



Automating Quicklook Products for Emergent Events using Python

Overview

- Background
- Reason for Development
- MXD Staging
- Python Script
- ArcGIS Tool

Department of Homeland Security

National Protective Programs Directorate (NPPD)

Office of Infrastructure Protection (IP)



Homeland
Security



Project Description:

Provide geospatial support for the protection of our nation's critical infrastructure

Highlights:

- Cartographic products range in size from Quick Turn individual maps to multi-page map books
- Many products are repetitive and are requested many times during an event or project
 - Annual events such as College Bowl Games, Marathons, etc.
 - Daily Update Briefs during an ongoing project

Quicklook Background

Snapshot of Developing Situation:

- Relatively simple map!
- Depicts incident location and nearby assets

What it's for:

- Used to brief leadership who alert nearby infrastructure stakeholders

As soon as a QL is requested, it's needed ASAP

Reason for Development

To quickly produce static cartographic products:

- Primarily for leadership to get a quick idea of the incident/surrounding areas
- Grew out of a need to produce a pleasing product in less than 20 minutes

To take the “Template” one step further:

- Frees up the Geospatial Analyst to add more “interesting” additional things to the product, rather than focus on mundane repeatable tasks

“Real Reason”

I was interested:

- Literally a self-imposed opportunity to learn on the job
- Wanted to expand upon my python knowledge
- I wanted to save time

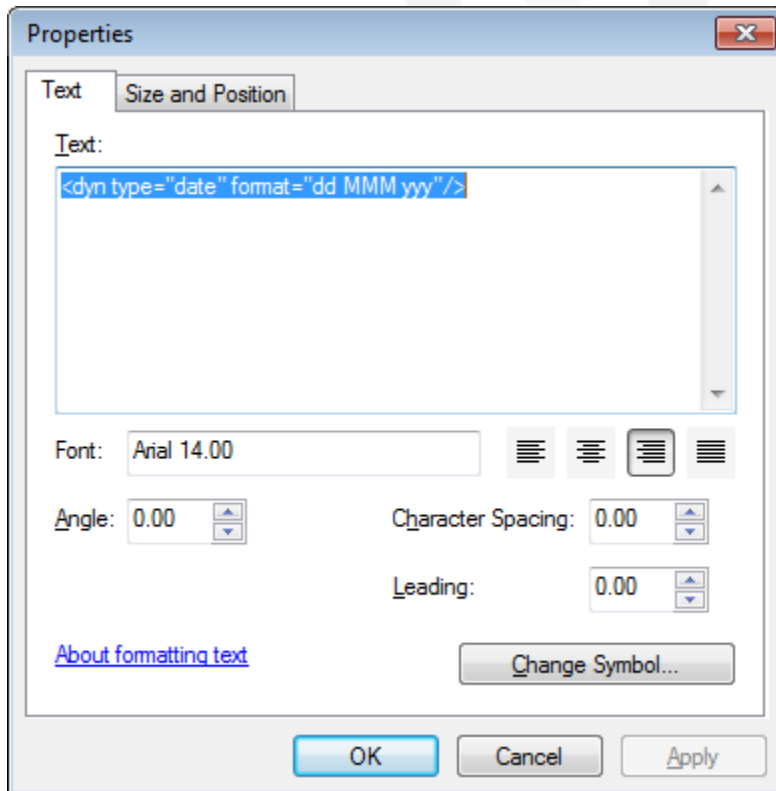
Tired of doing it “by hand” every time:

- All maps formatted the exact same way
- Felt above some of the simple things we needed to do each time
 - Point creation
 - Buffer
 - Pan/Zoom

MXD Staging

Really Useful & Important:

