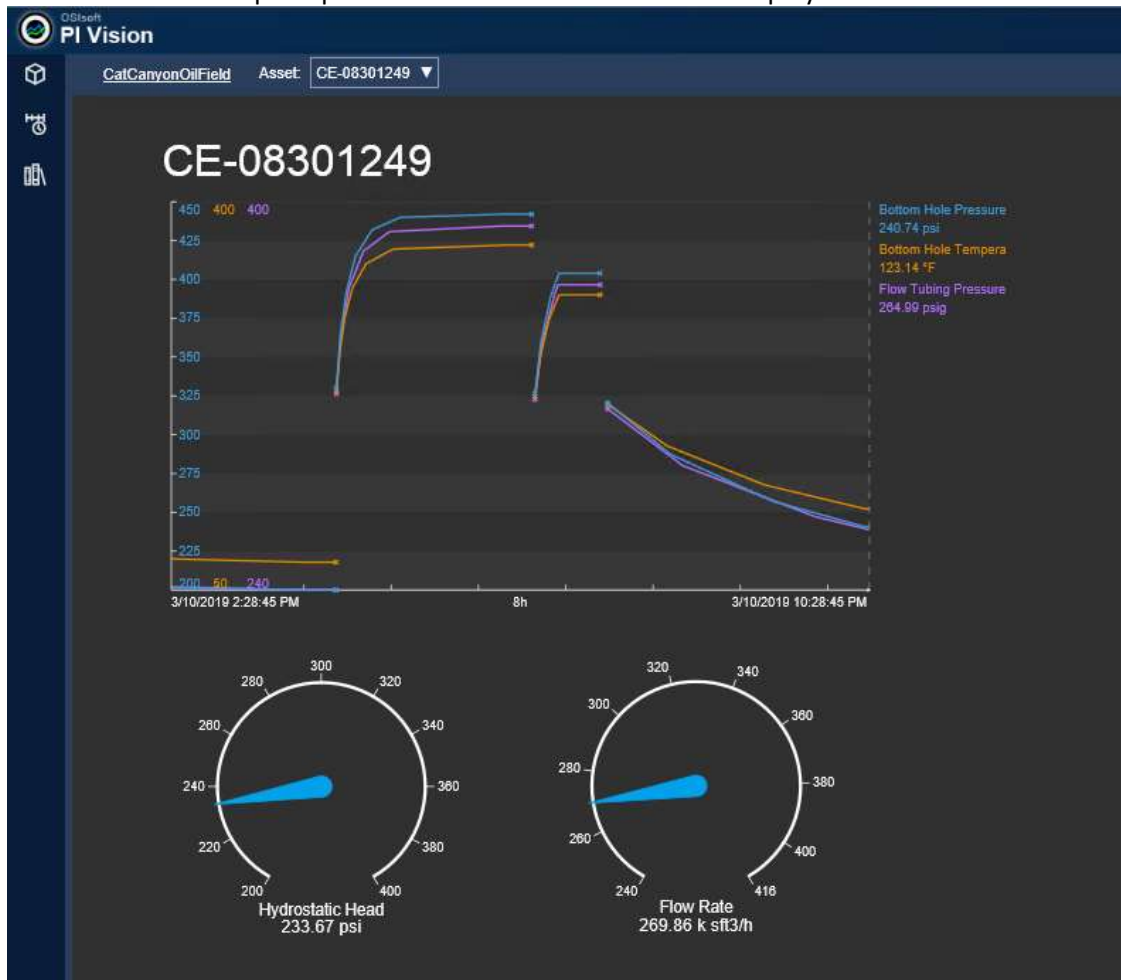
Refresh Interval  
☐ Refresh image every 0 minutes

OK CANCEL

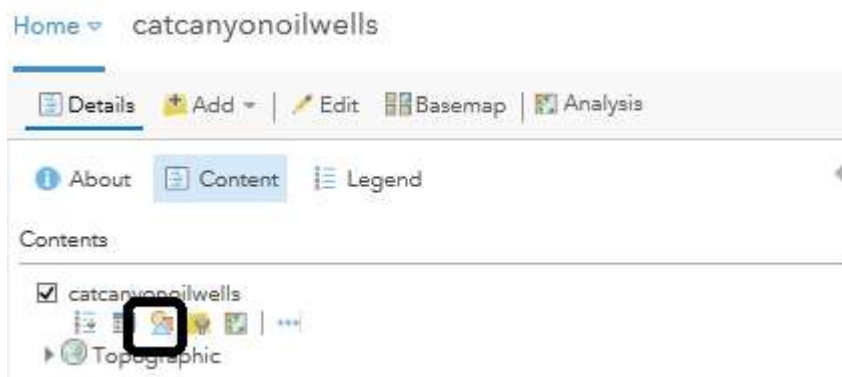
21. Now clicking on any one of the wells would open the popup window. Then click on the Analyze.



22. This would open up the OSIsoft Visualization custom display for this well.



23. Now let's add the symbology to indicate the status of the Wells.



24. Select **bottom\_hole\_pressure** for item # 1. Acknowledge **Yes** if prompted and click Done.

Change Style  
:atcanyonoilwells

1 Choose an attribute to show  
bottom\_hole\_pressure  
[Add attribute](#)

2 Select a drawing style

Counts and Amounts (Size) ☒  
[OPTIONS](#)

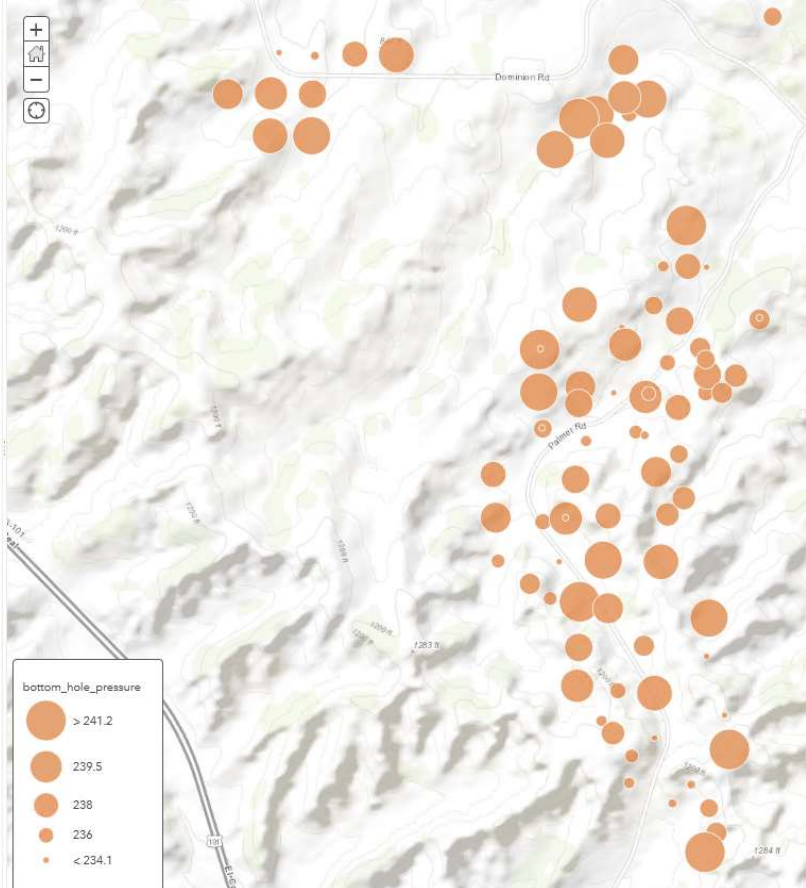
Counts and Amounts (Color)  
[SELECT](#)

Heat Map  
[SELECT](#)

Location (Single symbol)  
[SELECT](#)

Types (Unique symbols)  
[SELECT](#)

[DONE](#) [CANCEL](#)



bottom\_hole\_pressure

- > 241.2
- 239.5
- 238
- 236
- < 234.1

25. Select the **Save As** from Save dropdown menu. Specify the Title and Tags mentioned below and click **Save Map**.

Save Map ✕

Title:

Tags:  ✕ [Add tags](#)

Summary:

Save in folder:  ▼

[SAVE MAP](#) [CANCEL](#)

Create a feature service to bring-in all the Maintenance Vehicles based on AF element template

1. Now kindly try to create the layer using the PI Integrator for Esri ArcGIS 2017 SP1 for vehicles based-on the **Vehicle Template** that is present in the same AF databases.

Elements

Maintenance Vehicles

- T-101
- T-102
- T-103
- T-104
- T-105

Wells

Element Searches

T-101

General Child Elements Attributes Ports Analyses Notification Rules Version

Name: T-101

Description:

Template: Vehicle Template

Categories:

[Extended Properties \(0\)](#) [Annotations \(0\)](#) [Location](#) [Security](#)

Find: [Parents](#) [Children](#) [Event Frames](#) [Models](#) [Layers](#) [Connections](#)

2. Click Create Layer button to commence creating the feature layer for the vehicles. Follow the same steps described in exercise 3 where the wells layer was created.

home / services / CatCanyonOilCo

Service CatCanyonOilCo ✖

CatCanyonOilCo

Created on 03/10/2019 10:01:27 (33 minutes ago)

Layers (1)

Layers are used to select PI System data to connect to the ArcGIS platform. You can configure multiple layers within a single service.

+ Create Layer Tile view

Name	Description	Created	Modified	Time-enabled	GeoEvent
CatCanyonOilWells	CatCanyonOilWells	03/10/2019 10:05:24	03/10/2019 10:05:24	<input type="checkbox"/>	<input checked="" type="checkbox"/>

## Creating new layer (MaintenanceVehicles) in service CatCanyonOilCo

### Basic information

Step 1 of 4

Name\* MaintenanceVehicles

Description\* MaintenanceVehicles

☐ **Time-enabled Feature Layer.** This option creates an item in Portal for ArcGIS or in ArcGIS Online. These layers support historical data access.

Create item in



ArcGIS Online



ArcGIS Enterprise

☒ **Connect through ArcGIS GeoEvent Server.** This option allows you to publish data to a feature service in ArcGIS Online or Portal for ArcGIS. These layers enable real-time spatial analytics in ArcGIS GeoEvent Server.

Continue

Creating new layer (MaintenanceVehicles) in service CatCanyonOilCo

Data source

Step 2 of 4

AF Server\*

PISRV01

AF Database\*

CatCanyon Oil Fields

Template\*

Vehicle Template

Category

Max count

1000000

Search root

CatCanyon Oil Fields

Select

Preview

Back

Continue

Creating new layer (MaintenanceVehicles) in service CatCanyonOilCo

Layer fields

Step 3 of 4

All field names are converted automatically to lowercase

Template attribute fields Show less

A - Z

Z - A

Show categories

Select all

Included	Name	Attribute Name	Type	Source	Units	Function
★ Category: Vehicle Information						
<input checked="" type="checkbox"/>	driver	Driver	String	String Builder		None
<input checked="" type="checkbox"/>	truck_id	Truck ID	String	String Builder		None
★ Category: Location						
<input checked="" type="checkbox"/>	latitude	Latitude	Double	PI Point	*	Y
<input checked="" type="checkbox"/>	longitude	Longitude	Double	PI Point	*	X

Element fields Show less

Included	Name	Function
<input checked="" type="checkbox"/>	name	Key Include AF Element name
<input type="checkbox"/>	elementpath	None Include AF Element path
<input type="checkbox"/>	guid	None Include AF Element ID (GUID)
<input type="checkbox"/>	description	None Include AF Element description
<input type="checkbox"/>	template	Include AF Element Template name
<input checked="" type="checkbox"/>	retrievaltime	Include retrieval time (Always included)

Back

Continue

.....  
.....  
.....

1. Feature Service Environment 2. **Create Feature Service** 3. Configure GeoEvent Server 4. Advanced Settings 5. Summary

✓ Portal for ArcGIS credentials verified. Provide feature service configuration details.

**Feature service name** ⓘ

maintenancevehicles x

**Feature service description** ⓘ

Generated from: catcanyonoilco

**Feature layer name** ⓘ

maintenancevehicles

**Feature layer description** ⓘ

MaintenanceVehicles

**Geometry type:**

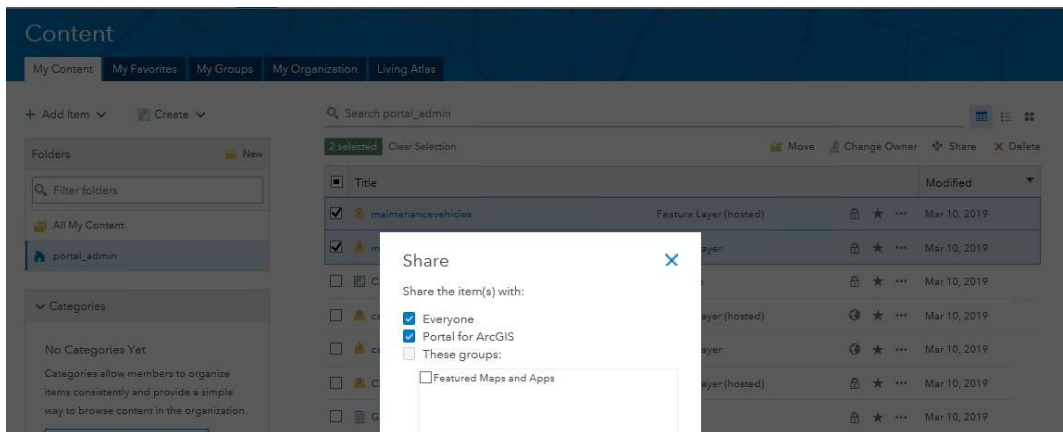
Point (from layer configuration)

**Spatial reference:**

GCS\_WGS\_1984 (from layer configuration)

Create

Previous Next Cancel



1. Feature Service Environment 2. Create Feature Service 3. Configure GeoEvent Server 4. **Advanced Settings** 5. Summary

Review the advanced settings. Generally, changes are needed only when multiple GeoEvent Servers are configured to use this PI Integrator for Esri ArcGIS layer.

**Input**

pigeo-catcanyonoilco-maintenancevehicles-ws-in

**Output**

pigeo-catcanyonoilco-maintenancevehicles-fs-update-out

**Service**

pigeo-catcanyonoilco-maintenancevehicles-service

**Identity (Key) Field**

name (String)

**Refresh Interval (seconds)**

5

**Session Inactivity Timeout (seconds)**

330

☒ Use HTTPS (secure)

Create Service

Connected

Previous

Next

Cancel

ArcGIS GeoEvent Manager							
Monitor							
GeoEvent Services							
In/Out	Count	Rate	Edit Rate	Max Rate	Time Since Last		
pigeo-catcanyonoilco-catcanyonoilwells-service	In: 5,360 Out: 5,360	3 /sec 3 /sec		13 /sec 13 /sec	00:00:27 00:00:27		
pigeo-catcanyonoilco-maintenancevehicles-service	In: 10 Out: 10	0 /sec 0 /sec		1 /sec 1 /sec	00:00:05 00:00:05		
Inputs							
pigeo-catcanyonoilco-catcanyonoilwells-ws-in [ Running On: PISRV01 ]	Count: 5,360	Rate: 3 /sec	Edit Rate:	Max Rate: 9 /sec	Time Since Last: 00:00:27		
pigeo-catcanyonoilco-maintenancevehicles-ws-in [ Running On: PISRV01 ]	Count: 10	Rate: 0 /sec	Edit Rate:	Max Rate: 1 /sec	Time Since Last: 00:00:05		
Outputs							
pigeo-catcanyonoilco-catcanyonoilwells-fs-update-out	Count: 5,360	Rate: 3 /sec	Edit Rate:	Max Rate: 13 /sec	Time Since Last: 00:00:27		
pigeo-catcanyonoilco-maintenancevehicles-fs-update-out	Count: 10	Rate: 0 /sec	Edit Rate:	Max Rate: 1 /sec	Time Since Last: 00:00:05		

### 3. Now add the maintenancevehicles to the map by selecting **Open in Map Viewer**.

Home Gallery Map Scene Groups **Content** Organization

Content My Content My Favorites My Groups My Organization Living Atlas

Add Item Create Search siteadmin Table Date Modified Filter

1 - 14 of 14 in siteadmin

Title	Type	Modified
maintenancevehicles	Feature Layer (hosted)	Jan 16, 2020
maintenancevehicles	Feature Layer	Jan 16, 2020
CatCanyonOilFieldWebMap	Web Map	Jan 16, 2020
catcanyonoilwells	Feature Layer (hosted)	Jan 16, 2020
catcanyonoilwells	Feature Layer	Jan 16, 2020
CoalPowerStations	Feature Layer (hosted)	Jan 16, 2020
CoalPowerStations	CSV	Jan 16, 2020
SampleWorldCities	WMS	Sep 22, 2019

