LEVEL 2

Steel City: Coal Power

from the Esri GeoInquiries™ collection for U.S. History

Target audience – U.S. history learners **Time required – 15 minutes**

Activity	Explore the factors that contributed to cities in 1890 becoming "steel cities" through location of steel smelters and coal mines.
Social Studies Standards	**C3: D2.His.14.9-12.** Analyze multiple and complex causes and effects of events in the past. **C3: D2.His.1.9-12.** Evaluate how historical events and developments were shaped by unique circumstances of time and place, as well as broader historical contexts.
Learning Outcomes	• Students will compare and contrast numbers of mines versus volume of production of coal mines relative to region. • Students will identify steel smelters receiving the highest volumes of coal from mines.
Level 2 GeoInquiry Requirements	• A free school ArcGIS Online organization account. Instructors or students must be signed in to the account to complete this activity. • Approximately 1.3 credits will be used per person in the completion of this activity as scripted.

Map URL: http://esriurl.com/historyGeoinquiry8

Ask

Where were coal mines relative to steel smelters?

- Click the link above to launch the map.
- In the upper-right corner, click Sign In. Use your ArcGIS Online organization account to sign in.
- Click the button, Bookmarks. Select Heart Of Industrialization.
- With the Details button underlined, click the button Show Contents of Map (Content).
- Turn on only the three layers: Smelters, Buffer of Smelters, and Coal Mines.
- ? Which area on the map do you think has the most coal mines closest to smelters? *[Virginia/Tennessee border]*

Acquire

How can you use tools to help analyze a large amount of data?

- See the Aggregate Points ToolTip on the next page.
- Click button, Analysis. Choose Summarize Data. Select Aggregate Points.
- In the Summarize Data tool, set the following values in the corresponding numbered section:
  1. Click the down arrow and choose Coal Mines.
  2. Set the layer to Polygon, and then from the drop-down list, choose Buffer of Smelters. Uncheck the Keep Areas With No Points check box.
  3. From the drop-down list, choose tot_prod.
  3. From the drop-down list, choose Sum.
  5. Leave the Use Current Map Extent check box checked so that you will only compute mines in the map view. Always click Show Credits to ensure acceptable credit usage, and then click Run Analysis.

Explore

Where were coal mines within 50 miles of a smelter?

- In the Contents pane, turn off the layer, Buffer of Smelters.
- For the newly created CoalMines_xxxx layer, click the button Show Legend.
- ? Which smelters had the most mines within 50 miles? *[Smelter on Virginia/Tennessee border.]*
- ? Which smelters had the next most mines within 50 miles? *[The smelters in Pennsylvania, east Ohio, and Missouri.]*

more ▶

Analyze

Was production within a 50-mile radius equal amongst smelters?

- → On the map, click the largest purple dots.
- ? How many coal mines are at the largest dot located on the border of Tennessee and Virginia? *[265]*
- ? How many coal mines are at the next largest dots? *[Eastern Pennsylvania: 60, 54; Western Pennsylvania/ Eastern Ohio: 56, 50; Missouri: 43]*
- ? Between the four largest areas with the most mines close to smelters, what is your hypothesis of who transferred the most coal to the smelters? *[The Tennessee/Virginia smelter received the most coal.]*

Act

Were all coal mines equal?

- → Move the map so that the buffered mines are not hidden behind the table.
- → In the Contents pane, for the layer, CoalMines_REED_ABC1. Click the Show Table button.
- → Click the Sum tot_prod column name. Choose Sort Descending.
- → Click the first entry in the table, which now indicates the top producing coal mine.
- ? Where is that mine highlighted in the map, and how much did it produce? *[Eastern Ohio: 72,649,463 tons]*
- ? Which smelter received the most coal from nearby mines? *[106 Pennsylvania/Ohio coal mines produced 100 million tons compared to 256 Tennessee/Virginia mines producing 51 million tons.]*

VIEW A TABLE

- Tables are only available for certain map layers.
- In the Contents pane, point to a layer and click the Show Table button that appears under the layer name.
- Click the field name and choose Sort Ascending or Sort Descending.

AGGREGATE POINTS

- Provides a count of the points in a defined area.
- The result layer name must be unique, so consider adding three initials, school code, and a number after the layer name (example: FileName_REED_ABC1).

Next Steps

DID YOU KNOW? ArcGIS Online is a mapping platform freely available to public, private, and home schools. A school subscription provides additional security, privacy, and content features. Learn more about ArcGIS Online and how to get a school subscription at http://www.esri.com/schools.

THEN TRY THIS...

- Add IronOreMinesUS to the map and Aggregate Points as you did with coal mines. Is there a correlation between location of coal and iron ore mines?
- Try the Analyze Patterns, Hot Spot Analysis tool to see if there is any significant clustering of either the coal mines or the iron ore mines to each other.

TEXT REFERENCES

This GIS map has been cross-referenced to material in sections of chapters from these high school texts.

- *The Americans by McDougal Littell — Chapter 14*
- *America: Pathways to the Present by Prentice Hall — Chapter 10*

Version Q2b 2018. Send feedback: http://esriurl.com/GeoInquiryFeedback