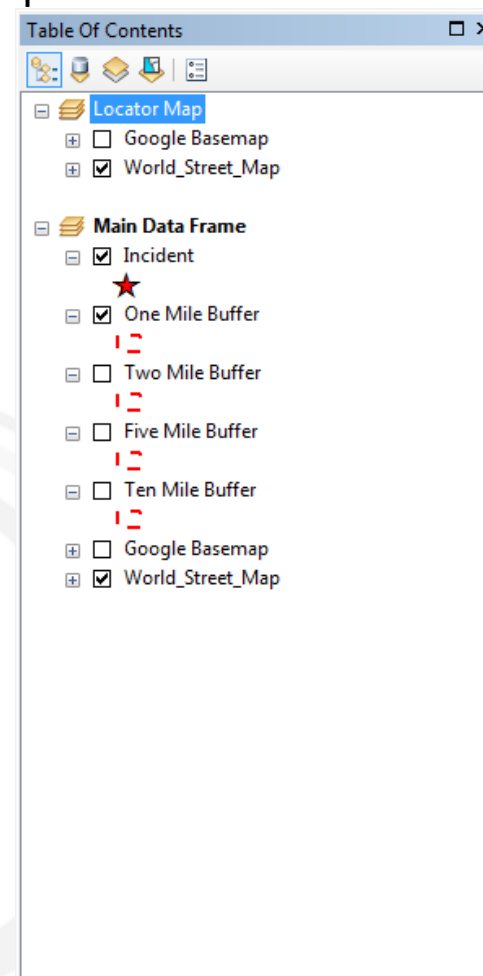
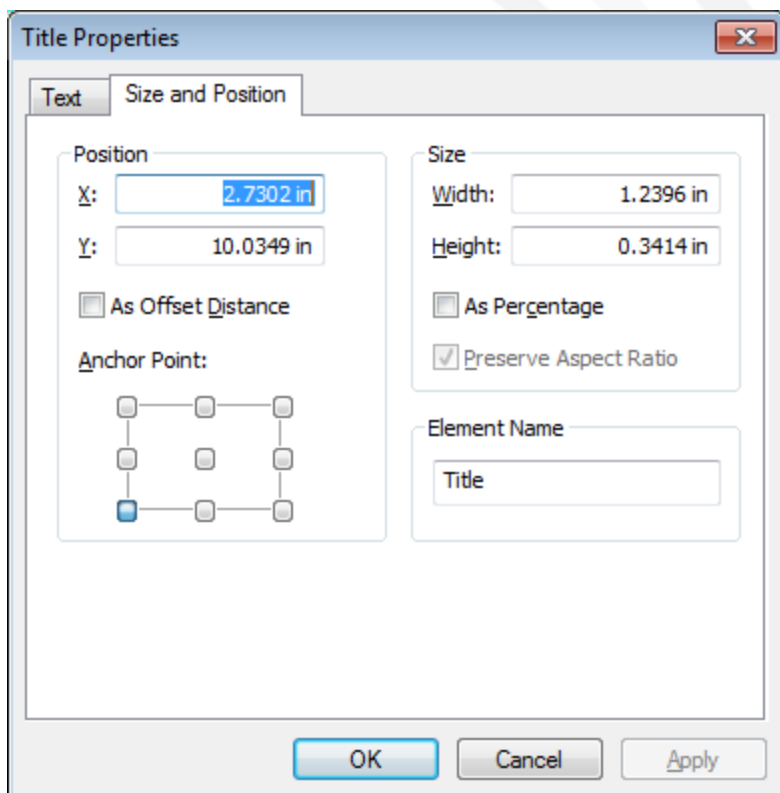
- Dynamically Updating Date/Time based upon OS time
- Has an auto-generating legend based upon what layers are on/in extent