View item details

**Open in Map Viewer**

Add to new map

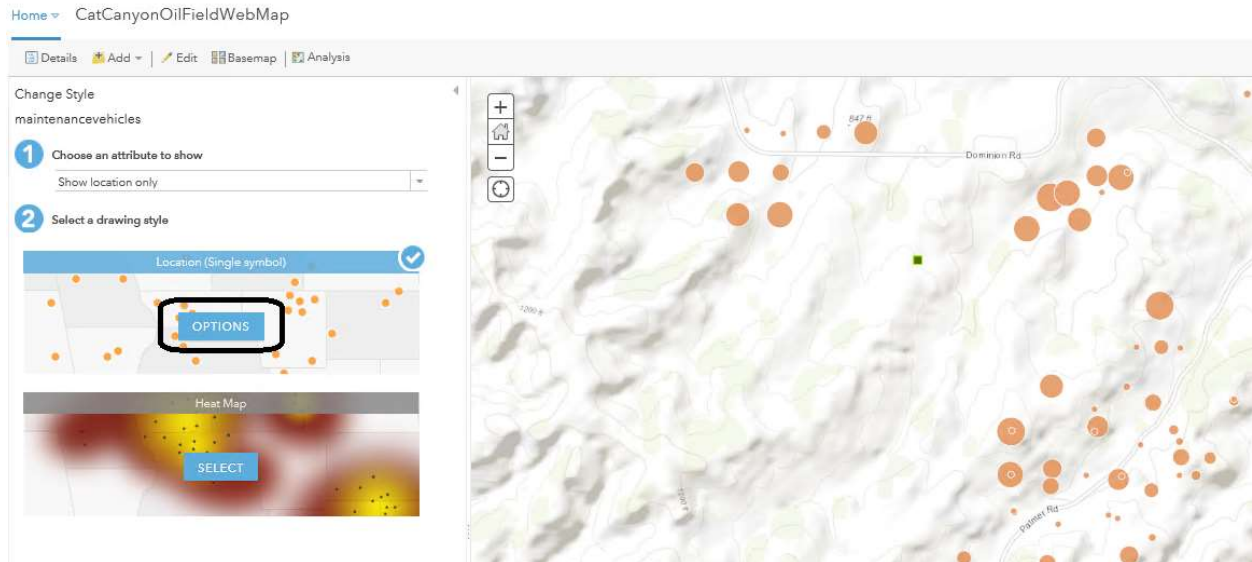
Add to new map with full editing control

Open in Scene Viewer

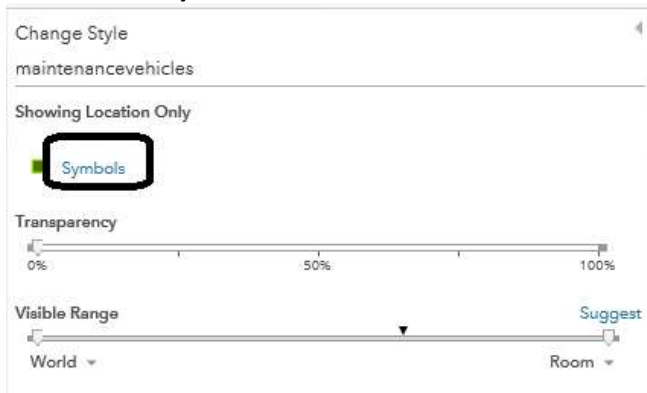
Open in ArcMap

Open in ArcGIS Pro

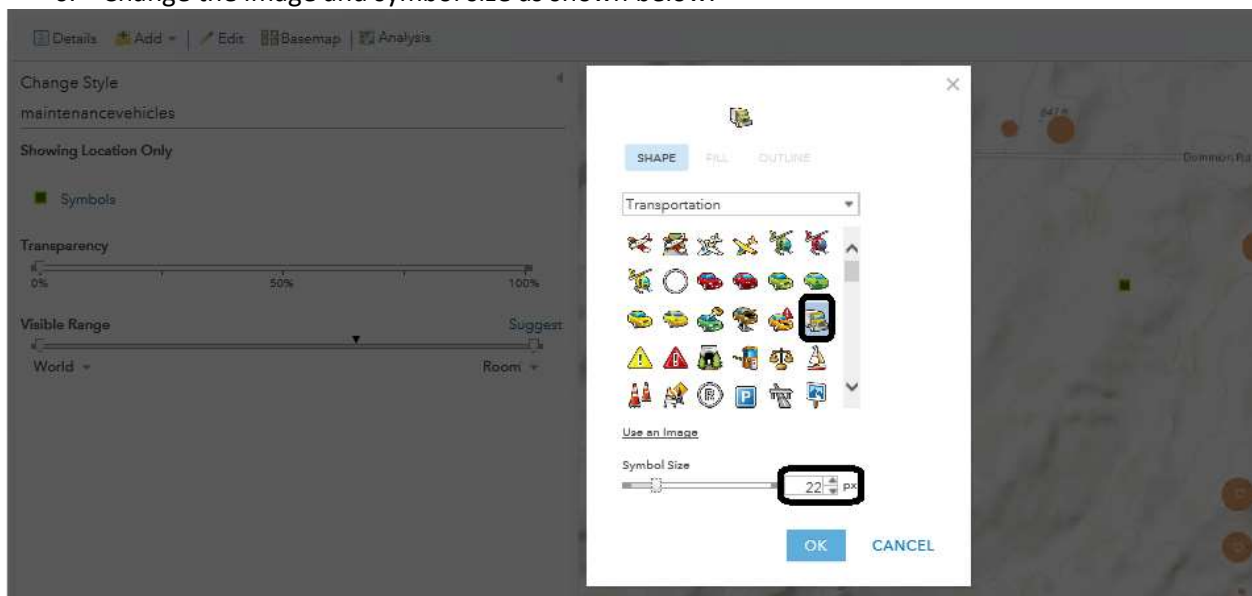
#### 4. Click **Options**.



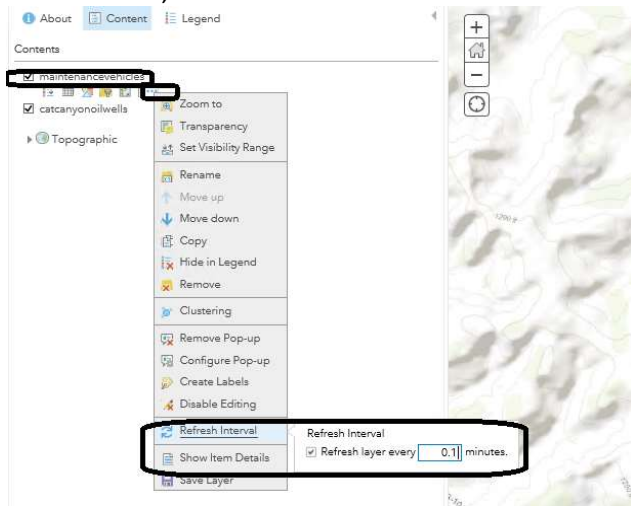
#### 5. Click **Symbol**.



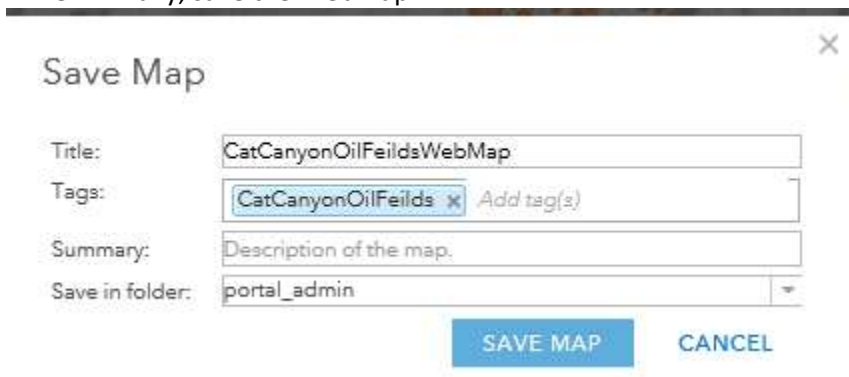
#### 6. Change the image and symbol size as shown below.



7. Then, add refresh rate for the maintenancevehicles layer to see the trucks moving in real-time.



8. Finally, save the WebMap.



## 5. Create an Operations View with PI Vision Integration

1. Click **CatCanyonOilFieldsWebMap** from the Portals **Content** page.

The screenshot shows the ArcGIS Content page. The top navigation bar includes 'Content', 'My Content', 'My Favorites', 'My Groups', 'My Organization', and 'Living Atlas'. Below the navigation bar are buttons for 'Add Item', 'Create', and a search bar labeled 'Search siteadmin'. On the left, there's a 'Folders' section with 'siteadmin' selected. The main area displays a list of items. The first item, 'CatCanyonOilFieldsWebMap', is highlighted with a red box. The table has columns for 'Title', 'Type', and 'Modified'.

Title	Type	Modified
CatCanyonOilFieldsWebMap	Web Map	Jan 17, 2020
mainteancevehicules	Feature Layer (hosted)	Jan 16, 2020
mainteancevehicules	Feature Layer	Jan 16, 2020
catcanyonoilwells	Feature Layer (hosted)	Jan 16, 2020

2. Select **Using Operations Dashboard** from **Create Web App** dropdown.

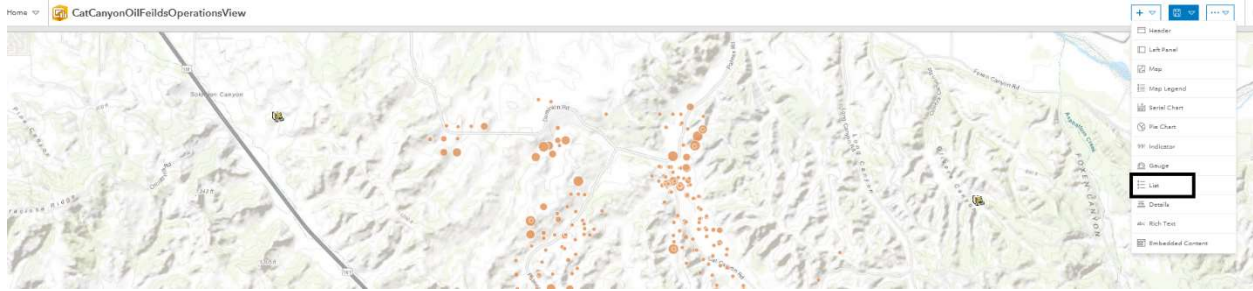
The screenshot shows the 'CatCanyonOilFieldWebMap' item page. The top navigation bar includes 'CatCanyonOilFieldWebMap', 'Overview', and 'Settings'. On the left, there's a thumbnail of the map and a description. On the right, there's a 'Create Web App' dropdown menu. The 'Using Operations Dashboard' option is selected and highlighted with a red box. Below the dropdown is an 'Item Information' section with a progress bar.

3. Provide a suitable name and click **OK**.

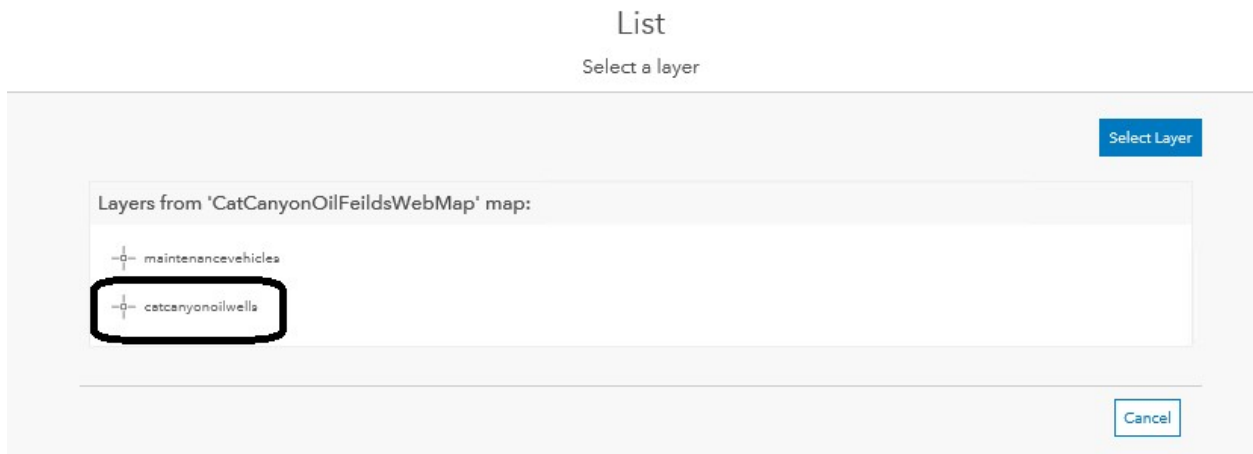
The screenshot shows the 'Create a web app' dialog box. It has a title 'Create a web app' and a subtitle 'Specify a title, tags, and summary for the new Operations Dashboard.' The 'Title' field contains 'CatCanyonOilFieldOperationsView'. The 'Tags' field contains 'CatCanyonOilField'. The 'Summary' field is empty. The 'Save in folder' dropdown is set to 'siteadmin'. There are 'OK' and 'Cancel' buttons at the bottom.

4. Select List from as shown below, more details are given in the article below.

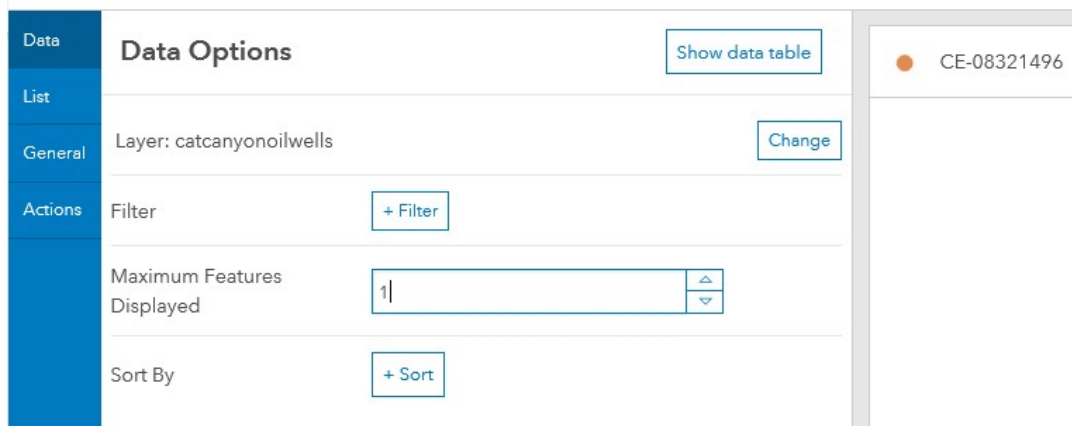
a. [How to integrate PI Vision into ESRI's Operation Dashboard for ArcGIS \(HTML\)](#)



5. Select **CatCanyonOilWells** Layer.



6. Under the Data tab, select a value of 1 for **Maximum Features Displayed**.



7. Then click on the list tab and then Source.

**List Options**

CE-08321496

Line Item Text

Format | Size | Ix | {} | Source

Line Item Icon: None Symbol

8. Copy the following string from the URLs\_Credentials.txt file that is provided in your desktop.

```
URLs_Credentials.txt - Notepad
File Edit Format View Help

PI Integrator for Esri ArcGIS URL: https://pisrv01.pischool.int:448/configuration#/services
PI Integrator for Esr ArcGIS Application Server:
username: pischool\student01
password:

Advanced Exercise:
(GEE Input)
Parameter: ?f=json&id=9eb1c20e-de79-a4b4-5c4c-19a2b24a6a93&timeout=330&latestValuesOnly=true

PI WebAPI Link:
https://pisrv01.pischool.int:446/piwebapi/admin/search/database.html

Coal Power Stations:
Geomerty feature layer URL: https://pisrv01.pischool.int/server/rest/services/Hosted/CoalPowerStations/FeatureServer/0

PI Vision admin
https://pisrv01.pischool.int:446/PIVision/admin

iframe for symbol on Esri Dashboard
<iframe height="400" id="MyFrame" name="MyFrame" runat="server"
src="https://pisrv01.pischool.int:448/api/v1/services/catcanyonoilco/catcanyonoilco/displayserver/0/displays/3?mapfeaturekey={name}&hidetoolbar$hidetimebar" width="600"></iframe>
```

