Science

1. What type of uranium enrichment process is used at the PGDP?

1. Laser
2. Centrifuge
3. Gaseous diffusion
4. Electromagnetic separation
5. Thermal diffusion

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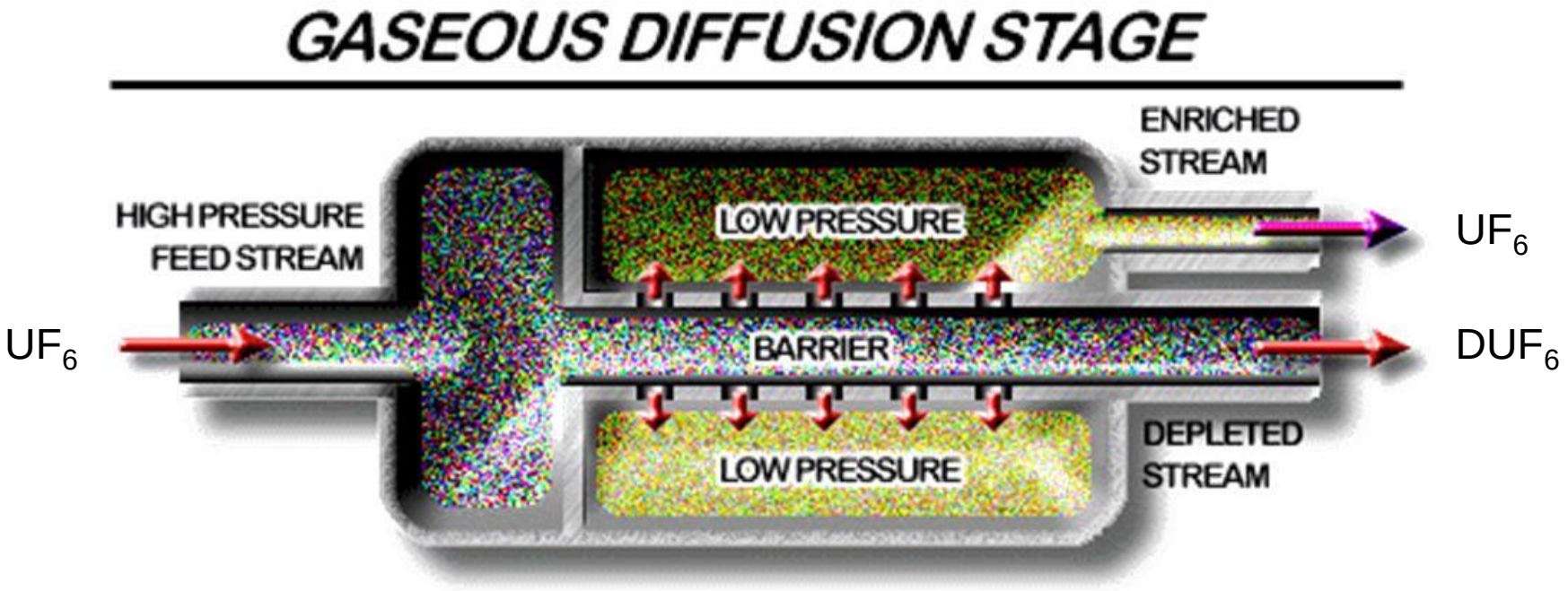

This process of uranium enrichment increases the concentration of U-235 from 0.7% up to 5.0%

http://www.usec.com/gaseousdiffusion.htm

PGDP has 1,760 enrichment stages

2. According to the Kentucky Geological Survey, the PGDP site is located in what earthquake (seismic) zone?

1. The Big Foot Lake Seismic Zone
2. The New Madrid Seismic Zone
3. The Wabash Valley Seismic Zone
4. In between the New Madrid and Wabash Valley Seismic Zones
5. In between the New Madrid and Big Foot Lake Seismic Zones