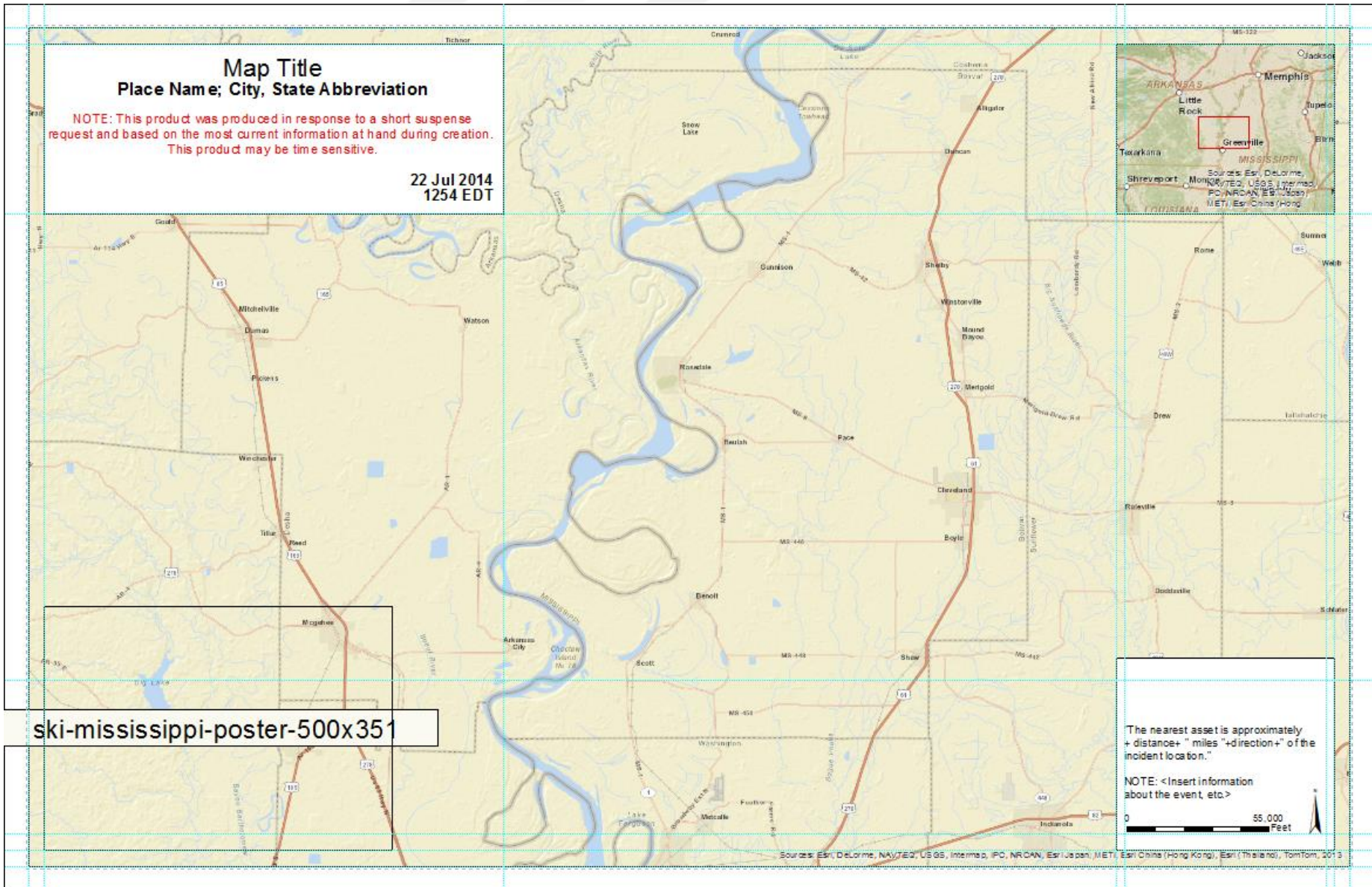
MXD Staging

Really Useful & Important:

- Contains “dummy” layers that have all symbology/labeling properties
- Title, Location, and Distance text boxes all dynamically updated from script



MXD Template



Python Script

A few things it does:

- Prompts the user to define the workspace
- Creates folders inside that workspace

```
arcpy.CreateFolder_management(workspace, projectFolder)
arcpy.CreateFolder_management(projectFolder, dataFolder)
arcpy.CreateFolder_management(projectFolder, mxdFolder)
arcpy.CreateFolder_management(projectFolder, pdfFolder)
```

- Gets lat/long from user and generates a point based upon it

```
coordinates = (arcpy.GetParameterAsText(2))
coordinates = string.split(coordinates, ",")
latitude = eval(coordinates[0])
longitude = eval(coordinates[1])

point = arcpy.Point(longitude, latitude)
geom = arcpy.Geometry("Point", point)
arcpy.CopyFeatures_management(geom, r"Data\Incident.shp")

sr = arcpy.SpatialReference(4326)
infc = r"Data\Incident.shp"

arcpy.DefineProjection_management(infc, sr)
```

Python Script

- Runs Buffer Tool

```
arcpy.Buffer_analysis("Data\Incident.shp", "Data\OneMileBuffer.shp", "1 Miles", "FULL", "ROUND", "LIST")
```

- Swaps out data sources for layers in TOC

```
updateIncident = arcpy.mapping.ListLayers(mxd, "Incident", df)[0]  
updateIncident.replaceDataSource(workspace + "/" + projectFolder + "\Data", "None", r"Incident.shp", "")
```

- Pan/Zoom Main Data Frame to One Mile Buffer Extent

```
lyr=arcpy.mapping.ListLayers(mxd, "One Mile Buffer", df)[0]  
arcpy.SelectLayerByAttribute_management(lyr, "NEW_SELECTION", "")  
df.extent = lyr.getSelectedExtent()  
arcpy.SelectLayerByAttribute_management(lyr, "CLEAR_SELECTION")
```

- Reprojects the Main Data Frame to correct UTM Zone

```
if longitude <= -66 and longitude > -72:  
    #set data frame to UTM 19N  
    df.spatialReference = arcpy.SpatialReference(26919)  
    arcpy.AddMessage("Reprojecting the Main Data Frame to UTM Zone 19N")
```

Python Script

- Calculates distance/direction to nearest asset
- Turns on and off layers in the TOC
- Passes title and location info from user

```
elm = arcpy.mapping.ListLayoutElements(mxd, "TEXT_ELEMENT", "Title")[0]
elm.text = title
elm2 = arcpy.mapping.ListLayoutElements(mxd, "TEXT_ELEMENT", "Location")[0]
elm2.text = location
```

- Saves the new map document into the user defined workspace

```
time = str(datetime.datetime.now())
time = time[:4]+time[5:7]+time[8:10]
mxd.saveACopy(workspace + "/" + projectFolder + "\MXD\Quicklook_" + time + "_" + title + ".mxd")
```

