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Teaching and learning with ArcGIS Explorer

Exercise 1: Work with ArcGIS Explorer
Estimated time: 45 minutes

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Integrating ArcGIS Explorer Online and ArcGIS Explorer Desktop into your lessons can be a simple activity to include in a lesson or used for more in-depth learning. For example:

- Create a map to share the latest event that is happening in the news in order to spark a discussion in class.
- Share a map and presentation with the class, before a lesson begins, so that students can get a feel for the locations and topics they will be learning about, or to provide the foundation for greater learning and discovery in project- and inquiry-based learning.

It really is up to you as the instructor to determine what is the best way to integrate ArcGIS Explorer in the classroom and learning environment. This lesson will give you ideas of how and what ArcGIS Explorer Online and ArcGIS Explorer Desktop can do to help you engage learners in a powerful and innovative way.

Step 1: Open ArcGIS Explorer Online

☐ Open a new browser window and in the address bar type in the following address: **http://explorer.arcgis.com**

Note: ArcGIS Explorer Online is a web-based application built with Microsoft Silverlight technology and can be run in any browser that has Silverlight installed. Popular browsers like Safari, Chrome, Internet Explorer and Firefox can be used.

☐ Explore the interface of ArcGIS Explorer Online. It consists of three toolbars:

- The title toolbar contains the name of the map, the Sign In link, and the Help menu.
- The Featured Maps toolbar contains a New Map button and a Find Maps & Groups search box.
- THe bottom toolbar contains the following buttons: Featured, My Maps, Recent, and Groups.

☐ Click the New Map drop-down and choose Advanced.

☐ Select the Topographic basemap.

Step 2: Explore the Battle of the Alamo

In this step, you will set a scenario where you need to teach about the Battle of the Alamo and Texas's fight for independence. If students have not visited this location, you can take them there by using ArcGIS Explorer Online and using its capabilities to bring in source material to teach about the Battle of the Alamo.

If you have ever used a web-based map before for navigation, you may notice that ArcGIS Explorer Online will act and behave pretty much the same way. Click and drag with your mouse to pan, use the scroll wheel to zoom in/out. You can also use the Navigator in the lower left-hand corner. You can zoom in/out, show the x,y coordinates and zoom to full extent.

> *Note:* If you hover your mouse over the tools, a ToolTip pop ups that provides an explanation of what the tool does.

☐ In the Find Places search box, type **Alamo** and press Enter.

> *Note:* Find Places will search for places, streets, addresses, intersections, points of interests, airports, and geographical coordinates and find their location on a map.

☐ In the Results Window, click Bookmark for the The Alamo, TX (as indicated below).

Question 1: Now that you have found the Alamo, what do you notice about its location in the city of San Antonio? How does this compare to television and movies that show the Alamo?

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Step 3: Represent features in a map

The Create Features tool is a way to represent geographic entities, or represent something important on the map for others to see. Each feature will include a pop-up in which you can include information about the feature and links to web pages and images for the user to read or use.

☐ Click the Create Features button 🖉.

The Map Contents panel opens to the Add Features view.

☐ From the template list, choose the appropriate tool and draw an area that represents the mission of the Alamo.

☐ Click the Edit Features button 🖳 — be sure that your feature is selected.

☐ Click the Change Symbol button (as indicated below) and change the symbol to a hollow fill. (To apply a hollow fill, move the Opacity slider to the left.)

Note: You can also change the color, transparency, and width of the symbol as well.

☐ Close the Symbol window.

☐ Using your skills for creating features, draw a blue line using the Freehand Line tool to represent the San Antonio River. The San Antonio River, at the time, had a horse-shoe shape to the course of the river.

> *Note:* The segment of the San Antonio River that is between Commerce and Market Streets was added in years later to become part of the famous River walk and to alleviate flooding in downtown San Antonio.

Question 2: What role do you think the San Antonio River plays in locating the Mission here?

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☐ Pan to the west following Commerce St. until you reach Main Plaza and Military Plaza.

San Fernando Cathedral is at the southeast corner of the intersection of Commerce St. and S. Flores St.

☐ Create a point feature to represent this building.

San Fernando Cathedral is where Mexican General Antonio Lopez de Santa Anna raised a "no quarter" flag from the cathedral's tower, thus marking the beginning of the siege of the Alamo.