9. Paste it in the edit box as show below.

**List Options**

CE-08321496

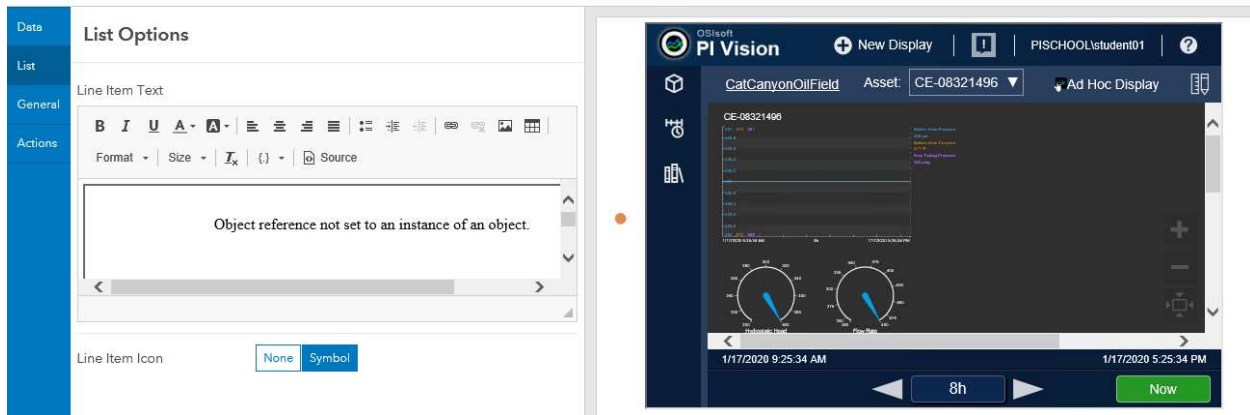
Line Item Text

Format | Size | Ix | {} | Source

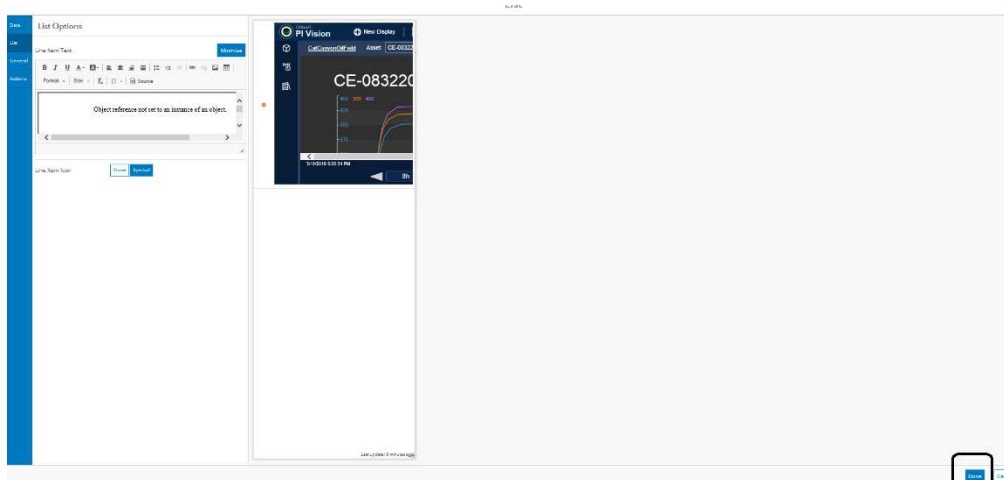
<iframe height="400" id="MyFrame" name="MyFrame" runat="server" src="https://pisrv01.pischool.int:448/api/v1/services/catcanyonoilco/catcanyonoilco/displayserver/0/displays/3?mapfeaturekey={name}&hidetoolbar\$hidetimebar" width="600"></iframe>

Line Item Icon: None Symbol

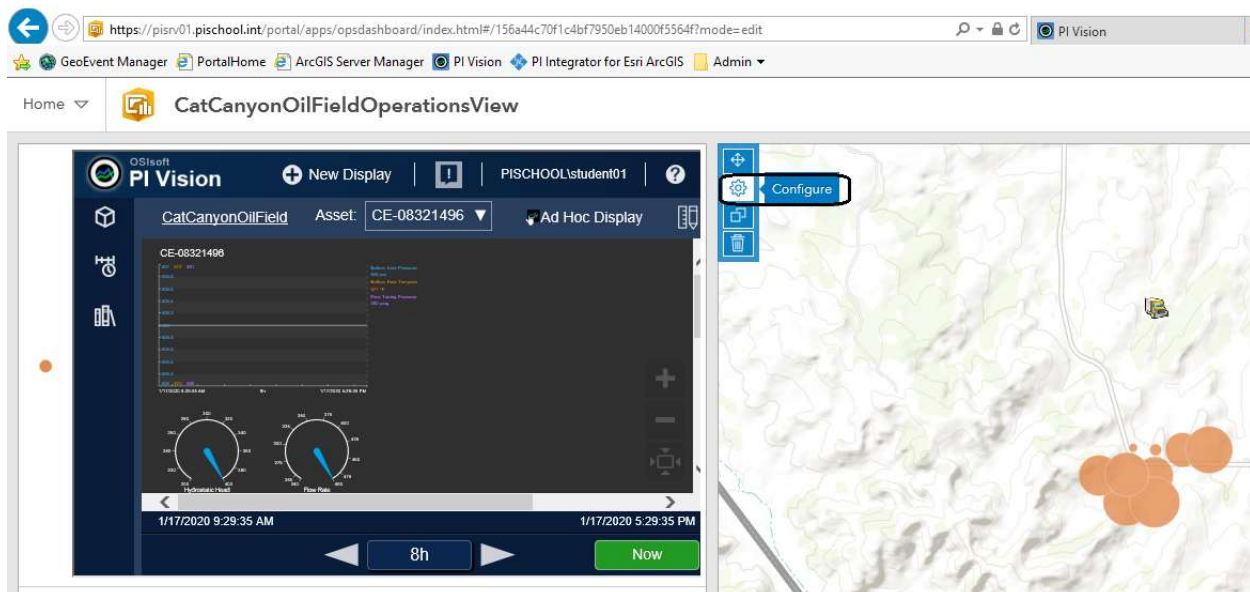
10. Click **Source** again.



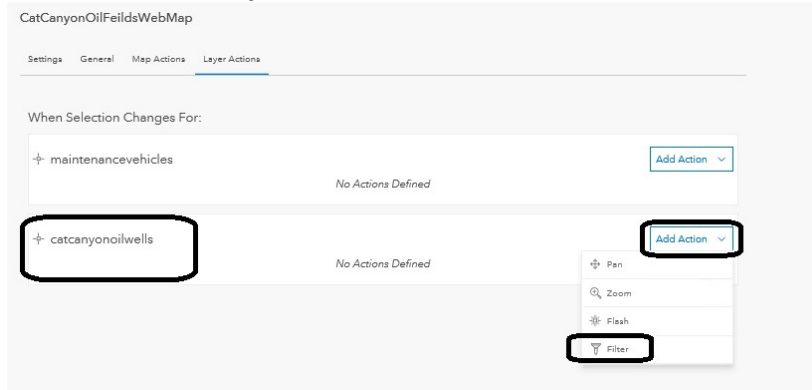
11. Click **Done** from bottom RHS.



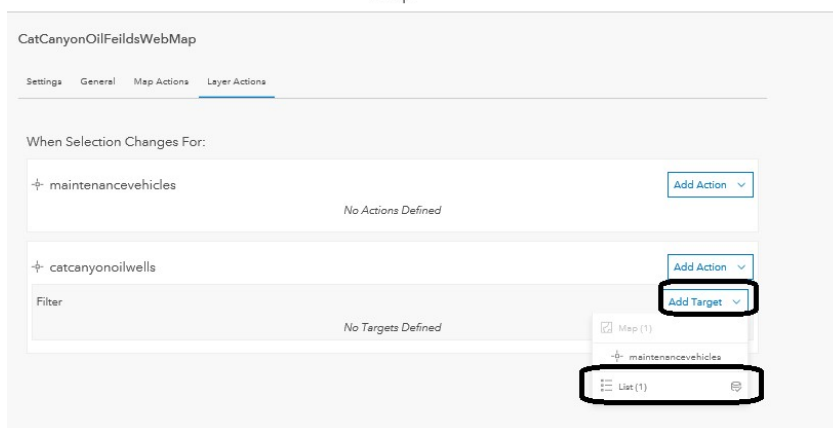
12. Now to create a layer action, select the **Configure** button as shown below.



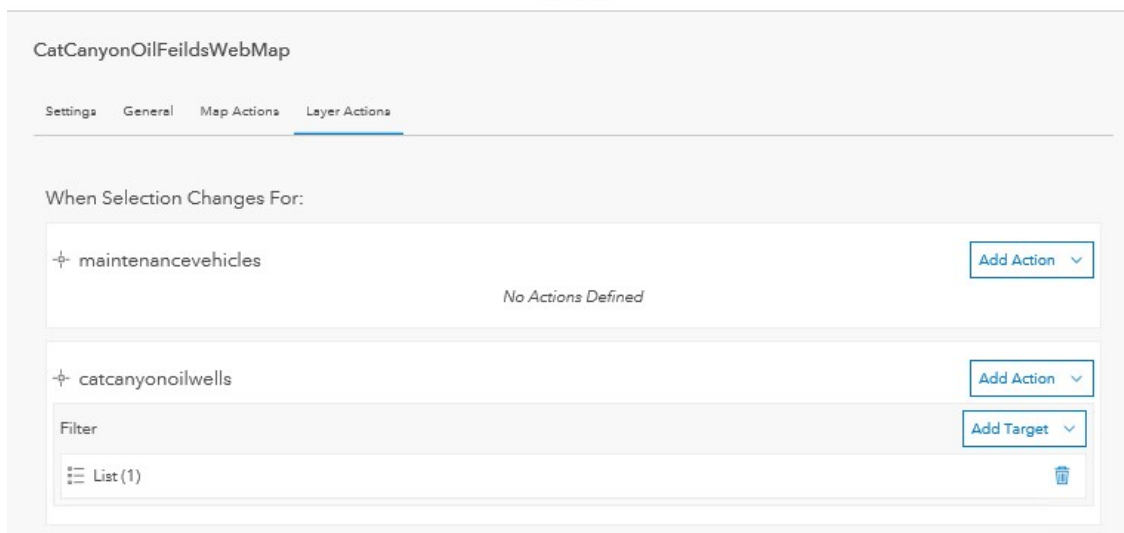
13. From the **Layer Actions** tab, select **Filter** from **Add Action** dropdown menu.



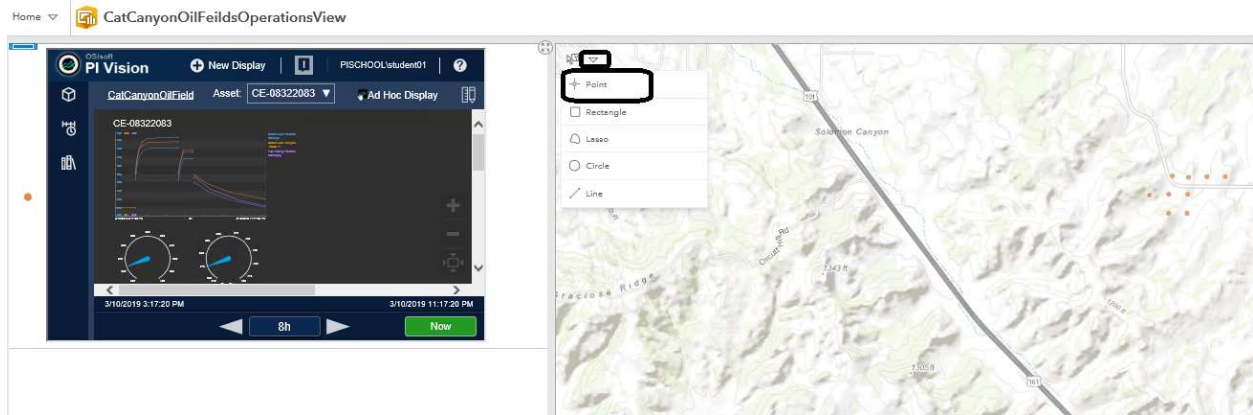
14. Now select List from the **Add Target** dropdown menu. Then click **Done**.



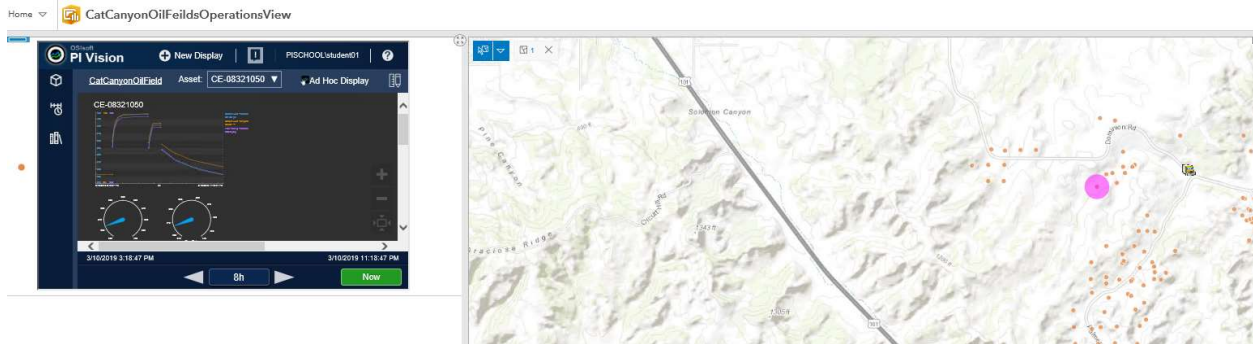
Map



15. Select **Point** from the menu shown below.



16. Then click on any one of the oil wells and notice that the PI Vision display changes.



17. Again, select **Gauge** as another widget to add to the dashboard.



18. Select **catcanyonoilwells** as the layer.

**Gauge**  
Select a layer

[Select Layer](#)

Layers from 'CatCanyonOilFeildsWebMap' map:

- maintenancevehicles
- **catcanyonoilwells**

[Cancel](#)

19. Select Average, **bottom\_hole\_temperature**, and 500 as values for Statistics, Field, and Maximum Value fields, respectively. Then click **Done**.

**Data** Data Options [Show data table](#)

**Gauge**

**General**

Value

Using 'catcanyonoilwells' layer [Change](#)

Filter [+ Filter](#)

Value Type [Statistic](#) [Feature](#)

Statistic [Average](#)

Field [bottom\\_hole\\_temperature](#) decimal

Value Conversion ☐

Minimum Value

Value Type [Fixed Value](#) [Statistic](#)

Value

Maximum Value

Value Type [Fixed Value](#) [Statistic](#)