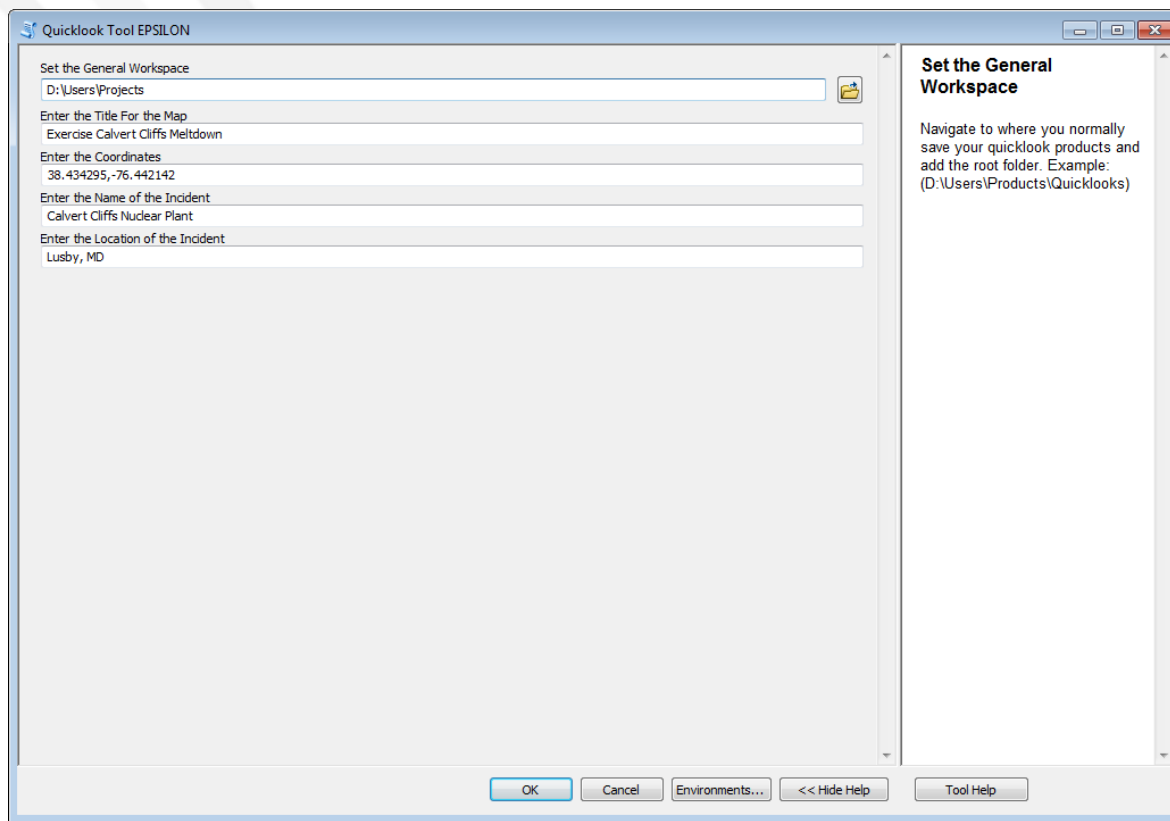
- Launches ArcMap

```
strArcMapPath = r"C:\Program Files (x86)\ArcGIS\Desktop10.1\bin\ArcMap.exe"
strMxd = workspace + "/" + projectFolder + "\MXD\Quicklook_" + time + "_" + title + ".mxd"
```

ArcGIS Tool

User Friendly:

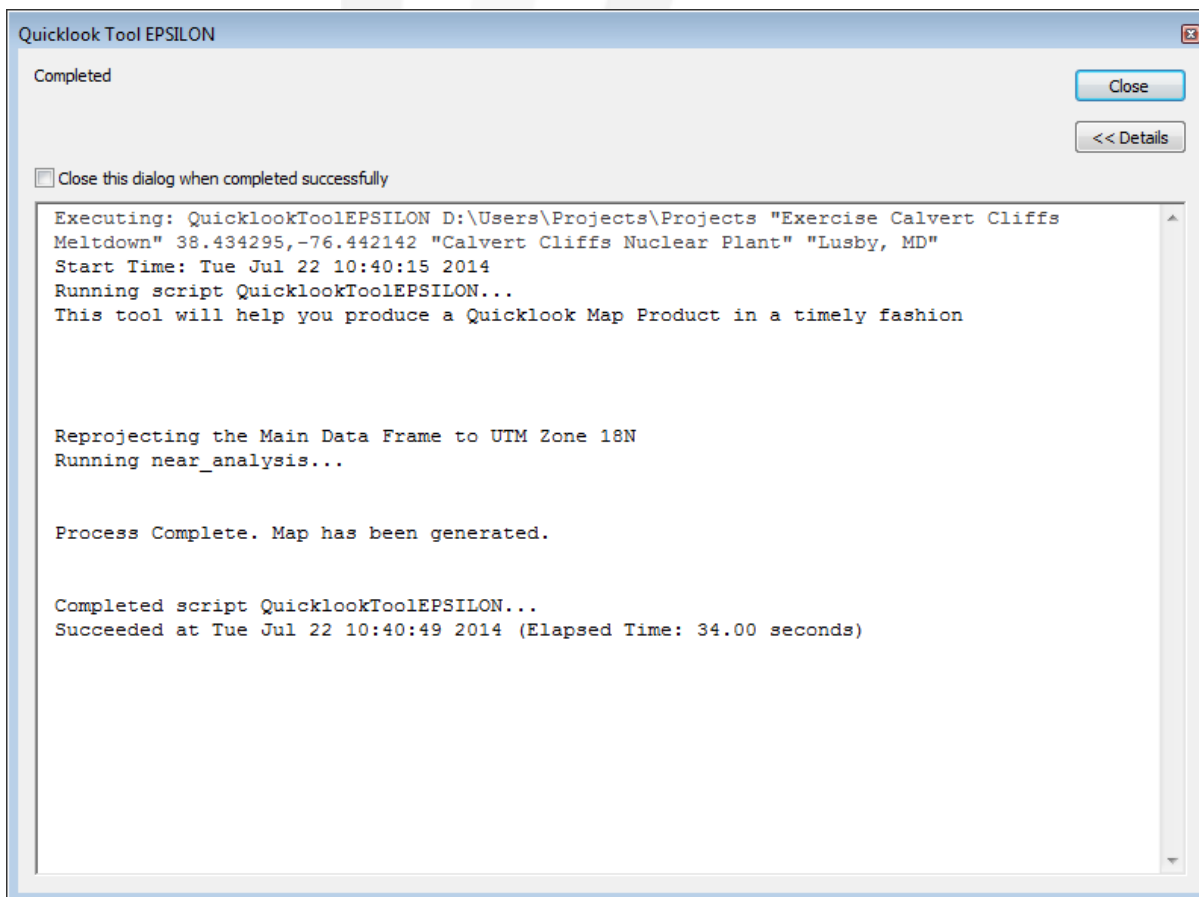
- Users input parameters to set values of the variables in the python script
- Contains descriptions/help for each parameter so the user knows what to input
- Once the tool runs, it automatically launches the newly generated map for additional editing



ArcGIS Tool

User Interaction:

- Tool outputs messages to show user which processes it's running

A screenshot of the 'Quicklook Tool EPSILON' dialog box. The window title is 'Quicklook Tool EPSILON'. The status is 'Completed'. There are 'Close' and '<< Details' buttons. A checkbox labeled 'Close this dialog when completed successfully' is checked. The main text area contains the following output:

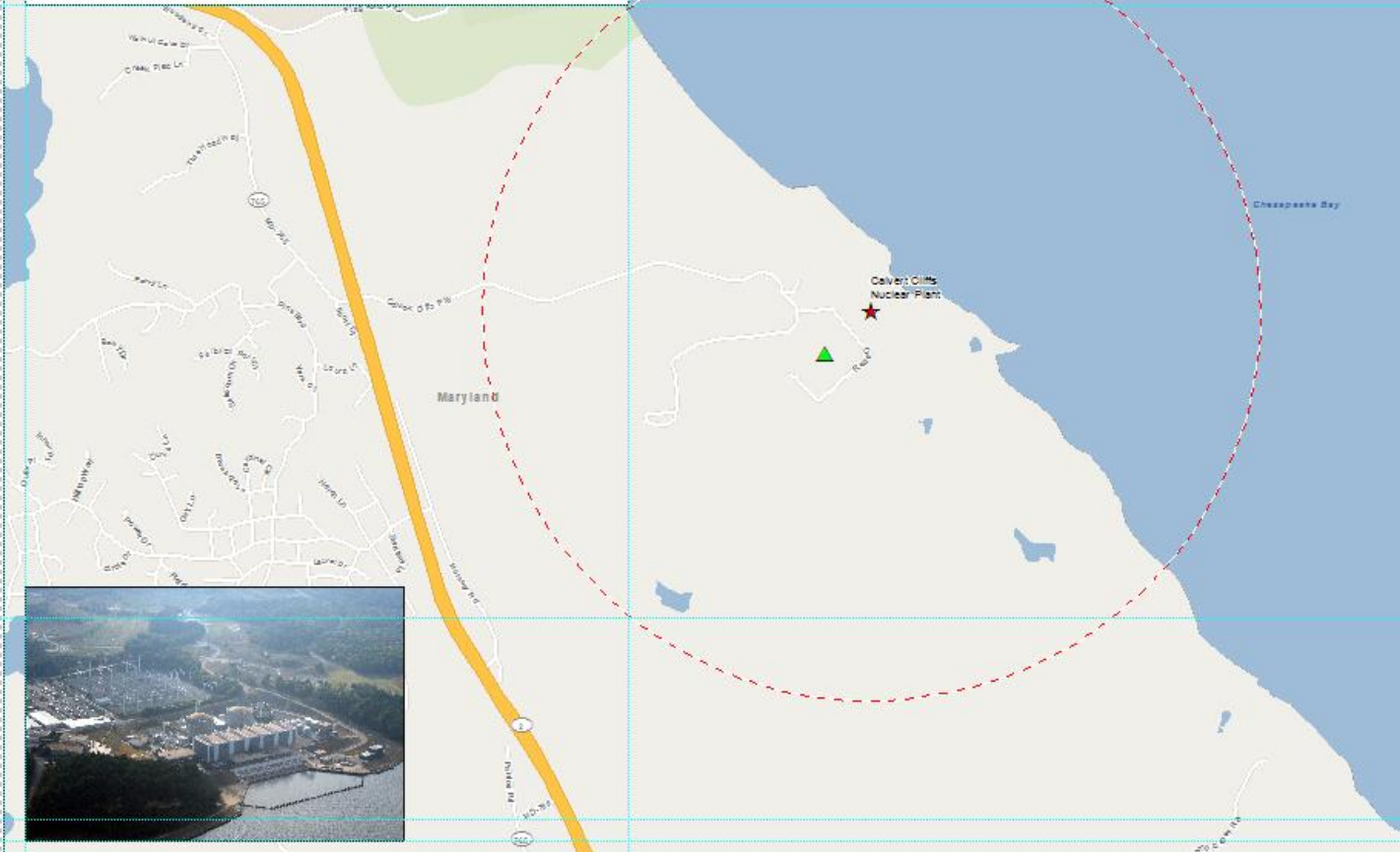
```
Executing: QuicklookToolEPSILON D:\Users\Projects\Projects "Exercise Calvert Cliffs  
Meltdown" 38.434295,-76.442142 "Calvert Cliffs Nuclear Plant" "Lusby, MD"  
Start Time: Tue Jul 22 10:40:15 2014  
Running script QuicklookToolEPSILON...  
This tool will help you produce a Quicklook Map Product in a timely fashion  
  
Reprojecting the Main Data Frame to UTM Zone 18N  
Running near_analysis...  
  
Process Complete. Map has been generated.  
  
Completed script QuicklookToolEPSILON...  
Succeeded at Tue Jul 22 10:40:49 2014 (Elapsed Time: 34.00 seconds)
```


Generated MXD

Exercise Calvert Cliffs Meltdown Lusby, MD

NOTE: This product was produced in response to a short suspense request and based on the most current information at hand during creation. This product may be time sensitive.

22 Jul 2014
1058 EDT



★ Incident
▲ Asset
- - - One Mile Buffer

The nearest asset is approximately 0.15 miles southwest of the incident location.
NOTE: This is a fictitious scenario

0 2,500 Feet

Questions?

Useful Links:

Blog Post - <http://zekiah.com/index.php?q=blog/2014/04/04/automating-quicklook-map-products-emergent-events>

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