Question 3: Using the Measure tool ⚹, how far away from the Alamo is San Fernando Cathedral?

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☐ Find the following missions and create point features for them:
- Mission Concepcion
- Mission San Jose
- Mission San Juan Capistrano
- Mission Espada

Question 4: What was the original purpose for these missions including the Alamo?
(*Hint*: Visit http://www.nps.gov/saan/index.htm to find out)

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Step 4: Work with pop-ups

Pop-up windows are part of a feature that can have descriptive information such as a title, descriptive text about the feature, links to other websites, media elements such as an image, or even a graph derived from the properties of the feature.

☐ Click the Edit Features button 🖳.

☐ Select the area that you drew to represent the Alamo.

☐ Click the Show Pop-up button 🖼.

The pop-up window for this feature opens. This is how it looks by default. You can edit the pop-up from the Edit drop-down menu or by using the Edit Pop-up 📝 button on the toolbar.

☐ Make the following changes to the pop-up for the Alamo:

- Title: **The Alamo**
- Description:
  The Battle of the Alamo (make this text bold)
  (February 23-March 6, 1863)
- Related Link: **http://www.thealamo.org**
  (a hyperlink to the Official Alamo website)

Adding pictures to a pop-up window is a great way to bring the real world into the map. Photo-sharing sites like Flickr and Picasa are an excellent way to share photos, but they can also be used as a repository for photos that can be brought into ArcGIS Explorer through the use of a URL. A word of caution though, the image can change or not be available if linking to websites that you don't control or maintain.

☐ Open a web browser and go to the following address:
http://www.tsl.state.tx.us.

☐ Search for **"Alamo"**.

☐ Find an image on one of the resulting pages. Right-click the image and open the properties to copy the URL of the image to your clipboard.

☐ Return to ArcGIS Explorer Online.

☐ In the Edit Pop-up window:
- For the Image URL field, paste in the URL that you copied.
- Be sure to add the following: **Photo source: Texas State Library - www.tsl.state.tx.us**
- Click OK.

☐ When you finish editing the pop-up, click Done on the toolbar.

☐ Click the feature to see your edits to the pop-up window.

☐ Find an image of San Fernando Cathedral or General Antonio Lopez de Santa Anna and add it to the pop-up for the San Fernando Cathedral.

A question about video and pop-ups: Will video work in a pop-up? It will as long as you have a URL to the video. It will be represented as a hyperlink in your pop-up and most browsers will play the video in a new tab.

Step 5: Create a presentation

Presentations are a great way to explore and ask questions about the geography and features in the map. They are also a great way to communicate important information to others. A map can contain a collection of slides that can be stepped through as a presentation so you can review important information or to present to others.

☐ Click the Presentation tab.
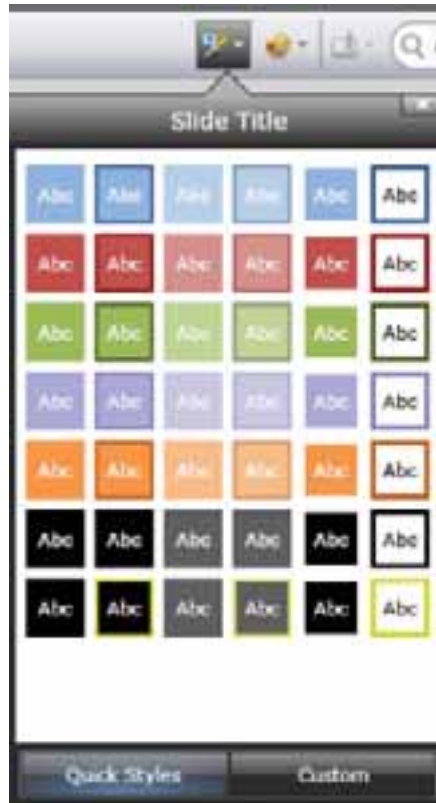
☐ Click where it says "Click to add the first slide."

☐ Pan/zoom to the area that you want to represent on the first slide.

> ! **The unlock/lock icon in the upper-right corner will lock the extent while using presentation mode. You can still navigate using bookmarks during a presentation. By default, slides are set to be unlocked.**

☐ Click where it says "Click to add title" and add a title of your choice.