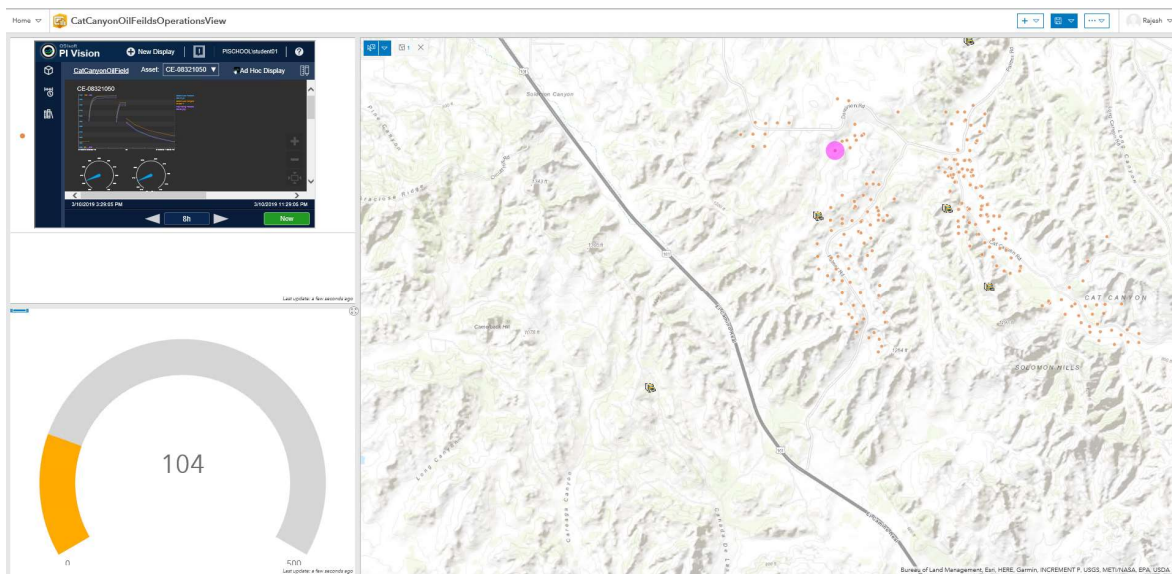
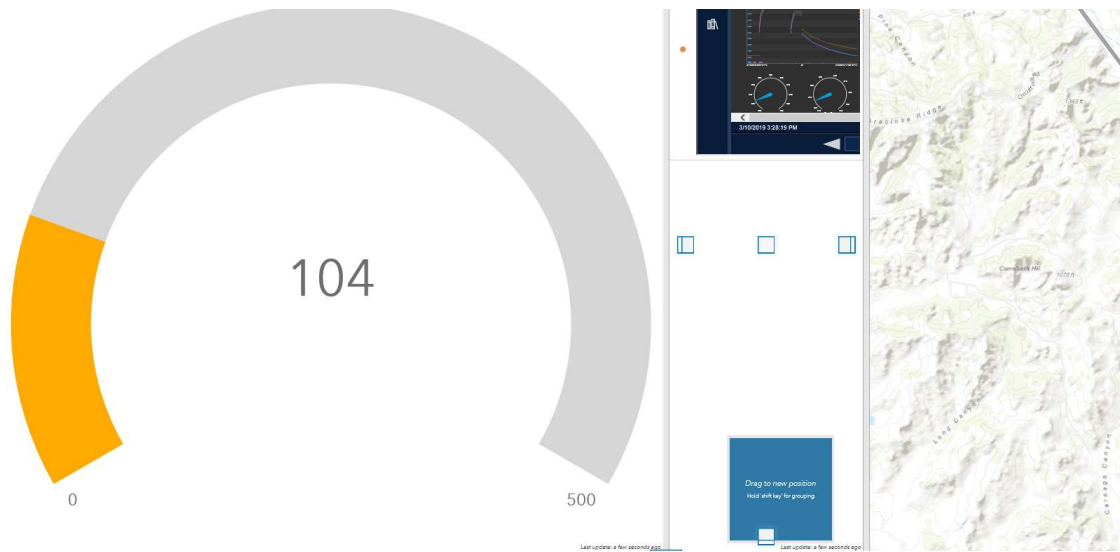
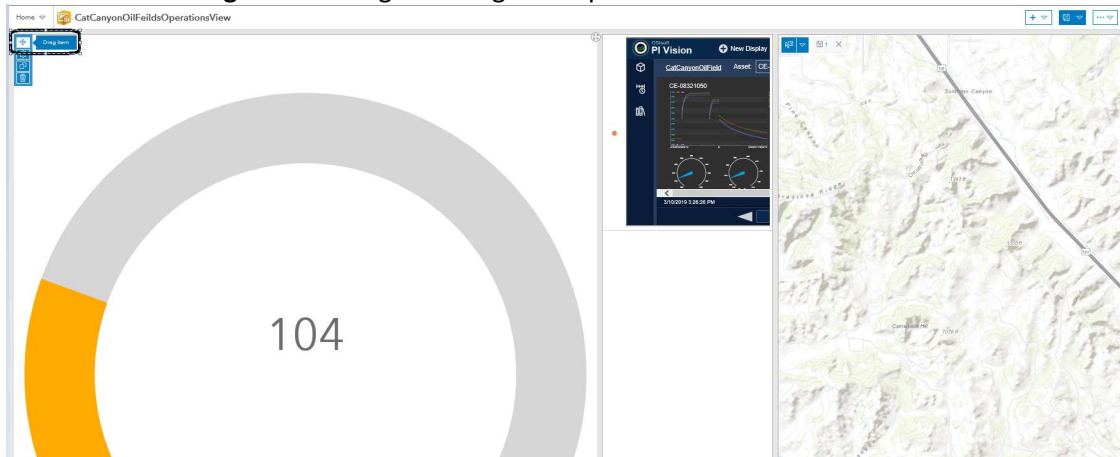
Value  [\(\)](#)

104

0 500

Last update: a few seconds ago

20. Select **Drag item** to drag this widget and place it below the PI Vision dashboard.



21. Add another target for Gauge (1) to the layer action previously added to the map with the gauge as target then click **Done**.

### CatCanyonOilFieldWebMap

Settings General Map Actions Layer Actions

When Selection Changes For:

✚ maintenancevehicles

Add Action ▾

No actions defined

✚ catcanyonoilwells

Add Action ▾

Add Target ▾

Filter

List (1)

Map (1)

✚ maintenancevehicles

Gauge (1)

### Map

CatCanyonOilFieldWebMap

Settings General Map Actions Layer Actions

When Selection Changes For:

✚ maintenancevehicles

Add Action ▾

No actions defined

✚ catcanyonoilwells

Add Action ▾

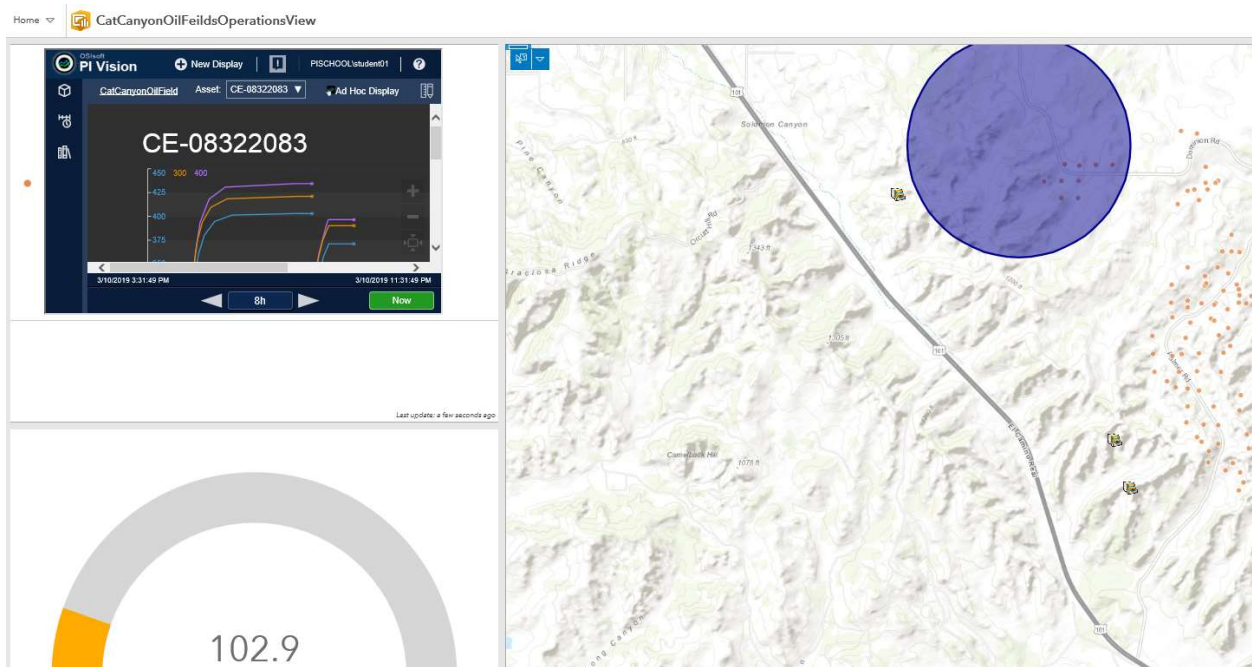
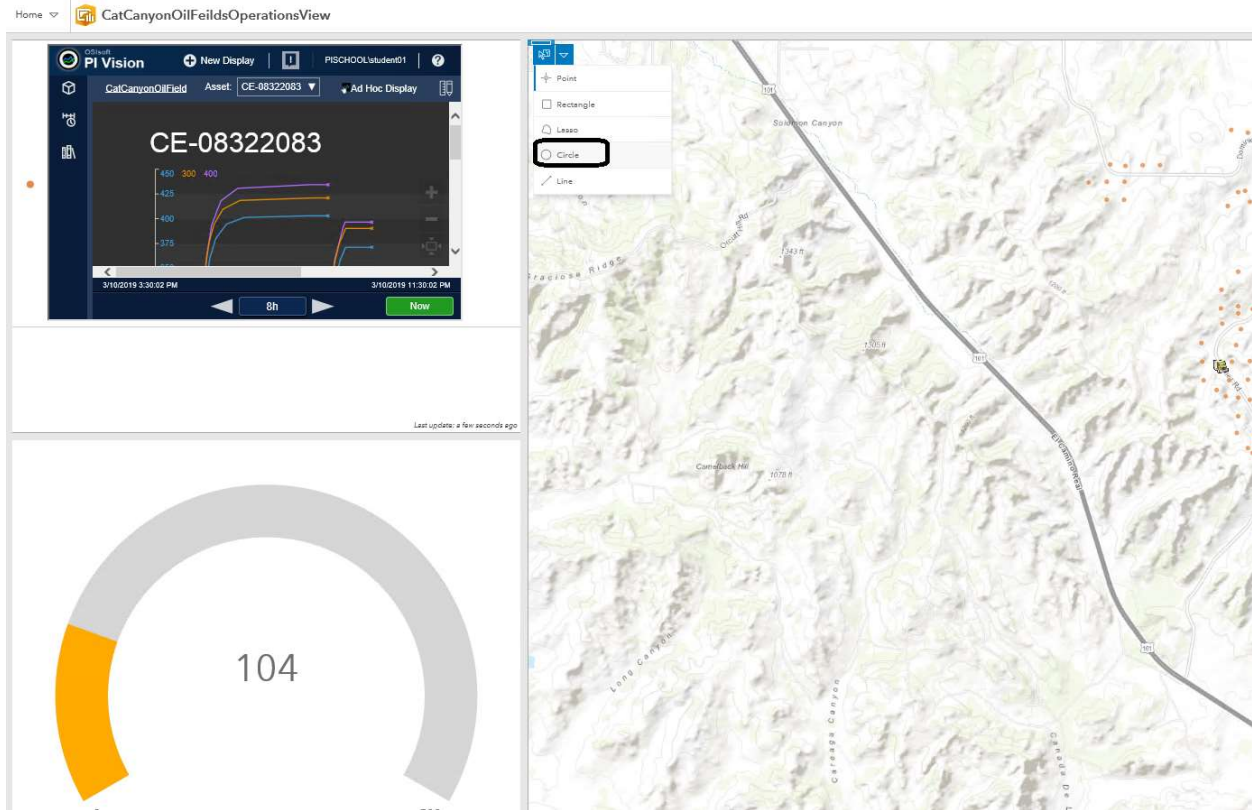
Add Target ▾

Filter

List (1)

Gauge (1)

22. Select Draw a circle option as shown below and draw a circle for a group of oil well to render the calculated averages shown using the gauge.





## 6. Demonstration of the feature in the PI Integrator for Esri ArcGIS 2017 SP1 that would delete the associated GeoEvent Server connectors

Now we would like to demonstrate a feature in the Esri Integrator 2017 that will delete the associated GeoEvent objects, when deleting the layer from the PI Integrator for Esri ArcGIS 2017 SP1.

1. Go to the PI Integrator for Esri ArcGIS 2017 SP1 and click on the service **CatCanyonOilCo**.

The screenshot shows the PI Integrator for Esri ArcGIS 2017 SP1 interface. The top navigation bar includes 'Services', 'Administration', 'Tools', and 'Help'. The user is logged in as 'PISCHOOL\student01'. The breadcrumb trail is 'home / services / CatCanyonOilCo'. The main heading is 'Service CatCanyonOilCo' with a close icon. Below it, the service name 'CatCanyonOilCo' and creation date 'Created on 03/10/2019 10:01:27 (2 hours ago)' are shown. A 'Layers (2)' section indicates that layers are used to select PI System data to connect to the ArcGIS platform. Two buttons, 'Create Layer' and 'Tile view', are present. A table lists the layers:

Name	Description	Created	Modified	Time-enabled	GeoEvent
CatCanyonOilWells	CatCanyonOilWells	03/10/2019 10:05:24	03/10/2019 10:05:24		✓
MaintenanceVehicles	MaintenanceVehicles	03/10/2019 10:37:01	03/10/2019 10:37:01		✓

2. Now we will delete the CatCanyonOilWells layer. Click on the X icon in the last column next to Well layer. This will open up another dialog box and click OK to acknowledge that you wish to delete this layer, which would delete the associated ArcGIS feature service, GeoEvent Server Objects, and this Integrator layer.

The screenshot shows the 'Layer Delete Wizard' dialog box. It has a red header with a close icon and the text 'Are you sure you want to run the Layer Delete Wizard?'. Below, it states 'You will be able to delete the following:' and lists three items: 'ArcGIS feature service', 'GeoEvent Server objects', and 'Integrator layer'. At the bottom, there are 'Cancel' and 'OK' buttons.

3. Click **Next**.

4. Enter the password for the Portal for ArcGIS, namely, vlesiteadmin and click **Verify Credentials**.

The screenshot shows the 'ArcGIS GeoEvent Feature Layer' configuration page. The breadcrumb trail is 'home / services / CatCanyonOilCo / CatCanyonOilWells / delete-wizard'. The page has a progress bar with four steps: '1. Feature Service Environment', '2. GeoEvent Server Environment', '3. Confirmation', and '4. Summary'. The main heading is 'ArcGIS GeoEvent Feature Layer'. Below it, a message says 'Verify the ArcGIS Portal credentials for the feature service associated with your ArcGIS GeoEvent layer.' with a 'Hide Login' link. The 'Portal for ArcGIS' section includes a text box with 'Portal\_10\_7\_1' and a URL 'https://pisrv01.pischool.int/portal'. The 'User name' section has a text box with 'siteadmin'. The 'Password' section has a text box with masked characters. At the bottom, there is a 'Verify credentials' button.

## 5. Click Next.

PI Integrator for Esri ArcGIS Services Administration Tools Help PISCHOOL/student01

home / services / CatCanyonOilCo / CatCanyonOilWells / delete-wizard

1. Feature Service Environment 2. GeoEvent Server Environment 3. Confirmation 4. Summary

ArcGIS GeoEvent Feature Layer

- ✓ Portal for ArcGIS credentials verified.
- ✓ Feature service 'catcanyonoilwells' was found

Previous Skip Next Cancel

## 6. Enter the password for the GeoEvent Server, namely, vlesiteadmin and click **Verify Credentials**.

home / services / CatCanyonOilCo / CatCanyonOilWells / delete-wizard

1. Feature Service Environment 2. GeoEvent Server Environment 3. Confirmation 4. Summary

**GeoEvent Server**

GeoEventServer

Use the same credentials that you use for logging into Portal for ArcGIS:  
<https://pisrv01.pischool.int/portal>

**User name**

siteadmin

**Password**

Verify credentials

## 7. Click Next.

home / services / CatCanyonOilCo / CatCanyonOilWells / delete-wizard

1. Feature Service Environment 2. GeoEvent Server Environment 3. Confirmation 4. Summary

- ✓ You are connected to GeoEvent Server **GeoEvent**.
- ✓ GeoEvent Server objects can be deleted from 'https://pisrv01.pischool.int:6143'

**The following GeoEvent Server objects can be deleted from this layer:**

**Service:** pigeo-catcanyonoilco-catcanyonoilwells-service

**Input:** pigeo-catcanyonoilco-catcanyonoilwells-ws-in

**Output:** pigeo-catcanyonoilco-catcanyonoilwells-fs-update-out

**GeoEvent Definition:** pigeo-catcanyonoilco-catcanyonoilwells-ws-in

## 8. Click Delete.

[home](#) / [services](#) / [CatCanyonOilCo](#) / [CatCanyonOilWells](#) / [delete-wizard](#)

1. Feature Service Environment 2. GeoEvent Server Environment 3. **Confirmation** 4. Summary

Status of the Layer Delete Wizard:

### Feature Service Environment

ArcGIS GeoEvent: 'catcanyonoilwells' can be deleted from 'https://p1srv01.p1school.int/portal'

### GeoEvent Server Environment

GeoEvent Server objects can be deleted from 'https://p1srv01.p1school.int:6143'

### Integrator Environment

Layer is ready to delete.

After you click Delete, the process might take several minutes to complete. Do not close the browser or navigate away from this page until the process is complete.

Delete

## 9. Once you see the Green checkmark in the Delete Summary, click Finish.

[home](#) / [services](#) / [TransmissionAndDistribution](#) / [Meters](#) / [delete-wizard](#)

1. Feature Service Environment 2. GeoEvent Server Environment 3. Confirmation 4. **Summary**

Delete Summary:

### Feature Service Environment

✓ ArcGIS GeoEvent: 'meters' was deleted successfully for 'https://p1srv01.p1school.int/portal'

### GeoEvent Server Environment

✓ GeoEvent Server: All GeoEvent Server objects for this layer were deleted successfully on 'https://p1srv01.p1school.int:6143'.