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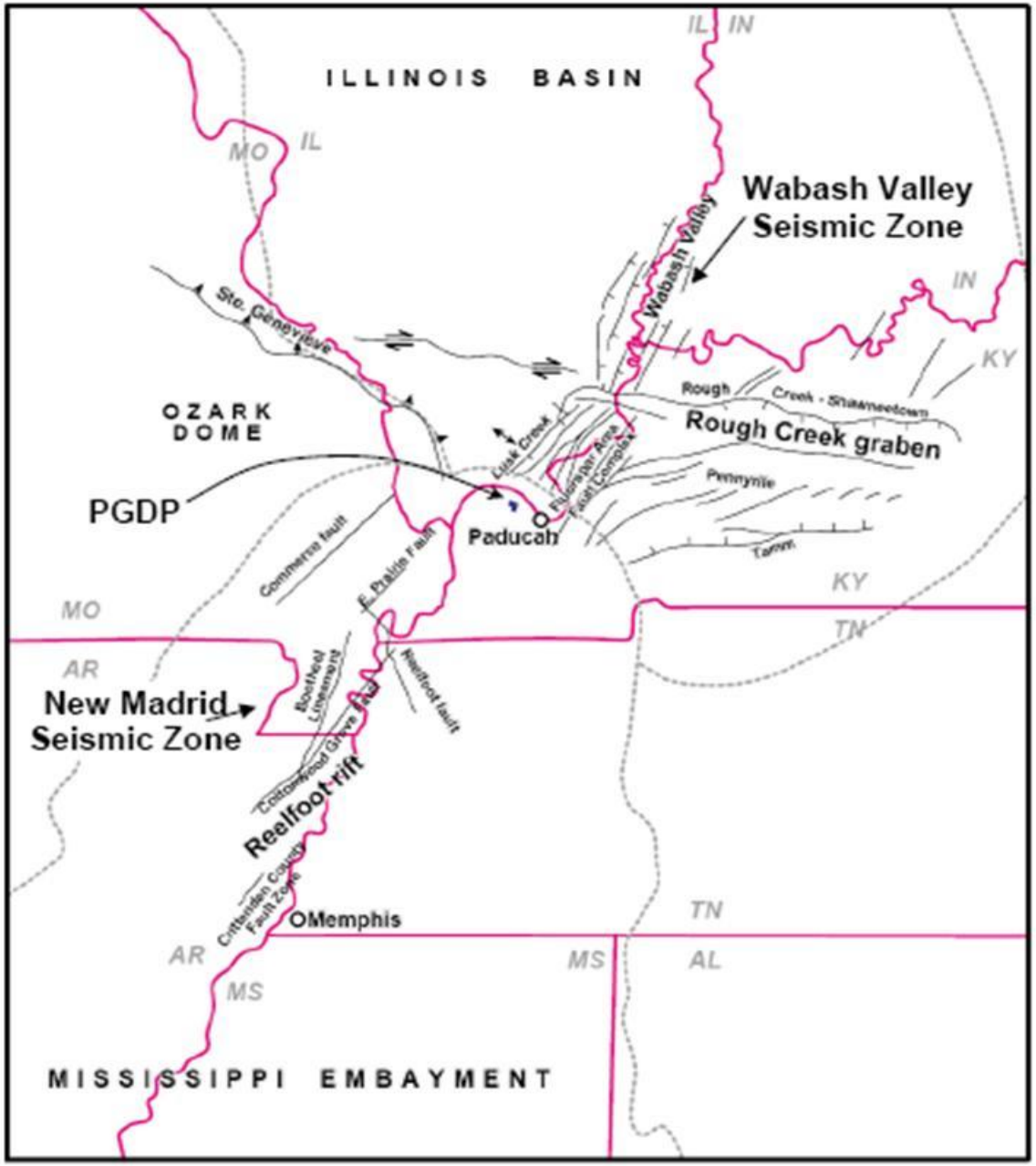
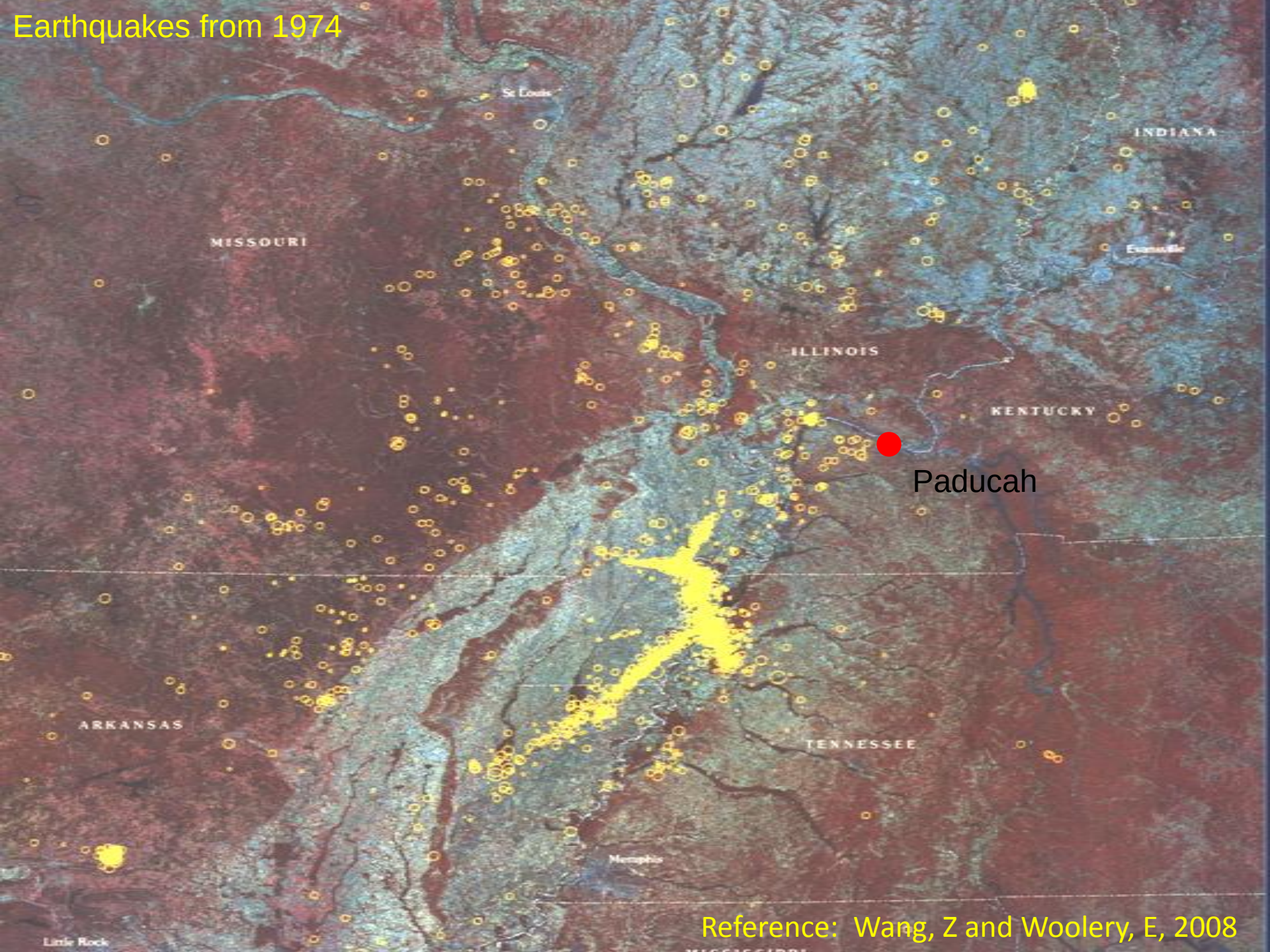