☐ Click Format Slide Title (as indicated below) and change the slide formatting. Use either one of the Quick Styles or pick Custom to change fonts, size, color, and more.

☐ Click the New Slide button 🔲 to add a new slide.

A new slide is added to the Slide Strip at the bottom of the browser page.

☐ Continue to add several slides and slide titles to your presentation. You can re-order the slides by selecting them in the Slide Strip and dragging and dropping them in the order that you would like them to be.

☐ When all your slides are done and ready for presentation, click the Start Presentation button 🔲.

> *Note:* If you would like your presentation to play automatically, use Presentation Options to set up the presentation to automatically advance based upon a time setting.

☐ If the Microsoft Silverlight warning appears, click Yes.

> *Note:* To exit out of full screen mode during a presentation, press the ESC key.

☐ Use the navigation bar at the bottom of the browser window to navigate back and forth between and to slides.

☐ Play your presentation and interact with your features using your mouse.

Step 6: Save your map

When working with ArcGIS Explorer Online or ArcGIS Explorer Desktop, you can share your maps, notes, and presentations with others by having an Esri Global Account registered with ArcGIS.com. In this step, you will create and/or register an Esri Global Account.

> *Note:* If you do not register an Esri Global Account today, you will not be able to save your work to finish later.

☐ If you have NOT already registered an Esri Global Account to use ArcGIS.com:

- Open a browser and go to: **http://www.arcgis.com**.
- In the upper-right corner of the web page, click Sign In.
- If you do not have an Esri Global Account:
    - Click *Create an account*.
    - On the Create a New Esri Global Account page, complete the form using a valid e-mail address. You will need to validate the email address before continuing.
    - When the process is complete, you will be notified that you must confirm your e-mail address to activate your account. (In your e-mail account, open the e-mail sent by accounts@esri.com, and click the link embedded in the message to complete your registration.)
    - Return to the Sign In page on www.arcgis.com.
- Click *Register your Esri Global Account*.
- On the next screen, enter your Username and Password and click Register.
- Read and accept the Terms of Use. You will then be prompted to fill in basic information about your profile.

You are now able to save resources to ArcGIS.com.

☐ Return to your ArcGIS Explorer Online browser window, if necessary.

□ Click the Save button.

□ In the Sign In dialog box, enter your Username and Password and click Sign In.

□ Complete the Save Map dialog box and click Save.

Step 7: Use ArcGIS Explorer Desktop to analyze the toxic spill in Hungary

A reservoir at an alumina factory in Hungary burst in early October 2010, causing a toxic torrent of water to flow through villages and creeks. Ten people on site and in hospitals died; fish and other life in rivers died; 300 homes were destroyed; and livelihoods were deeply affected. Yet from a spatial perspective, we all know that the problem did not end with the immediately adjacent villages and rivers. The water had to flow somewhere, but where? Your task is to use GIS to analyze the temporal and spatial extent and implications of this event to better understand this and other chemical spills.

□ Open ArcGIS Explorer Desktop.

ArcGIS Explorer Desktop uses the Ribbon interface similar to Microsoft Office. To find out what a tool does, you can hover your mouse over a tool to expose a ToolTip that describes what the tool does.

□ Take a moment to familiarize yourself with the tabs and tools located on the Ribbon.

□ On the Home tab, in the Map group, click Add Content (as indicated below) and choose Map Content Files.

□ Browse to C:\2011_EdUC\TeachingArcGISExplorer and open the Location of Hungary Toxic Flood October 2010 .nmc file.

You can navigate in the map using several techniques:

- Keyboard—using keyboard shortcuts, such as "A" to move left, "D" to move right, "W" to move forward, and "S" to move back. (The ArcGIS Explorer Help has a layout of a keyboard that shows all the shortcut keys that aid in navigation.)
- Mouse
- Navigation Control—using your mouse, you can zoom in/out, change the tilt, etc.
- Navigate with a game controller.

Step 8: Conduct your investigation

In this step, you will explore content stored in notes, using tools to measure, and other analysis tools. Notes allow you to represent features in the map with geometry (e.g., point, line, or polygon) and at the same time provide information in a easily consumable manner. Notes can have enhanced capabilities with the use of HTML and JavaScript. Tools such as the Measure tool and Buffer tool answer questions like "How far away?" or "What's nearby based upon a distance?"