### Integrator Environment

✓ Layer: 'Meters' was deleted successfully for 'PI Integrator for Esri ArcGIS'

[home](#) / [services](#) / [CatCanyonOilCo](#)

## Service CatCanyonOilCo ✖

CatCanyonOilCo

Created on 03/10/2019 10:01:27 (2 hours ago)

Layers (1)


Layers are used to select PI System data to connect to the ArcGIS platform. You can configure multiple layers within a single service.

+ Create Layer

Tile view

Name ↓	Description	Created	Modified	Time-enabled	GeoEvent
MaintenanceVehicles	MaintenanceVehicles	03/10/2019 10:37:01	03/10/2019 10:37:01		✓ ✖

## 10. Confirm that the GeoEvent Server components are deleted.

 **ArcGIS GeoEvent Manager**

**Monitor** | Inputs | GeoEvent Services | Outputs

**Monitor**

**GeoEvent Services** ▶ ■

	In/Out	Count
▶ <a href="#">p1geo-catcanyonoilco-maintenancevehicules-service</a>	In Out	32,335 32,335

**Inputs** ▶ ■

	Count
▶ <a href="#">p1geo-catcanyonoilco-maintenancevehicules-ws-in</a> [ Running On: P1SRV01 ]	32,335

**Outputs** ▶ ■

	Count
▶ <a href="#">p1geo-catcanyonoilco-maintenancevehicules-fs-update-out</a>	32,335

## 7. Create Time-enabled Feature Layer for the Oil Wells & Maintenance Vehicles

1. Click on Services and then click on **CatCanyonOilCo** service on the PI Integrator for Esri ArcGIS 2017 SP1.
2. Now to create a new layer for the Oil Wells and click **Create Layer** button.
3. Enter **CatCanyonOilWellsTE** for both Name and descriptions fields. Kindly make sure that you have checked only **Time-enabled Feature Layer** option.

home / services / CatCanyonOilCo / new

### Creating new layer (CatCanyonOilWellsTE) in service CatCanyonOilCo

Basic information Step 1 of 4

**Name\***

**Description\***

☒ **Time-enabled Feature Layer.** This option creates an item in Portal for ArcGIS or in ArcGIS Online. These layers support historical data access.  
Create item in Select one and provide your credentials.

ArcGIS Online

ArcGIS Enterprise

☐ **Connect through ArcGIS GeoEvent Server.** This option allows you to publish data to a feature service in ArcGIS Online or Portal for ArcGIS. These layers enable real-time spatial analytics in ArcGIS GeoEvent Server.

[Continue](#)

4. Click on **ArcGIS Enterprise** button
5. Enter the username and password as siteadmin and vlesiteadmin, respectively, and click **Login**.

PI Integrator for Esri ArcGIS

home / services / CatCanyonOilCo

### Creating new layer (CatCanyonOilWellsTE) in service CatCanyonOilCo

Basic information Step 1 of 4

**Name\***

**Description\***

☒ **Time-enabled Feature Layer.** This option creates an item in Portal for ArcGIS or in ArcGIS Online. These layers support historical data access.  
Create item in Select one and provide your credentials.

ArcGIS Online

ArcGIS Enterprise

☐ **Connect through ArcGIS GeoEvent Server.** This option allows you to publish data to a feature service in ArcGIS Online or Portal for ArcGIS. These layers enable real-time spatial analytics in ArcGIS GeoEvent Server.

[Continue](#)

Login to ArcGIS Enterprise

**Portal**

Portal\_10\_7\_1

Local Portal for ArcGIS 10.7.1

**User name**

siteadmin

**Password**

\*\*\*\*\*

[Login](#)

## 6. Click **Continue**.

home / services / CatCanyonOilCo / new

---

Creating new layer (*CatCanyonOilWellsTE*) in service CatCanyonOilCo

Basic information Step 1 of 4

**Name\***

**Description\***

☒ **Time-enabled Feature Layer.** This option creates an item in Portal for ArcGIS or in ArcGIS Online. These layers support historical data access.

Create item in

☐ **Connect through ArcGIS GeoEvent Server.** This option allows you to publish data to a feature service in ArcGIS Online or Portal for ArcGIS. These layers enable real-time spatial analytics in ArcGIS GeoEvent Server.

## 7. Select now **Wells** for the Template field. Make sure to select **CatCanyon Oil Fields** as the AF database and click **Continue**.

Creating new layer (*CatCanyonOilWellsTE*) in service CatCanyonOilCo

Data source Step 2 of 4

**AF Server\***

**AF Database\***

**Template\***

**Category**

**Max count**

**Search root**

8. Select the attributes as in the screenshot below and click **Continue**.

All field names are converted automatically to lowercase

Template attribute fields [\[show less\]](#)

A - Z Z - A ☒ Show categories

☒ Select all

Included	Name	Attribute Name	Type	Source	Units	Function
★ Category: Metadata						
<input checked="" type="checkbox"/>	well_type	Well Type	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	type	Type	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	operator	Operator	String	static		None <input type="checkbox"/>
<input type="checkbox"/>	objectid	OBJECTID	Int64	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	lease	Lease	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	field	Field	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	county	County	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	asset_name	Asset Name	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	api	API	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	activerwell	ActiveWell	String	static		None <input type="checkbox"/>
★ Category: Geometry						
<input checked="" type="checkbox"/>	longitude	Longitude	Double	static	*	X <input type="checkbox"/>
<input checked="" type="checkbox"/>	latitude	Latitude	Double	static	*	Y <input type="checkbox"/>
<input type="checkbox"/>	coordinate_system_name	Coordinate system name	String	static		None <input type="checkbox"/>
<input type="checkbox"/>	coordinate_system_id	Coordinate system ID	Int32	static		None <input type="checkbox"/>
<input type="checkbox"/>	coordinate_projection_id	Coordinate projection ID	Int32	static		None <input type="checkbox"/>
<input type="checkbox"/>	arcgis_feature_shape_type	ArcGIS feature shape type	String	static		None <input type="checkbox"/>
<input type="checkbox"/>	arcgis_feature_shape	ArcGIS feature shape	String	static		None <input type="checkbox"/>
★ Category: PI Data						
<input checked="" type="checkbox"/>	hydrostatic_head	Hydrostatic Head	Double	PI Point		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	flow_tubing_pressure	Flow Tubing Pressure	Double	PI Point		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	flow_rate	Flow Rate	Double	PI Point		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	bottom_hole_temperature	Bottom Hole Temperature	Double	PI Point	*F	None <input type="checkbox"/>
<input checked="" type="checkbox"/>	bottom_hole_pressure	Bottom Hole Pressure	Double	PI Point	psi	None <input type="checkbox"/>

Element fields [\[show less\]](#)

Included	Name	Function
<input checked="" type="checkbox"/>	name	Key <input type="checkbox"/> Include AF Element name
<input type="checkbox"/>	elementpath	None <input type="checkbox"/> Include AF Element path
<input type="checkbox"/>	guid	None <input type="checkbox"/> Include AF Element ID (GUID)
<input type="checkbox"/>	description	None <input type="checkbox"/> Include AF Element description
<input type="checkbox"/>	template	Include AF Element Template name
<input checked="" type="checkbox"/>	retrievaltime	Include retrieval time (Always included)

9. Then in the next screen click **Create Layer**.

home / services / CatCanyonOilCo / new

### Creating new layer (*CatCanyonOilWellsTE*) in service CatCanyonOilCo

Geometry information Step 4 of 4

Geometry type Point

Spatial reference GCS\_WGS\_1984 (4326) Q  (5256)

[Back](#) [Create Layer](#)

home / services / CatCanyonOilCo / CatCanyonOilWellsTE

### Layer CatCanyonOilWellsTE

CatCanyonOilWellsTE  
Created on 03/10/2019 11:45:35 (just now)

[View Item in Portal for ArcGIS](#) [View in Map Viewer](#) [verify and repair](#)

Initialized [Reinitialize](#)

[All](#) [Features](#) [Fields](#) [Visualization](#) [Feature Layer](#)

This layer exposes **PI AF Elements** using the following search parameters

AF Server	PISRV01	Categories
AF Database	CatCanyon Oil Fields	Search root
Template	Wells	Max count 1000000

Geometry settings

Geometry type	Point
Spatial reference	GCS_WGS_1984

10. Now you can also create a time-enabled layer for the maintenance vehicles.

### Creating new layer (*MaintenanceVehiclesTE*) in service CatCanyonOilCo

Basic information Step 1 of 4

Name\* MaintenanceVehiclesTE

Description\* MaintenanceVehiclesTE

☒ **Time-enabled Feature Layer.** This option creates an item in Portal for ArcGIS or in ArcGIS Online. These layers support historical data access.

Create item in

ArcGIS Online ArcGIS Enterprise

☐ **Connect through ArcGIS GeoEvent Server.** This option allows you to publish data to a feature service in ArcGIS Online or Portal for ArcGIS. These layers enable real-time spatial analytics in ArcGIS GeoEvent Server.

[Continue](#)

## Creating new layer (*MaintenanceVehiclesTE*) in service CatCanyonOilCo

Data source

Step 2 of 4

AF Server*	<input type="text" value="PISRV01"/>	<input type="button" value="v"/>
AF Database*	<input type="text" value="CatCanyon Oil Fields"/>	<input type="button" value="v"/>
Template*	<input type="text" value="Vehicle Template"/>	<input type="button" value="v"/>
Category	<input type="text"/>	<input type="button" value="v"/>
Max count	<input type="text" value="1000000"/>	
Search root	<input type="text" value="CatCanyon Oil Fields"/>	<input type="button" value="Select"/>
<input type="button" value="Q Preview"/>		
		<input type="button" value="Back"/> <input type="button" value="Continue"/>

## Creating new layer (*MaintenanceVehiclesTE*) in service CatCanyonOilCo

Layer fields

Step 3 of 4

All field names are converted automatically to lowercase

Template attribute fields [\[Show less\]](#)

[A - Z](#) [Z - A](#) ☒ Show categories

☒ Select all

Included	Name	Attribute Name	Type	Source	Units	Function
★ Category: Vehicle Information						
<input checked="" type="checkbox"/>	<input type="text" value="driver"/>	Driver	String	String Builder		<input type="text" value="None"/> <input type="button" value="v"/>
<input checked="" type="checkbox"/>	<input type="text" value="truck_id"/>	Truck ID	String	String Builder		<input type="text" value="None"/> <input type="button" value="v"/>
★ Category: Location						
<input checked="" type="checkbox"/>	<input type="text" value="latitude"/>	Latitude	Double	PI Point	"	<input type="text" value="Y"/> <input type="button" value="v"/>
<input checked="" type="checkbox"/>	<input type="text" value="longitude"/>	Longitude	Double	PI Point	"	<input type="text" value="X"/> <input type="button" value="v"/>

Element fields [\[Show less\]](#)

Included	Name	Function
<input checked="" type="checkbox"/>	<input type="text" value="name"/>	<input type="text" value="Key"/> <input type="button" value="v"/> Include AF Element name
<input type="checkbox"/>	<input type="text" value="elementpath"/>	<input type="text" value="None"/> <input type="button" value="v"/> Include AF Element path
<input type="checkbox"/>	<input type="text" value="guid"/>	<input type="text" value="None"/> <input type="button" value="v"/> Include AF Element ID (GUID)
<input type="checkbox"/>	<input type="text" value="description"/>	<input type="text" value="None"/> <input type="button" value="v"/> Include AF Element description
<input type="checkbox"/>	<input type="text" value="template"/>	Include AF Element Template name
<input checked="" type="checkbox"/>	<input type="text" value="retrievaltime"/>	Include retrieval time (Always included)

## Creating new layer (*MaintenanceVehiclesTE*) in service CatCanyonOilCo

### Geometry information

Step 4 of 4

Geometry type

Point

Spatial reference

GCS\_WGS\_1984 (4326)

Q

(5256)

Back

Create Layer

home / services / CatCanyonOilCo / MaintenanceVehiclesTE

### Layer MaintenanceVehiclesTE

MaintenanceVehiclesTE

Created on 03/10/2019 11:48:13 (2 minutes ago)

View Item in Portal for ArcGIS

View in Map Viewer

verify and repair

✓ Initialized

Reinitialize

All Features Fields Visualization Feature Layer

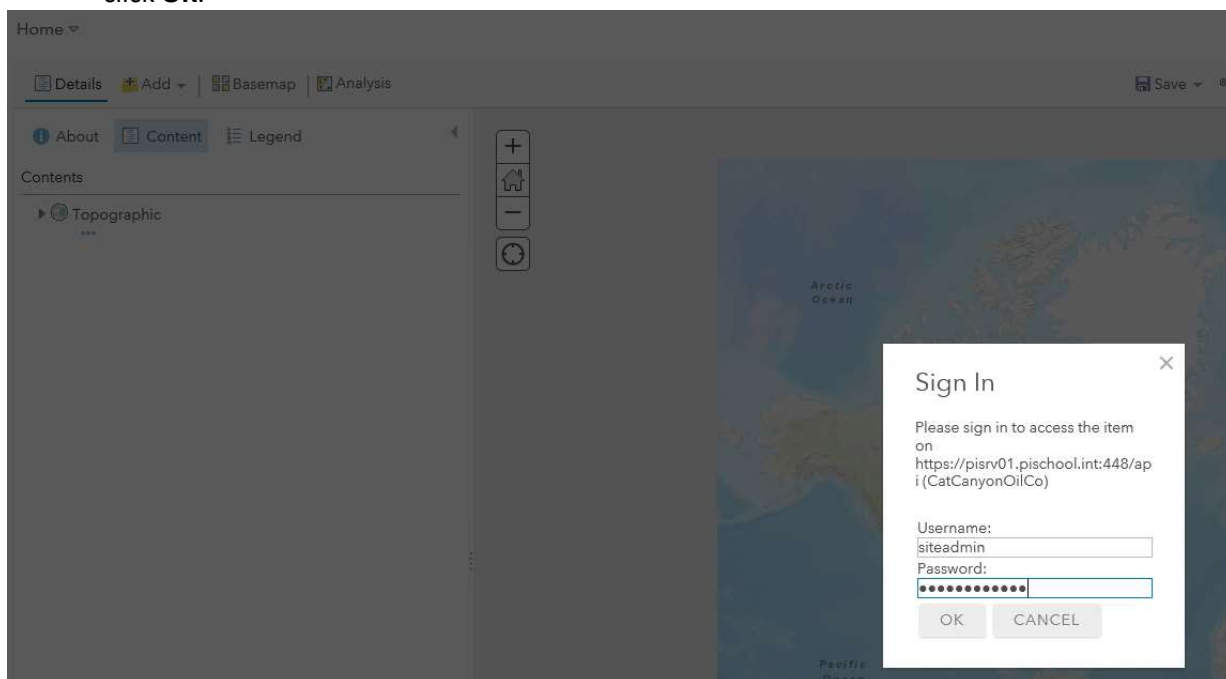
This layer exposes **PI AF Elements** using the following search parameters

AF Server	PISRV01	Categories	
AF Database	CatCanyon Oil Fields	Search root	
Template	Vehicle Template	Max count	1000000

Geometry settings

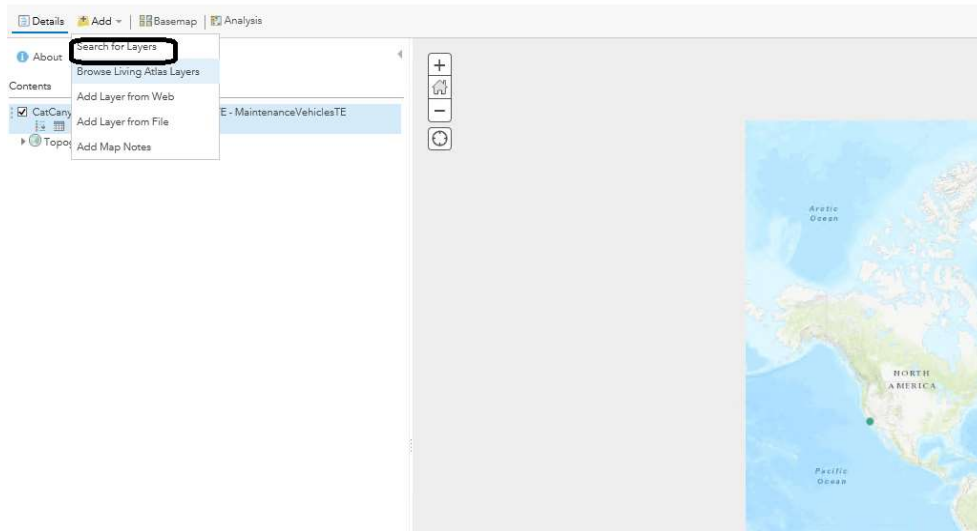
Geometry type	Point
Spatial reference	GCS_WGS_1984

11. You would note 2 buttons at the top, namely, **View Item in Portal for ArcGIS** and another one **View in Map Viewer**. If you click the **View in Map Viewer** button, it will open another tab on the browser, where you can see the layer in the Portal for ArcGIS. Enter the ArcGIS credentials and click **OK**.