Kolata, D., Treworgy, J., Master, J., 1981. Structural framework of the Mississippi embayment of southern Illinois. III. St. Geol. Surv. Circ. 516, pp. 2 – 19.


Earthquakes from 1974
St Louis
INDIANA
MISSOURI
ILLINOIS
KENTUCKY
Paducah
ARKANSAS
TENNESSEE
Memphis
Little Rock
Reference: Wang, Z and Woolery, E, 2008

3. Which of the following statements about Technetium 99 is true?

1. It is produced in nuclear reactors
2. It is an atomic element with atomic number 43 on the periodic table
3. Its name comes from the Greek word meaning artificial
4. It is radioactive and has a half-life of 211,000 years
5. All of the above

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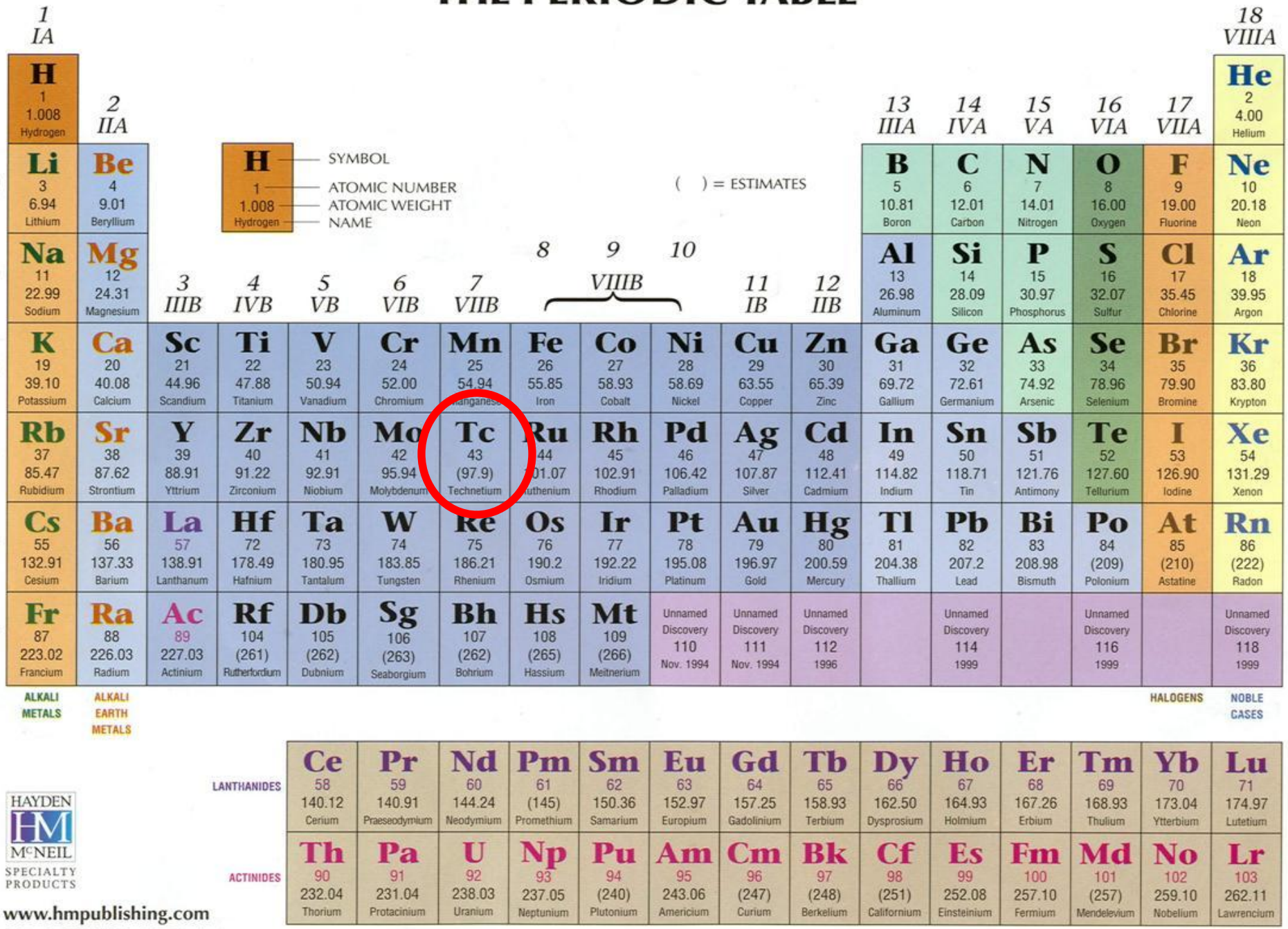
THE PERIODIC TABLE



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4. What keeps contaminated groundwater from moving south of the PGDP?