☐ Examine the link to the CBS News Article and the TIME magazine article about the spill.

Question 5: What is being manufactured here, the by-product of which was spilled into the water? What specific by-product was spilled into the water?

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Question 6: What are at least three substances that are in the red sludge that makes it toxic?

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Question 7: How much volume was spilled?

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☐ Click Basemap (as indicated below).

☐ Change your basemap from the satellite image and examine other types of maps.

Question 8: In what part of Europe did the spill occur?

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Question 9: In what part of Hungary did the spill occur?

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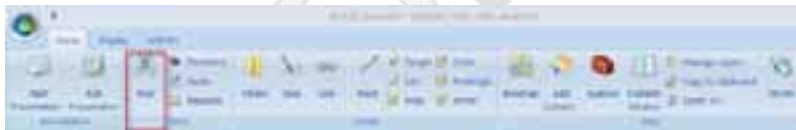☐ Open the CBS News Article note again.

☐ In the lower-right corner of the pop-up window, click the Edit Pop-up button 🔵 to see and edit the content for this note.

Question 10: What type of content is in this pop-up?

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☐ Explore the other Notes and look at the formatting to see how images are displayed inside of a note.

> *Note:* The images are displayed using the HTML tag `<img src>`.

☐ Use the Find tool (as indicated below) and search for the town of Ajka.

> *Note:* The Find tool can use places, lat/long, addresses, or grid coordinates.

☐ Click the Point tool (as indicated below).

☐ Create a note in the Contents window and a feature in the map. For the title, type **Ajka**.

> ❗ **Don't click OK just yet.**

☐ In a browser window:

- Do a Google search for **"Ajka sludge wiki"**.
- Open the wikipedia article for this search term.
- Copy the address from the address bar.

☐ Return to ArcGIS Explorer and paste the address into the note field.

☐ Click OK to preview your note.

Question 11: What three villages are closest to and immediately downstream from the spill?

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Question 12: How far does the toxic sludge travel in the Marcal River before reaching the Danube? (*Hint*: Use the Measure tool)

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Question 13: If the Marcal River flows at 10 km/hour, how long before it reaches the Danube River which is the Hungary's northern border?

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☐ Use the Find tool to search for the city of Gyor.

☐ Change your basemap to Bing Maps Aerial.

In the north-west/central part of the city, the Mosoni River and the Marcal River merge.

☐ Pan to this area.

☐ On the Home tab, in the Map group, click Analysis and choose the Buffer point tool.

> *Note:* ArcGIS Explorer includes a wide range of out-of-the box functionality that allows you to explore and ask questions about the geography in your map. It is possible to increase the range and complexity of questions you can ask by using tools within the Analysis Gallery. The Analysis Gallery contains tools that offer a greater level of analytical capability by applying GIS operations to manipulate spatial data. Additional analysis tools include geoprocessing services that are published to ArcGIS Server and are designed to run in clients like ArcGIS Explorer Desktop.

☐ In the Buffer Point dialog box:

- Set the location to buffer at the confluence of the Mosoni and Marcal rivers.
- Set the distance to 1 kilometer.
- Click Run.