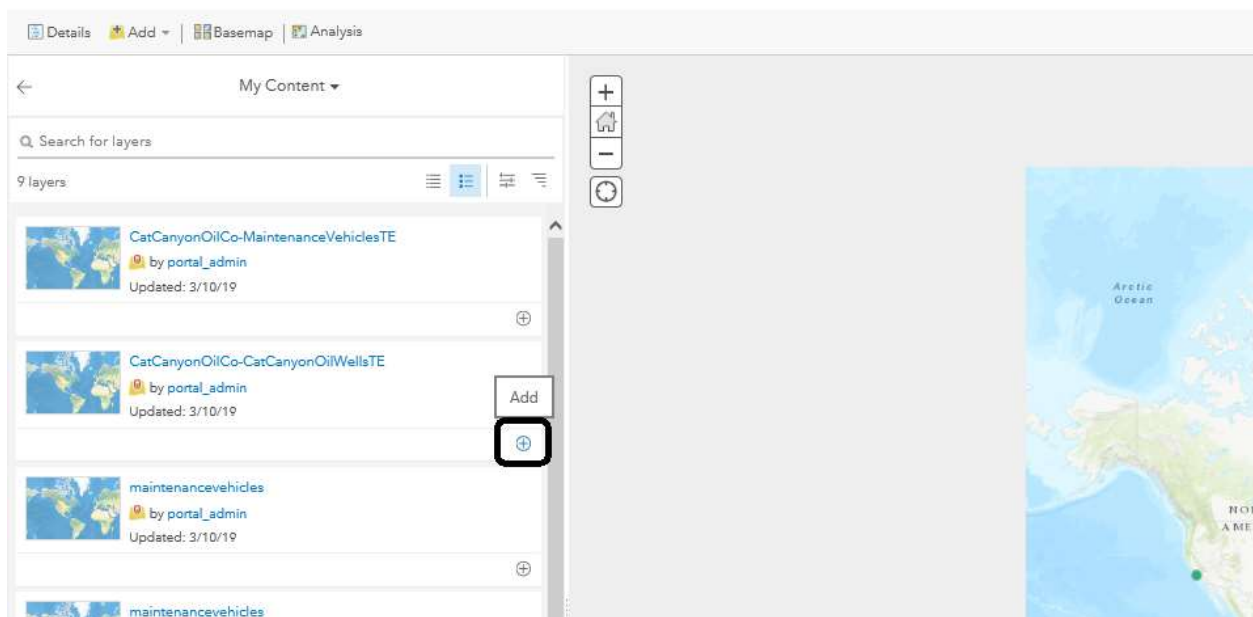


12. Now search for the **CatCanyonOilWellsTE** layer by selecting **Search for Layers** and selecting the relevant layer.

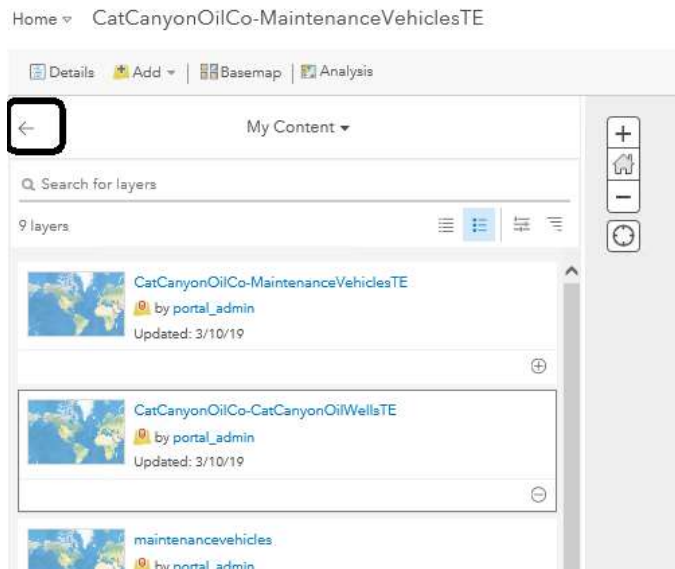
Home ▾ CatCanyonOilCo-MaintenanceVehiclesTE



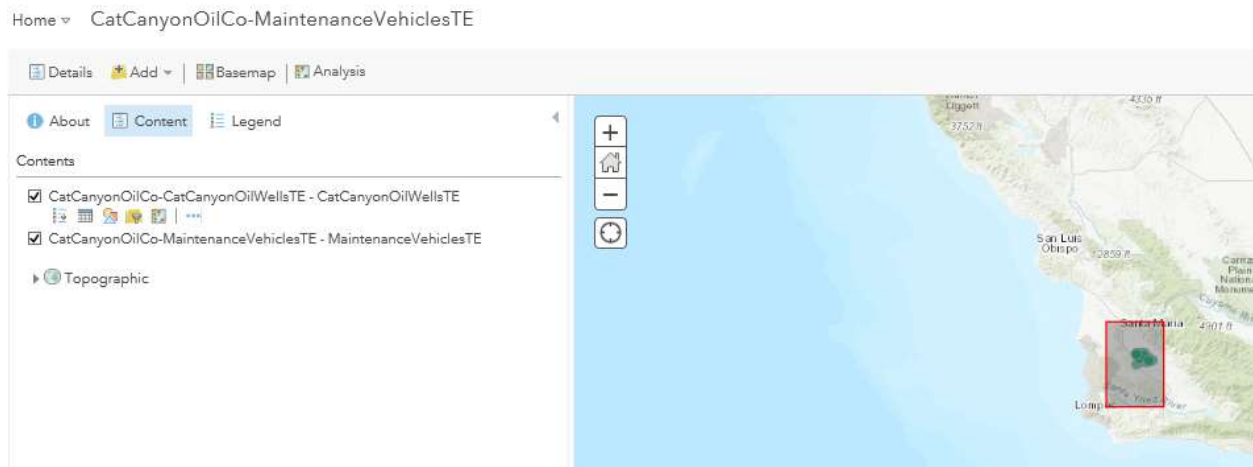
Home ▾ CatCanyonOilCo-MaintenanceVehiclesTE



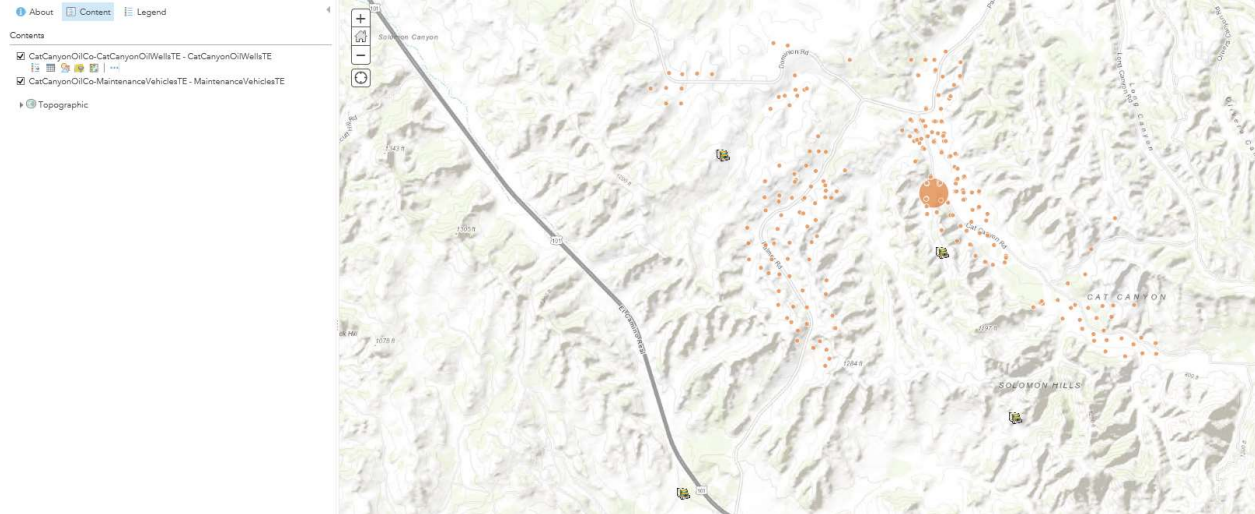
13. Click <- from the top as shown below.



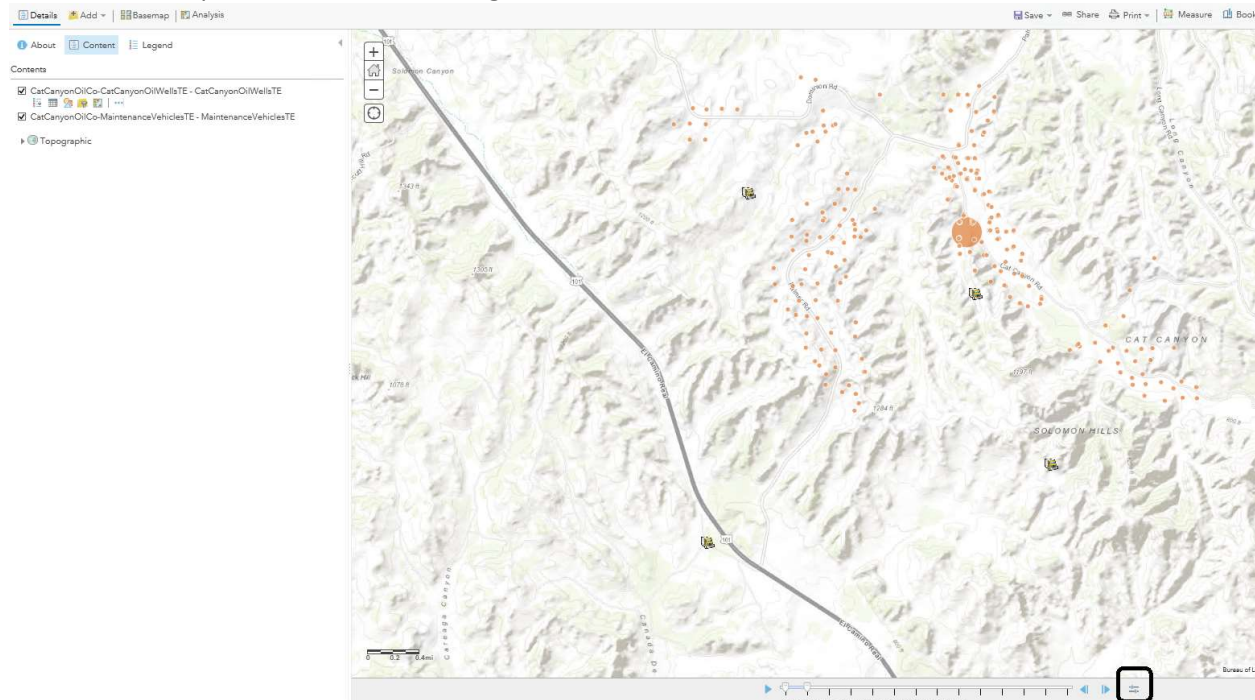
14. Click **SHIFT** on your keyboard and draw a rectangle around the area where you see the assets.



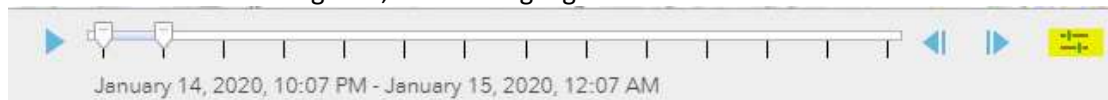
15. Add the symbology and refresh rates for both the layers as show earlier (instructor would also go over the part).



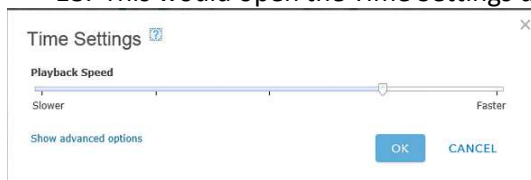
16. Now we would see the ability of the time-slider, which you can see at the bottom of the WebMap and click on the **Setting** button as shown below.



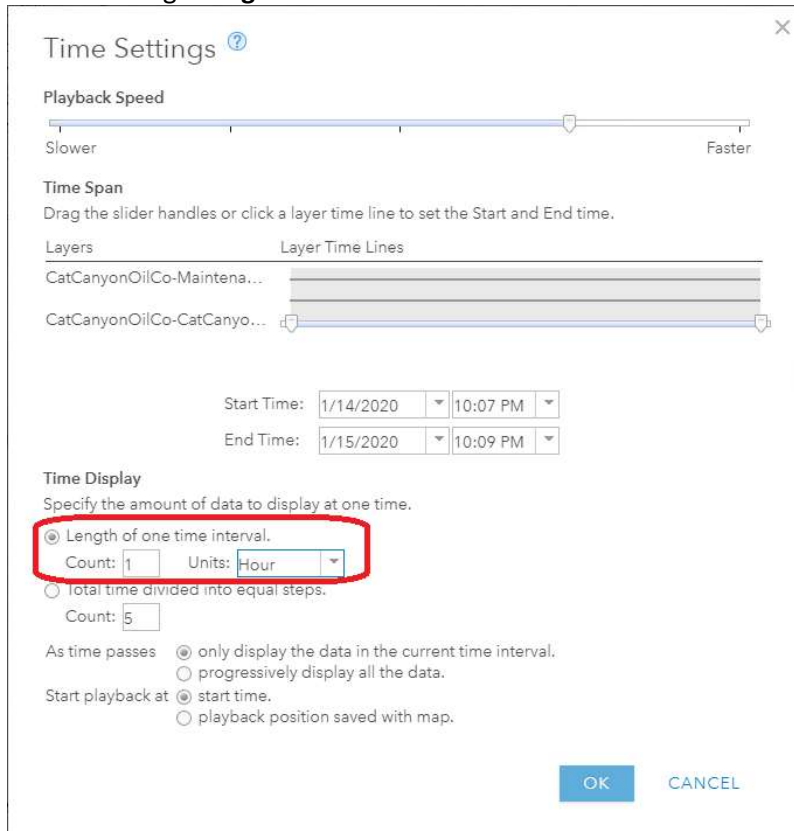
17. Click on the setting icon, which is highlighted below.



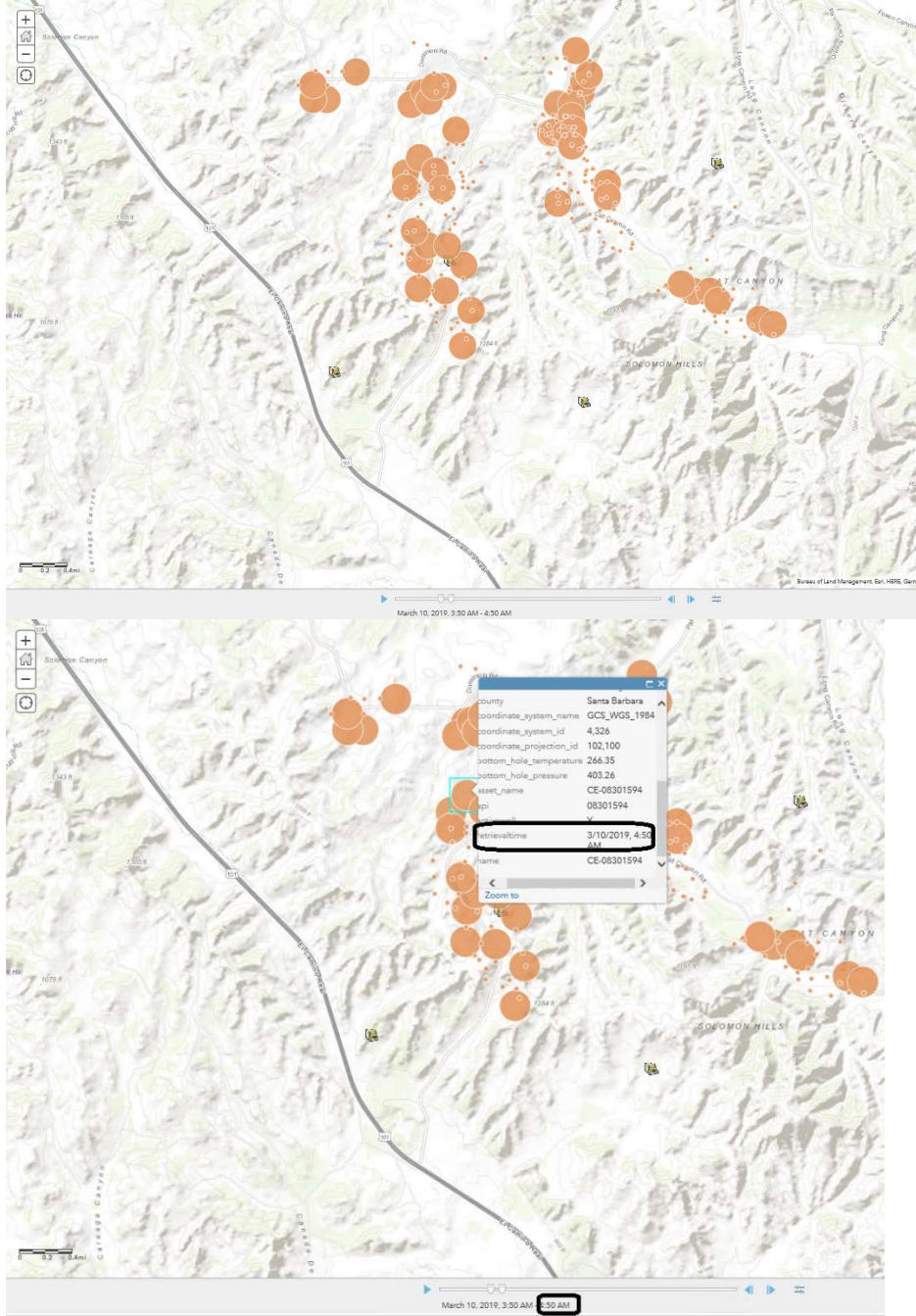
18. This would open the Time Settings dialog box. Click on **Show advanced options**.