1. Nothing
2. DOE pump and Treat Facilities
3. Porters Creek Clay Geologic Formation
4. Large impervious area within the DOE property boundary
5. Forest

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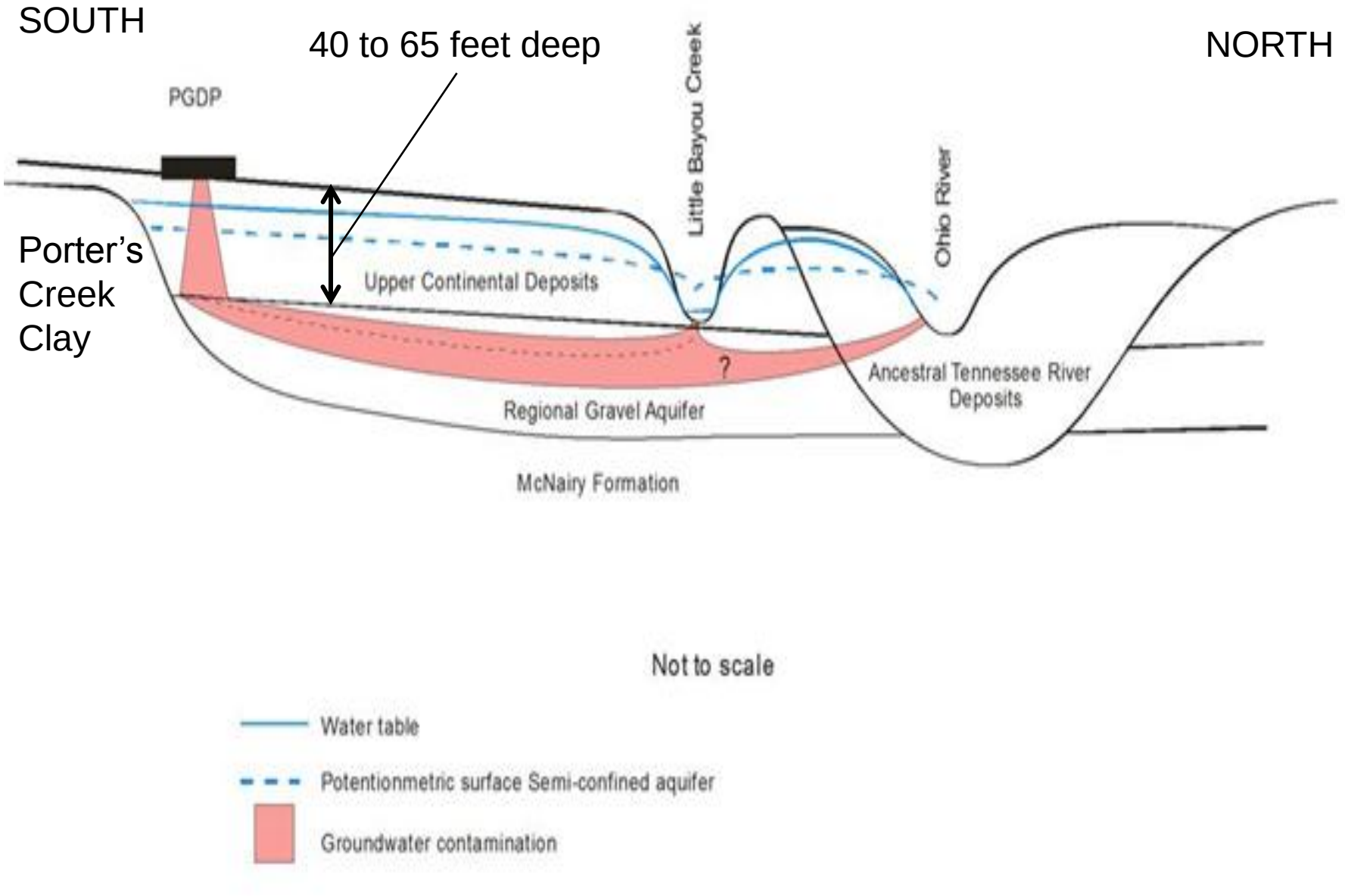
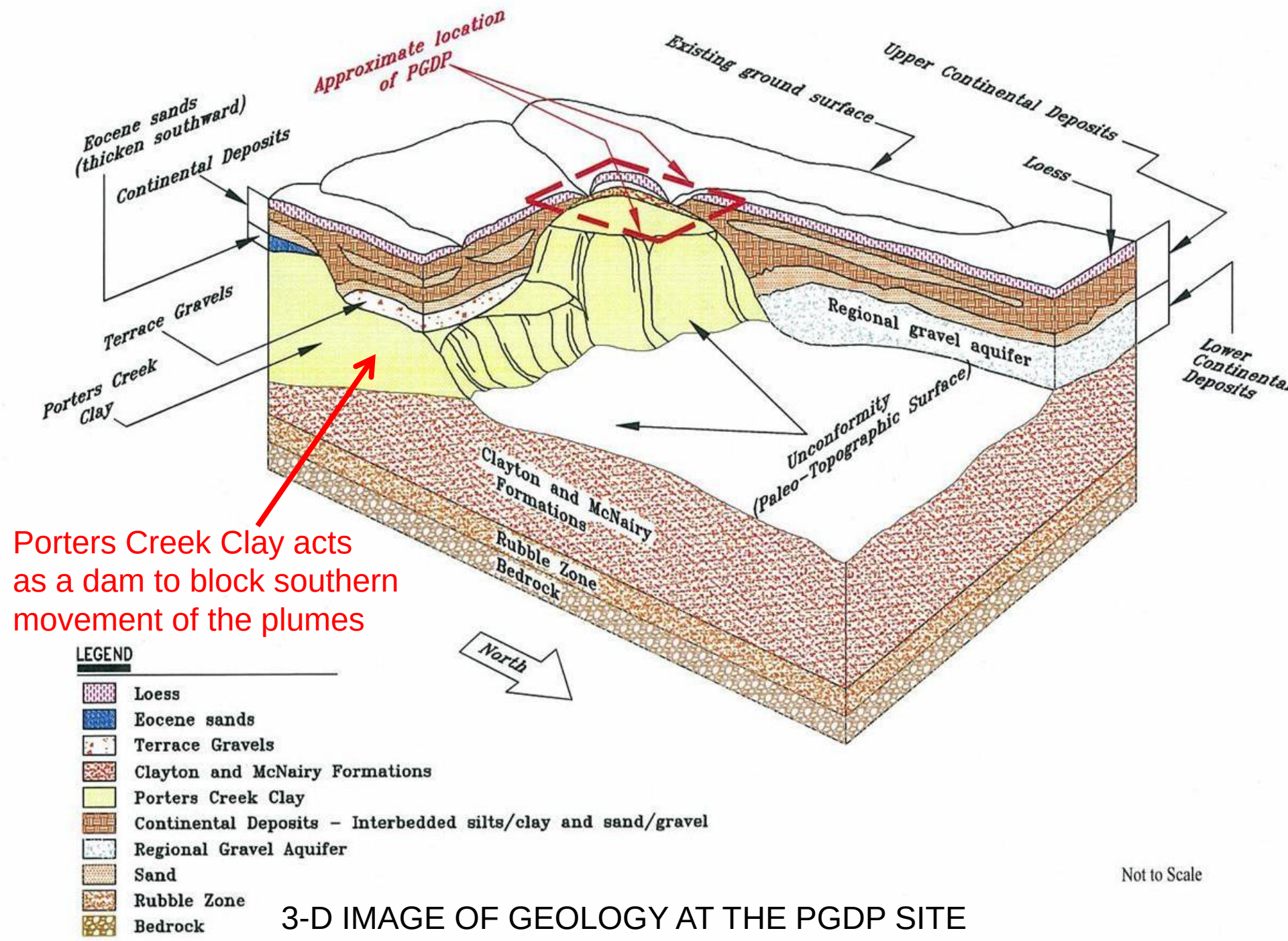
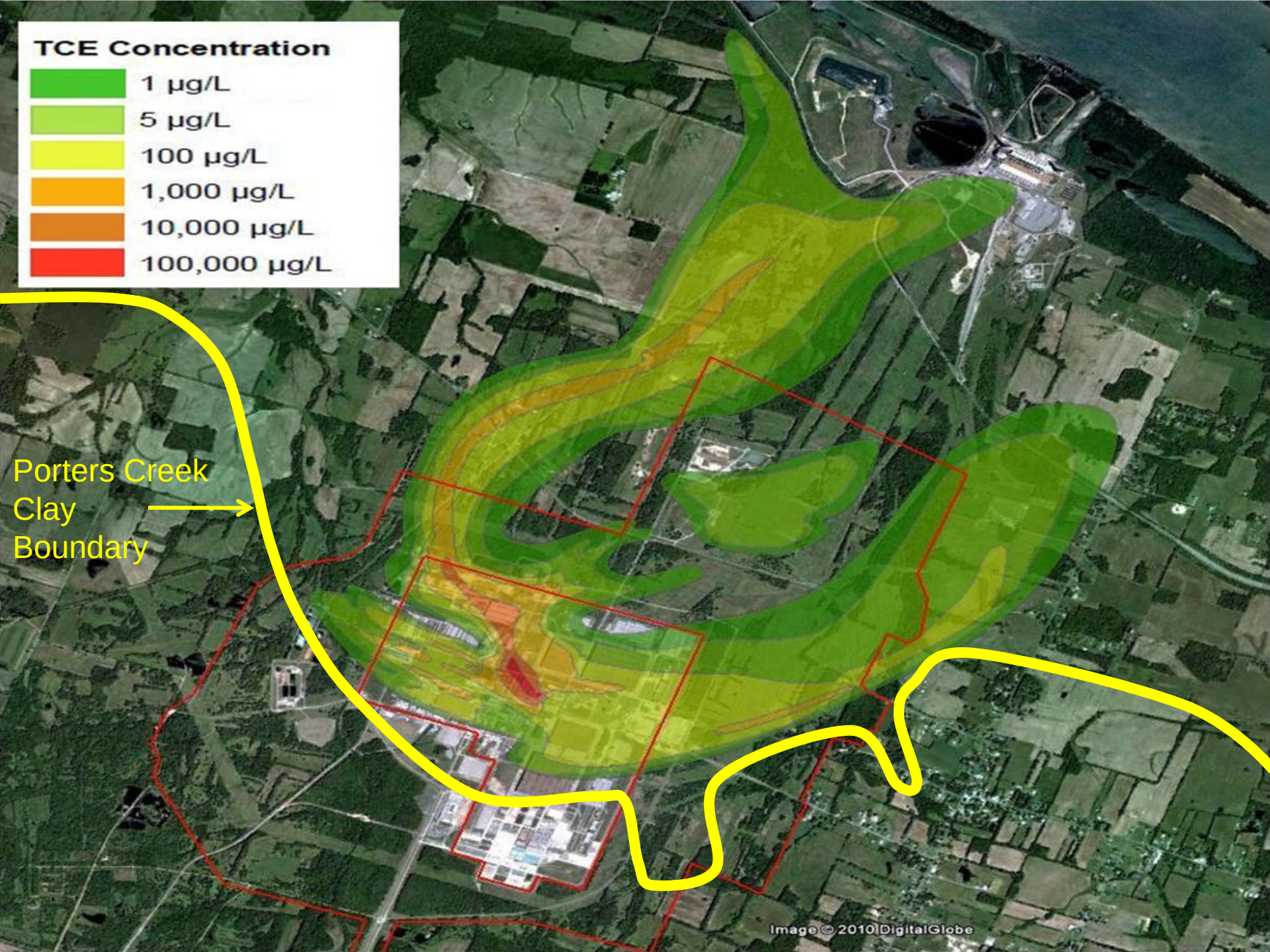