Note: The buffer tool runs based upon inputs provided by the user and is processed on an ArcGIS Server. The results are then displayed back to the client.
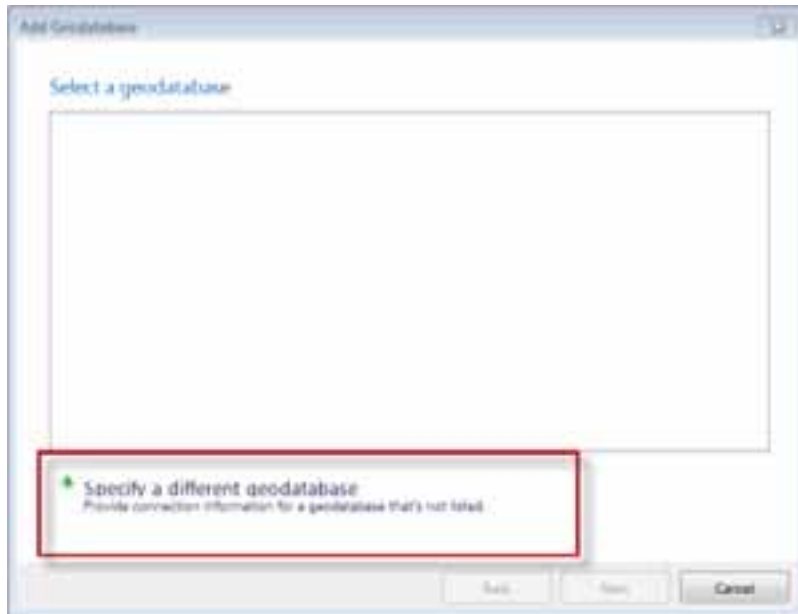
Question 14: Looking at the aerial image in the basemap, what type of zoning does this area represent in the 1 km buffer and would you need to be concerned about exposure to the sludge?

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Step 9: Add other data sources

An ArcGIS Explorer Desktop map can contain data not only from servers but also from sources that you have on your local machine or network. The content can include ArcGIS Online content, layer files and packages, shapefiles, geodatabase data, KML, text files, and GPS data files to name a few.

☐ Click Add Content and choose Geodatabase Data.

☐ Click *Specify a different geodatabase* (as indicated below).

☐ Browse to C:\2011_EdUC\TeachingArcGISExplorer\HungaryHydrology.gdb.

☐ Verify that the Geodatabase type is set to a File Geodatabase and click Next.

☐ Add the Streams_Hungary and DanubeRiver feature classes.

☐ Right-click each layer to change the symbology to a light blue line. Give the Danube River a thicker line to represent a major river. (After all, it is Europe's second longest river.)

☐ Click Add Content and choose ArcGIS Layers.

☐ Navigate to C:\2011_EdUC\TeachingArcGISExplorer and open the AffectedCountries.lpk layer package.

> *Note:* A layer package saves both the layer properties and the dataset referenced by the layer.

☐ Save the map as **Hungary_toxic_spill_<my_name>.nmf** in C:\2011_EdUC\TeachingArcGISExplorer.

Step 10: Create a presentation

Presentations created in ArcGIS Explorer Desktop are created very much in the same manner as before in ArcGIS Explorer Online. In ArcGIS Explorer Desktop, the presentation slides are stored within the map along with the content. When creating slides, it is a snapshot of the state of the map. You can change the basemap, viewing angle, layers turned on/off, and include any pop-up windows in the slide.
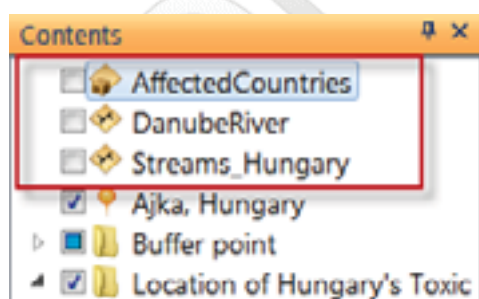
☐ In the Contents window, right-click the Ajka note and choose Go To.

☐ On the Home tab, in the Presentation group, click Edit Presentation.

☐ Pan and zoom in/out until you see the town and the ponds that contain the sludge.

☐ Uncheck the following layers: DanubeRiver, Streams_Hungary and AffectedCountries.

☐ On the Presentation tab, in the Slide Title group, click Edit Text.

☐ In the Slide Title Text dialog box, type **Ajka—the beginning of the spill**.

☐ Using the Quick Styles gallery and/or the various controls in the Presentation tab's Title Format group, modify the format of the slide to be captured.

☐ After you finish adjusting the title, layers turned on/off, and the zoom/pan, click Capture New Slide.

The slide is added to the Slides window.

☐ Turn on the DanubeRiver, Streams_Hungary, and AffectedCountries layers.

☐ Zoom out to an area where you can see the Danube River flowing through the affected countries.

☐ Click Edit Text and change the title to **Affected Countries**.

☐ Create a new slide.

☐ Create several more slides for each of the notes in the Contents window. Be sure to change the following before capturing a new slide:

- Turn layers on/off as needed.
- Zoom in/out and/or pan to capture the area you want in the slide.
- Include any pop-up windows.
- Change the basemap as needed (e.g., change the basemap to Bing Maps Aerial to show Gyor and the buffer of 1 km).