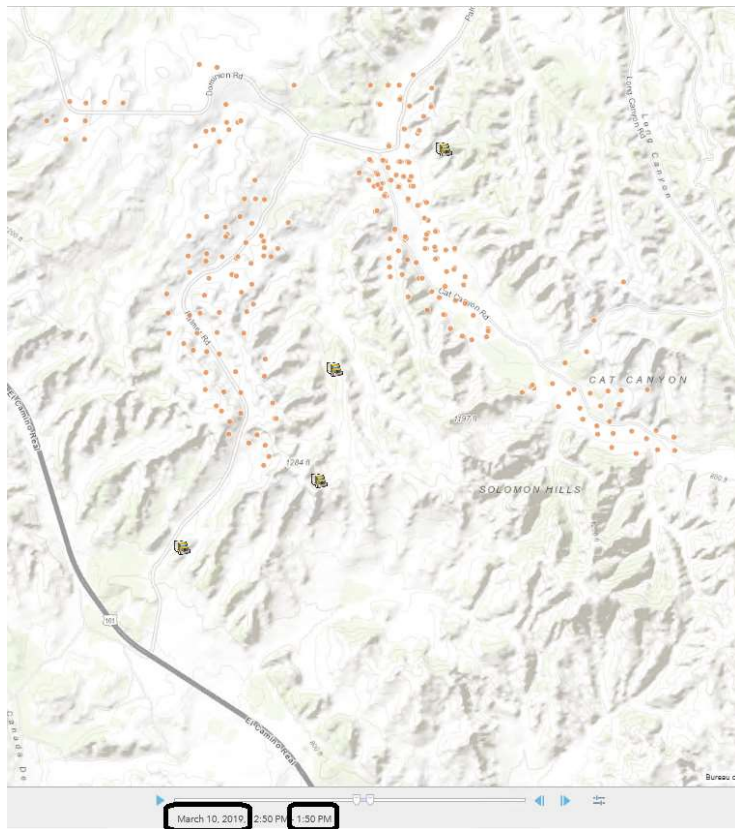


19. Change **Length of one time interval** to 1 hour and click **OK**.



20. Now click the play button to render the historical playback of the events for the past 1 day in 1 hour increment.





## 8. Create an Augmented Time-enabled Feature Layer that contains data from both the PI System and the existing feature layer that contains geometry, without modifying the existing feature layer

In this exercise, we would like to also highlight the point that it's easy to join real-time data from PI System with data from an existing ArcGIS feature layer in a new time-enabled feature layer.

1. For this example, we have a feature layer present in Portal for ArcGIS called CoalPowerStations. Currently, it does not have any live PI data.

1 - 15 of 15 in siteadmin

<input type="checkbox"/>	Title		Modified
<input type="checkbox"/>	CatCanyonOilCo-MaintenanceVehiclesTE	Feature Layer	Jan 17, 2020
<input type="checkbox"/>	CatCanyonOilCo-CatCanyonOilWellsTE	Feature Layer	Jan 17, 2020
<input type="checkbox"/>	CatCanyonOilFieldOperationsView	Dashboard	Jan 17, 2020
<input type="checkbox"/>	CatCanyonOilFieldWebMap	Web Map	Jan 17, 2020
<input type="checkbox"/>	maintenancevehicles	Feature Layer (hosted)	Jan 16, 2020
<input type="checkbox"/>	maintenancevehicles	Feature Layer	Jan 16, 2020
<input type="checkbox"/>	CoalPowerStations	Feature Layer (hosted)	Jan 16, 2020
<input type="checkbox"/>	CoalPowerStations	CSV	Jan 16, 2020

Home ▾ My Map

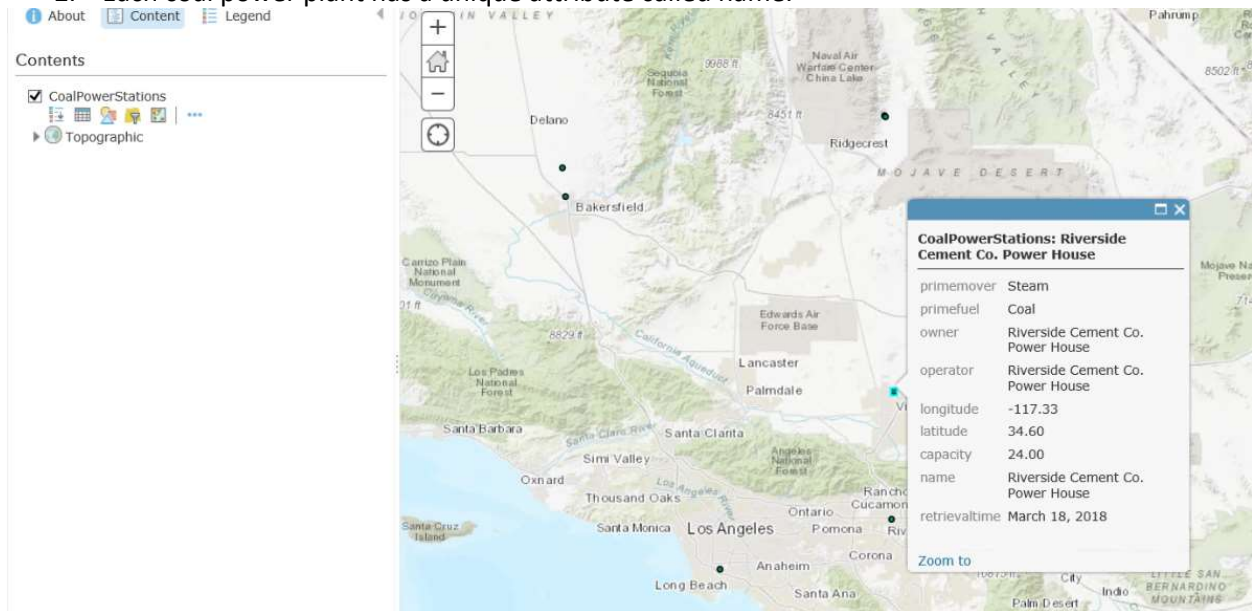
Details Add ▾ Basemap Analysis Save Share Print Measure

About Content Legend

Contents

- ☒ CoalPowerStations
- Topographic

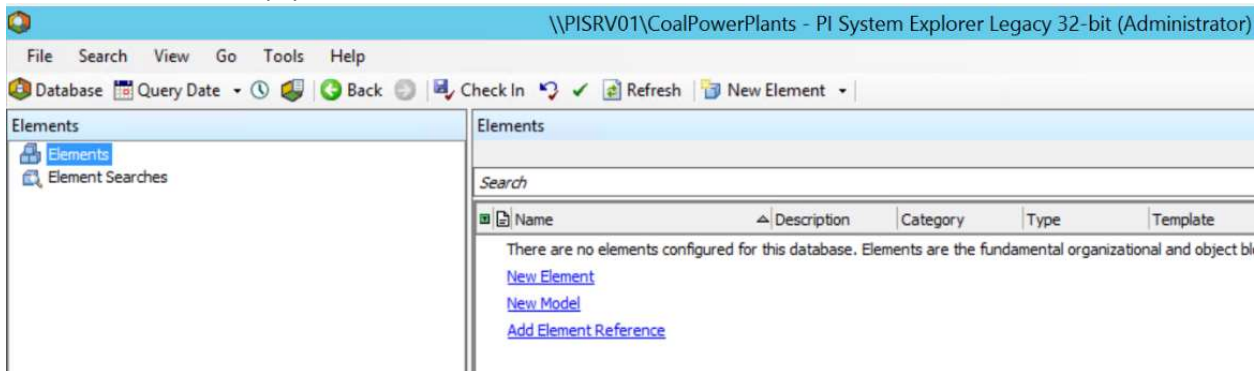
- Each coal power plant has a unique attribute called name.



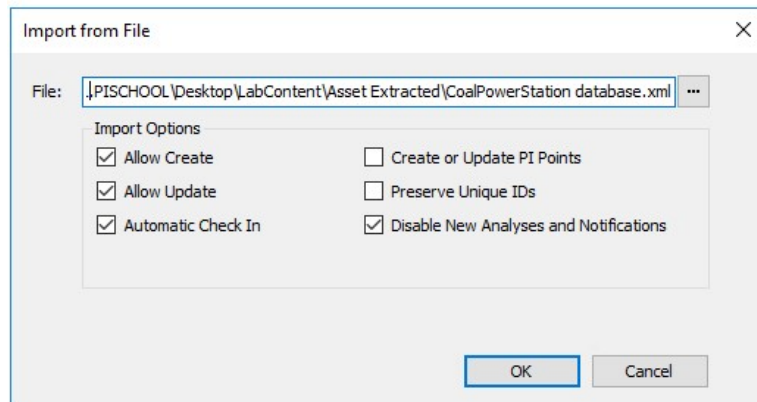
- Now in order to feed this layer with live PI system values, we will create an AF database that contains all the Coal Power Plants with live PI attributes along with the power plant's unique identifier, namely, PlantID. To accomplish this, the layer information was extracted for you using the Asset extractor (not covered in this training) and an xml file is ready to import into PI AF. The XML file contains the information about the AF template and assets needed.
- Open PI System Explorer. The shortcut for the same is provided for you in the toolbar.



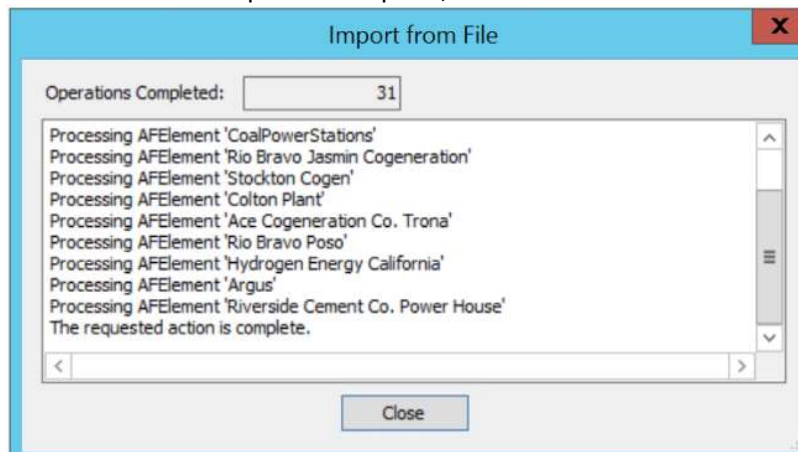
- Select the empty AF database called **CoalPowerPlants**.



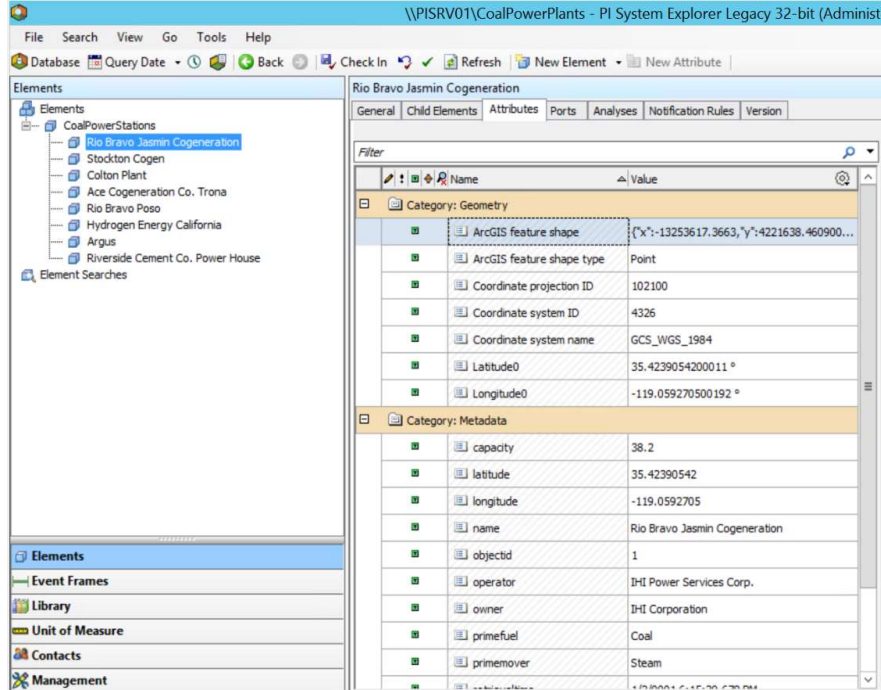
6. Click File -> Import from file and select the xml file that you downloaded to the **LabContent\Asset Extracted** folder on your desktop and click **OK**.



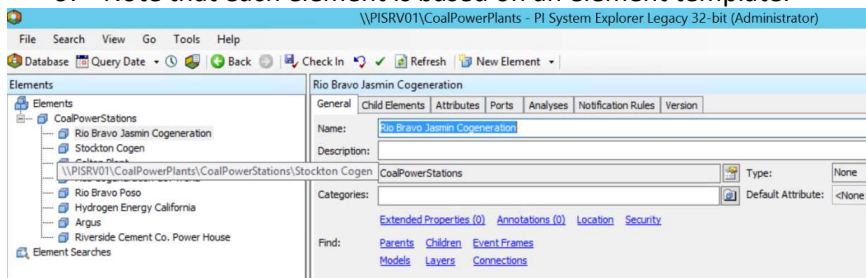
7. Once the import is complete, click **Close**.



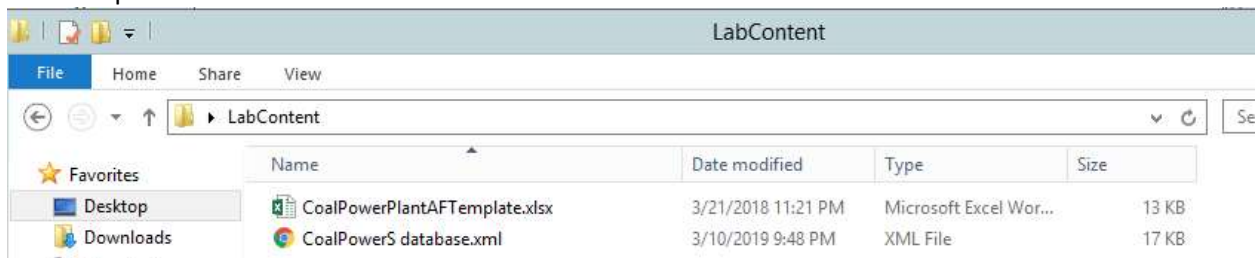
8. Clicking on one the elements and selecting the Attributes tab exposes all the attributes, which are currently all the static attributes obtained from Esri ArcGIS.



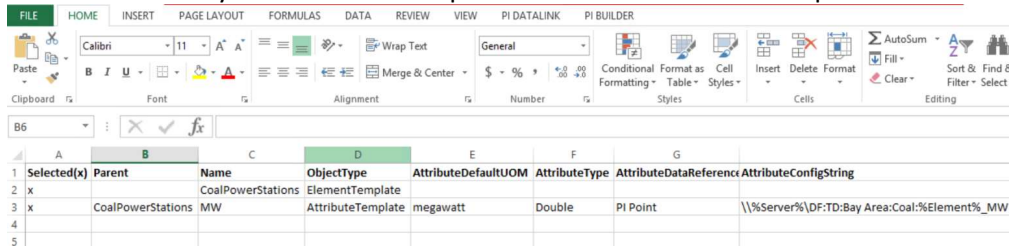
9. Note that each element is based on an element template.