CROSS SECTION OF GEOLOGY AT THE PGDP SITE

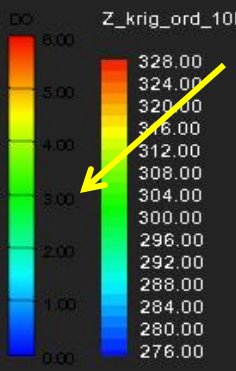


Porters Creek Clay acts as a dam to block southern movement of the plumes

3-D IMAGE OF GEOLOGY AT THE PGDP SITE


TCE Concentration
1 µg/L
5 µg/L
100 µg/L
1,000 µg/L
10,000 µg/L
100,000 µg/L
Porters Creek
Clay
Boundary
Image © 2010 DigitalGlobe

KRCEE FFY 09-10 Project Status



The darker the color, from red to blue, the deeper it is to the underlying impervious layer

McNairy in blue

This image shows the depth from the surface to the underlying impervious boundary – either the Porters Creek Clay which is relatively shallow, or the McNairy formation which is much deeper

The southern part of the plant sits over a relatively shallow clay, while the northern part of the plant protrudes out the much deeper groundwater aquifer

Porters Creek Clay in red

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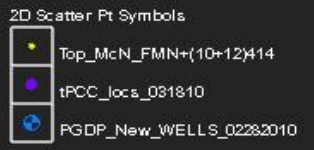
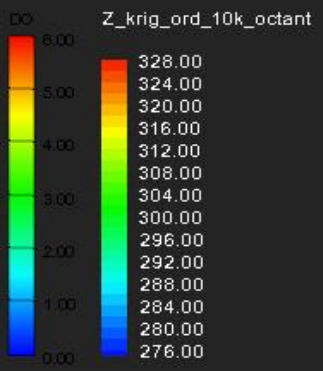
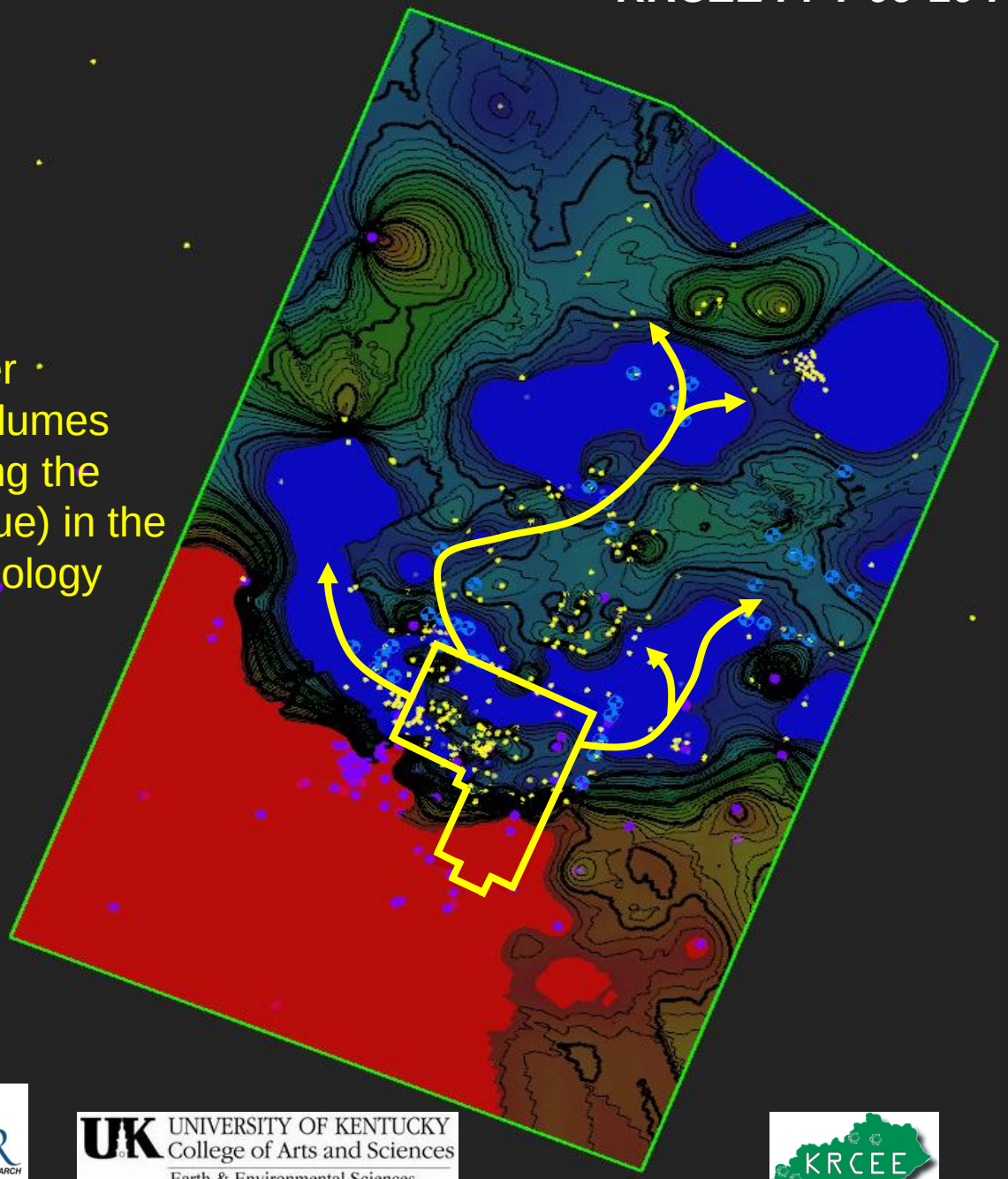