☐ When you are ready to view the presentation, click From Beginning or From Current Slide.

> *Note:* If you are not editing or creating a presentation, you can start a presentation from the Home tab using Start Presentation.

Conclusion

In this lesson, you looked at the capabilities of ArcGIS Explorer Online and ArcGIS Explorer Desktop to help with teaching and learning the content. The focus for this lesson was on the ease of use of bringing the content into the place of "where" for students to grasp a better understanding of the scope and spatial extent of a lesson or topic.

ArcGIS Explorer Online provides an easy web-based on-ramp to use in class for student presentations or making content more engaging in the learning process. ArcGIS Explorer Online is also an excellent collaboration tool with its create features tool and pop-ups, finding content in ArcGIS.com or on the web, and the ability to share a map with anyone that has access to the web.

ArcGIS Explorer Desktop gives additional functionality like adding other content from a server, network, or a local machine. It also offers the functionality to do analysis by the use of publishing geoprocessing services to answer questions like "What's nearby?" and "What's on top of what?" ArcGIS Explorer Desktop sharing capabilities go beyond just a URL—maps can be shared as well as specific content created in the map.

By adding ArcGIS Explorer to the set of tools used in the classroom, student's learning can be changed by how they interact and use information.

Answers to Exercise 1 Questions

Question 1: Now that you have found the Alamo, what do you notice about its location in the city of San Antonio? How does this compare to television and movies that show the Alamo?

Answer: The area surrounding the Alamo is well-developed with buildings and streets. Most visitors are surprised that the Alamo is located in downtown San Antonio.

Question 2: What role do you think the San Antonio River plays in locating the Mission here?

Answer: Initially, the Mission was built as an outreach to the Indians in the area. They initially grew maize and other crops suitable for this area.

Question 3: Using the Measure tool 📏, how far away from the Alamo is San Fernando Cathedral?

Answer: Approximately 0.5 mile

Question 4: What was the original purpose for these missions including the Alamo? (*Hint*: Visit http://www.nps.gov/saan/index.htm to find out)

Answer: The Spanish originally built the missions in Texas as a deterrent to French expansion, to claim land for Spain, and to convert the indigenous people to become citizens of Spain. In order to become a citizen of Spain, they had to be Catholic. (Source: NPS.gov.)

Question 5: What is being manufactured here, the by-product of which was spilled into the water? What specific by-product was spilled into the water?

Answer: Alumina is being manufactured here, and its by-products in the manufacturing process were spilled into the water.

Question 6: What are at least three substances that are in the red sludge that makes it toxic?

Answer: The 3 substances that are in the red sludge that makes it toxic include arsenic, cadmium, and lead.

Question 7: How much volume was spilled?

Answer: An estimated 35 million cubic feet, or one million cubic meters, were released.

Question 8: In what part of Europe did the spill occur?

Answer: The spill occurred in east-central Europe.

Question 9: In what part of Hungary did the spill occur?

Answer: The spill occurred in west-southwest Hungary.

Question 10: What type of content is in this pop-up?

Answer: A URL to the CBS News article. Notes can be simply a text description with a title, a URL or even more. See the help for more ways notes can be done.

Question 11: What three villages are closest to and immediately downstream from the spill?

Answer: The three villages immediately downstream from the spill are Kolontar, Devecser, and Somlovasarhely.

Question 12: How far does the toxic sludge travel in the Marcal River before reaching the Danube? (*Hint*: Use the Measure tool)

Answer: Approximately 100-120 km

Question 13: If the Marcal River flows at 10 km/hour, how long before it reaches the Danube River which is the Hungary's northern border?

Answer: If the Marcal River flows at 10 kilometers per hour, the Danube is about 100 km from the toxic source. It took 100 km/10 = 10 hours for the toxic water to reach the Danube.

Question 14: Looking at the aerial image in the basemap, what type of zoning does this area represent in the 1 km buffer and would you need to be concerned about exposure to the sludge?

Answer: Based upon the buildings, it looks mostly commercial and residential and exposure can be higher in these areas versus other zoning types like industrial or agricultural.