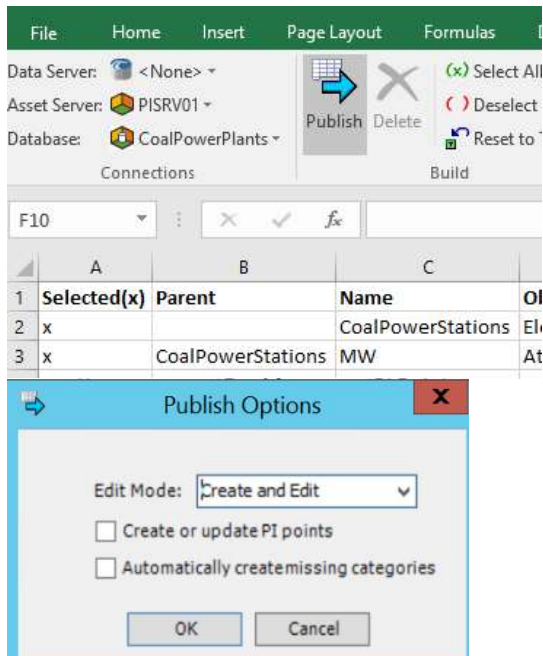
10. Now we will update the Element Template to bring in an additional attribute based on PI System data. To do this, you are already provided with the necessary script. Kindly open the Excel spreadsheet.



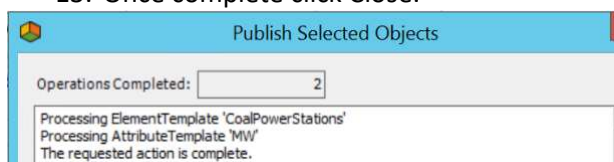
11. We will open the **CoalPowerPlantAFTemplate.xlsx** from the LabContent folder and use PI Builder (Excel plugin to interact with PI System) to update the Element Template. First make sure that you are on the **Templates** worksheet tab in Excel spreadsheet. Click on **PI Builder**.



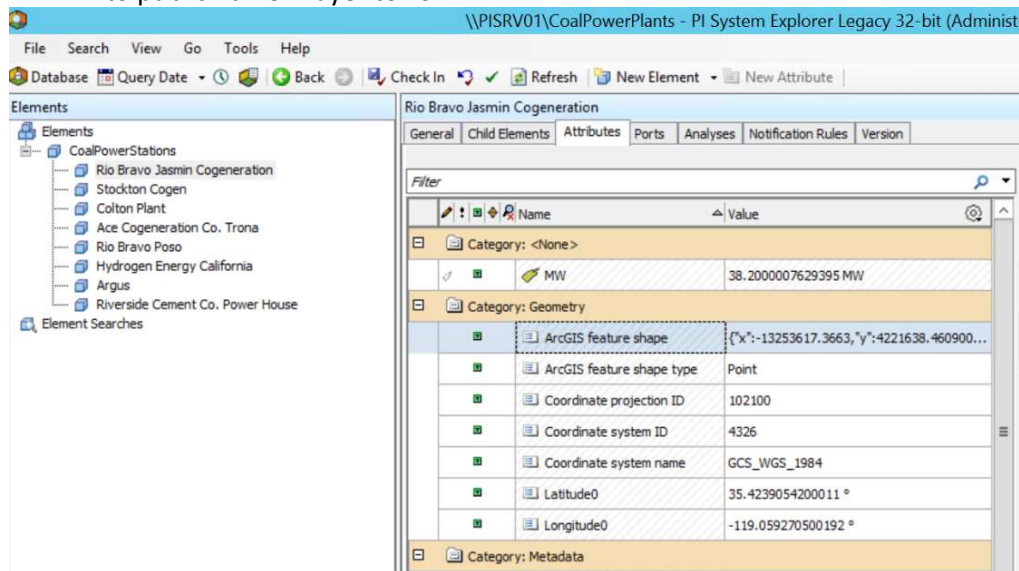
12. Select the PI AF Server and PI AF Database, PISRV01 and CoalPowerPlants Click respectively, then Publish and click **OK**.



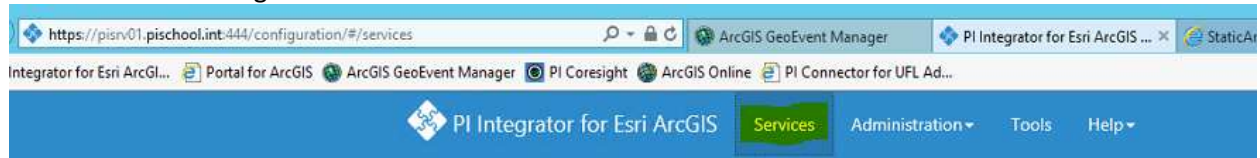
13. Once complete click Close.



14. Now open the PI System Explorer and click **Refresh**. At this point you have just added a PI point attribute for MW to the database created from the existing Esri layer. The next few steps will be to publish a new layer to Esri.



15. Go to PI Integrator for Esri ArcGIS 2017 SP1 and click Services.



16. Click **Create Service**.

17. Enter **CoalPlants** for both Name and Description. Then click **Create**.

18. Click **Create Layer button**.

19. Enter **CoalPlantsWithLivePIData** for both Name and Description.

20. Make sure only **Time-enabled Feature Layer** is selected.

21. Click **ArcGIS Enterprise** button.

22. Enter siteadmin & vlesiteadmin for username and password, respectively.

The screenshot shows the 'Login to ArcGIS Enterprise' dialog box. The 'Portal' dropdown is set to 'Portal105'. The 'User name' field contains 'portal\_admin' and the 'Password' field contains a masked password. The 'Login' button is visible. In the background, the 'Creating new layer' page is partially visible, showing the 'Basic information' section with fields for 'Name' and 'Description', and a 'Time-enabled' checkbox.

23. Click **Continue**.

The screenshot shows the 'Creating new layer (CoalPlantsWithLivePIData) in service CoalPlants' page, Step 1 of 4. The 'Basic information' section is visible. The 'Name' field contains 'CoalPlantsWithLivePIData' and the 'Description' field contains 'CoalPlantsWithLivePIData'. The 'Time-enabled Feature Layer' checkbox is checked. Below this, there are two buttons: 'ArcGIS Online' and 'ArcGIS Enterprise'. The 'Continue' button is at the bottom right.

24. Select **CoalPowerPlants** and **CoalPowerStations** for AF Databases and Templates, respectively and then click **Continue**.

The screenshot shows the 'Creating new layer (CoalPlantsWithLivePIData) in service CoalPlants' page, Step 2 of 4. The 'Data source' section is visible. The 'AF Server' dropdown is set to 'PISRV01'. The 'AF Database' dropdown is set to 'CoalPlants'. The 'Template' dropdown is set to 'CoalPowerStations'. The 'Category' dropdown is empty. The 'Max count' field contains '1000000'. The 'Search root' field contains 'CoalPlants'. There is a 'Select' button next to the search root field. At the bottom, there are 'Back' and 'Continue' buttons.

25. Select **name** as the **Key** and all other attributes in the screenshot below. Make sure that the Geometry and Location attributes are not selected, we will be getting the longitude and latitude from the existing Esri layer. Click **Continue**.

Template attribute fields [\[Show less\]](#) A - Z Z - A ☒ Show categories

☒ Select all

Included	Name	Attribute Name	Type	Source	Units	Function
★ Category: Geometry						
<input type="checkbox"/>	longitude0	Longitude0	Double	static	*	None <input type="checkbox"/>
<input type="checkbox"/>	latitude0	Latitude0	Double	static	*	None <input type="checkbox"/>
<input type="checkbox"/>	coordinate_system_name	Coordinate system name	String	static		None <input type="checkbox"/>
<input type="checkbox"/>	coordinate_system_id	Coordinate system ID	Int32	static		None <input type="checkbox"/>
<input type="checkbox"/>	coordinate_projection_id	Coordinate projection ID	Int32	static		None <input type="checkbox"/>
<input type="checkbox"/>	arcgis_feature_shape_type	ArcGIS feature shape type	String	static		None <input type="checkbox"/>
<input type="checkbox"/>	arcgis_feature_shape	ArcGIS feature shape	String	static		None <input type="checkbox"/>
★ Category: Metadata						
<input checked="" type="checkbox"/>	primemover	primemover	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	primefuel	primefuel	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	owner	owner	String	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	operator	operator	String	static		None <input type="checkbox"/>
<input type="checkbox"/>	objectid	objectid	Int64	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	name	name	String	static		Key <input type="checkbox"/>
<input type="checkbox"/>	longitude	longitude	Double	static		None <input type="checkbox"/>
<input type="checkbox"/>	latitude	latitude	Double	static		None <input type="checkbox"/>
<input checked="" type="checkbox"/>	capacity	capacity	Double	static		None <input type="checkbox"/>
★ No category						
<input checked="" type="checkbox"/>	mw	MW	Double	PI Point	MW	None <input type="checkbox"/>

Element fields [\[Show less\]](#)

Included	Name	Function
<input type="checkbox"/>	name	Key <input type="checkbox"/> Include AF Element name
<input type="checkbox"/>	elementpath	None <input type="checkbox"/> Include AF Element path
<input type="checkbox"/>	guid	None <input type="checkbox"/> Include AF Element ID (GUID)
<input type="checkbox"/>	description	None <input type="checkbox"/> Include AF Element description
<input type="checkbox"/>	template	Include AF Element Template name
<input checked="" type="checkbox"/>	retrievaltime	Include retrieval time (Always included)

Back Continue

26. Now you need to fill-in 2 parameters, namely, **Geometry feature layer URL**, and **Feature layer join field**.

home / services / CoalPlants / new

### Creating new layer (*CoalPlantsWithLivePIData*) in service CoalPlants

Geometry information Step 4 of 4

You have not specified any fields that supply geometry information.

To link this time-enabled feature layer with geometry that is specified in an existing ArcGIS feature layer, provide a feature layer URL and specify a feature layer field that joins with the defined key field.

**Geometry feature layer URL**

**Feature layer join field**

**PI System key**

Complete all required fields and fix any invalid fields.

27. Open the file **URLs\_Credentials.txt** file in the Desktop and copy first the URL highlighted below and paste it under the field **Geometry feature layer URL** shown in the screenshot above.

```
URLs_Credentials.txt - Notepad
File Edit Format View Help
CoalPowerPlant Feature Layer Rest Endpoint:
https://pisrv01.pischool.int/server/rest/services/Hosted/CoalPowerStations/FeatureServer/0

GEE Credentials:
username: portal_admin
password: portal_admin1

Portal for ArcGIS Server:
username: portal_admin
password: portal_admin1

PI Integrator for Esri ArcGIS URL: https://pisrv01.pischool.int:444/configuration#/services

PI Integrator for Esri ArcGIS Application Server:
username: pischool\student01
password:

Advanced Exercise:
(GEE Input)
Parameter: ?f=json&id=9eb1c20e-de79-a4b4-5c4c-19a2b24a6a93&timeout=330&latestValuesOnly=true

PI WebAPI Link:
https://pisrv01.pischool.int//piwebapi/admin/search/database.html

Water Gauges:
Geometry feature layer URL: http://pisrv01.pischool.int/server/rest/services/Hosted/CoalPowerStations/FeatureServer/0
```

28. Enter the URL into **Geometry feature layer URL** and click **Connect** button and then click **Populate** button. Select **name** as **Feature layer join field**. Then click **Create Layer**.

Creating new layer (*CoalPlantsWithLivePIData*) in service CoalPlants

Geometry information

Step 4 of 4

You have not specified any fields that supply geometry information.

To link this time-enabled feature layer with geometry that is specified in an existing ArcGIS feature layer, provide a feature layer URL and specify a feature layer field that joins with the defined key field.

Geometry feature layer URL [?](#)  [×](#) [Connect](#)

Feature layer join field [?](#)  [Populate](#)

PI System key [?](#)

[Back](#) [Create Layer](#)

PI Integrator for Esri ArcGIS Services Administration Tools Help PISCHOOL\student01

home / services / CoalPlants / CoalPlantsWithLivePIData

Layer CoalPlantsWithLivePIData [×](#) [View Item in Portal for ArcGIS](#) [View in Map Viewer](#)  
CoalPlantsWithLivePIData  
Created on 03/22/2018 02:40:57 (just now)  
verify and repair

[✓ Initialized](#) [Reinitialize](#)

[All](#) [Features](#) [Fields](#) [Visualization](#) [Feature Layer](#)

This layer exposes **PI AF Elements** using the following search parameters

AF Server	PISRV01	Categories
AF Database	CoalPlants	Search root
Template	CoalPowerStations	Max count 1000000

Augmented Feature Layer

Feature layer URL	<a href="http://pisrv01.pischool.int/server/rest/services/Hosted/CoalPowerStations/FeatureServer/0">http://pisrv01.pischool.int/server/rest/services/Hosted/CoalPowerStations/FeatureServer/0</a>
Feature layer join field	name
PI System key	PlantID

29. Go to the Portal for ArcGIS and click **View in Map Viewer** and enter the credentials for ArcGIS Enterprise.

Home ▾

[Details](#) [Add ▾](#) [Basemap](#) [Analysis](#) [Save ▾](#)

[About](#) [Content](#) [Legend](#)

Contents

- Topographic

Arctic Ocean

Pacific Ocean

**Sign In** [×](#)

Please sign in to access the item on <https://pisrv01.pischool.int:448/api/CoalPlants>

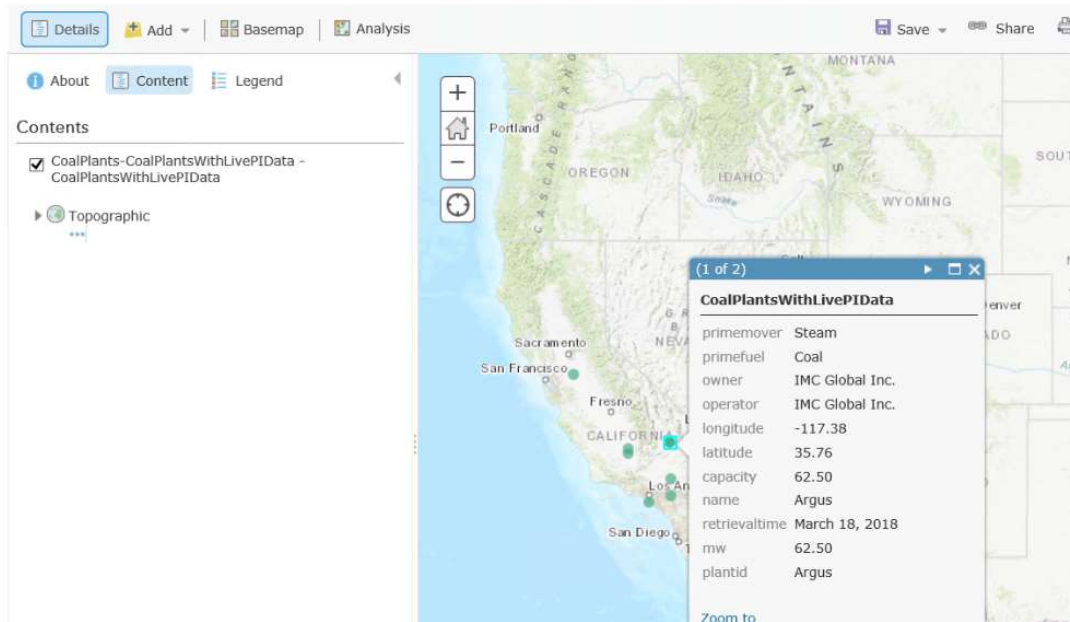
Username:

Password:

[OK](#) [CANCEL](#)

30. Zoom-into the location and you would note the Augmented time-enabled feature layer containing **MW** attribute, as well.

Home ▾ CoalPlants-CoalPlantsWithLivePIData



## Conclusion

Congratulations!

It's been quite a lot--thanks for your attention and participation. If you've any questions, feel free to bring them up with your instructors—we'd be glad to help. And if ever have any future questions, remember to consult the handy OSISOft Live Library, available for anyone, for free, at anyone at [livelibrary.osisoft.com](http://livelibrary.osisoft.com); click the "Integrators" section to see the full user manual for the PI Integrator for Esri ArcGIS 2017 SP1.





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OSIsoft PI World Users Conference in San Francisco, California. March 23-26, 2020.  
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