KRCEE FFY 09-10 Project Status



The groundwater contamination plumes tend to flow along the lowest spots (blue) in the Groundwater geology



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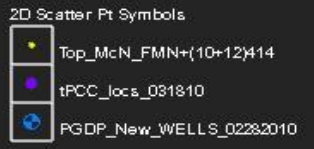

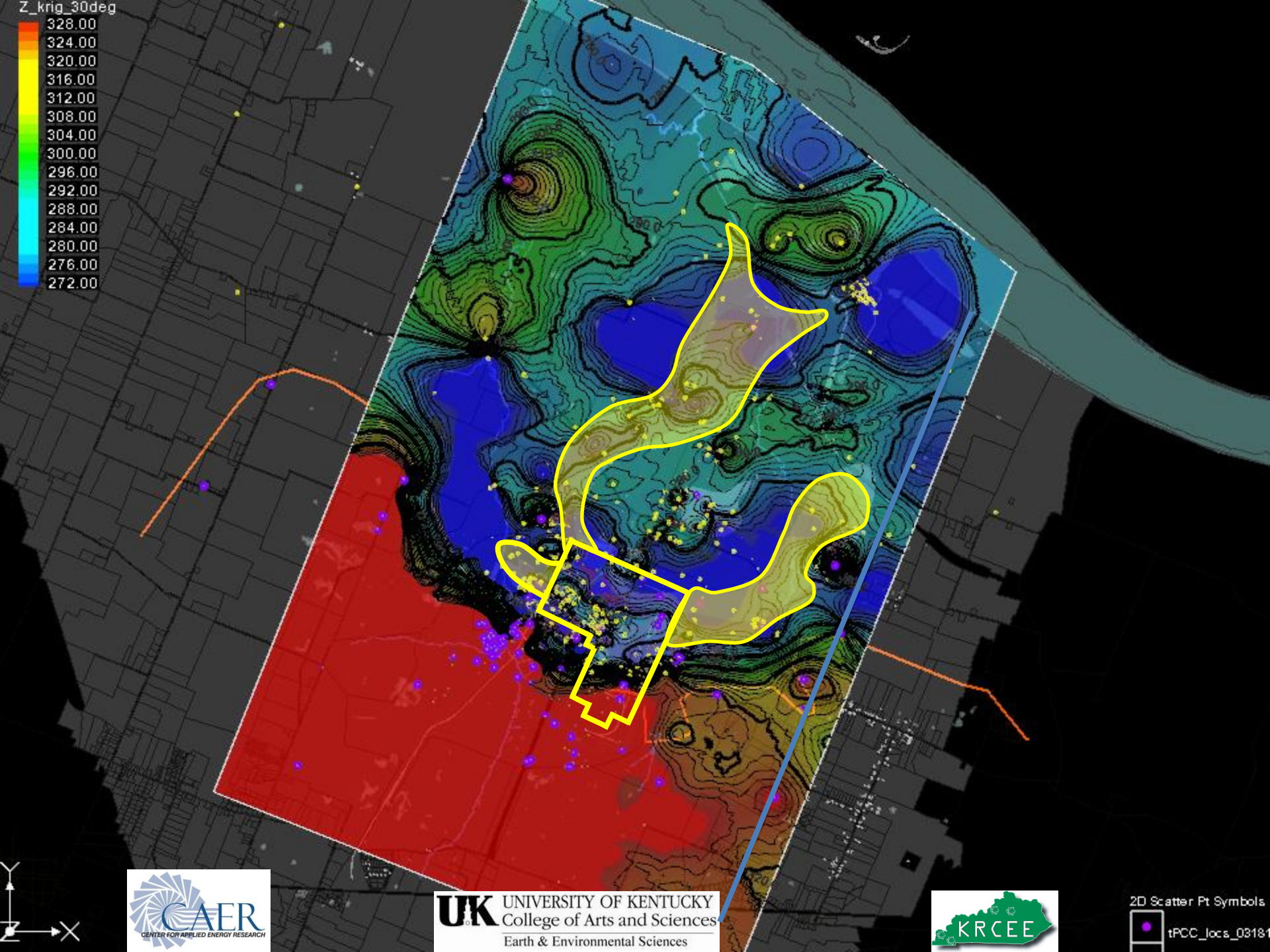
Z_krig_30deg
328.00
324.00
320.00
316.00
312.00
308.00
304.00
300.00
296.00
292.00
288.00
284.00
280.00
276.00
272.00
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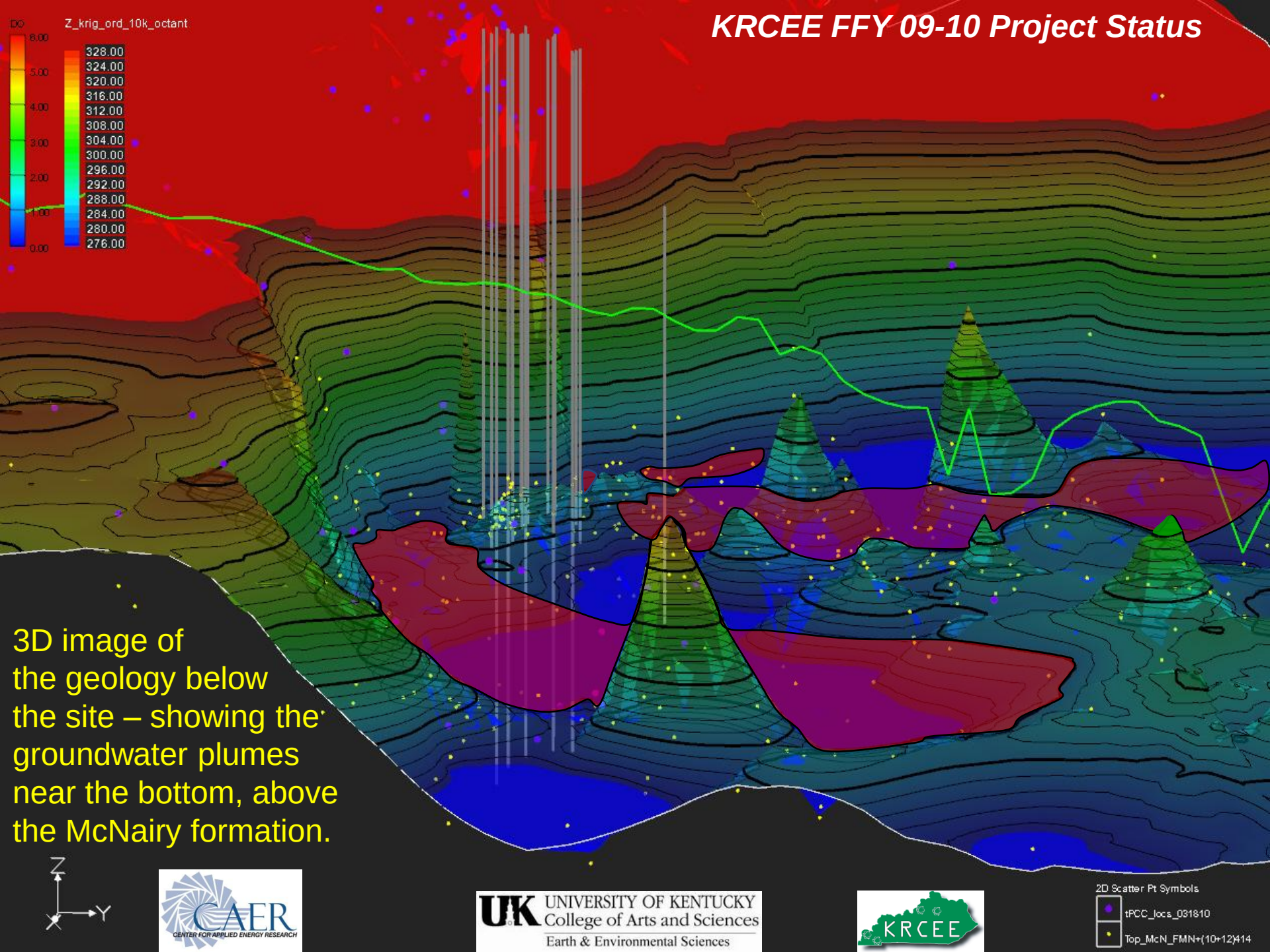

3D image of the geology below the site – showing the groundwater plumes near the bottom, above the McNairy formation.

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5. According to the National Renewable Energy Lab, areas with annual average wind speeds around 6.5m/s and greater at 80-m height are generally considered to have suitable resources for wind development. The average such wind speeds around the PGDP are?

1. 2 to 3 m/s
2. 3 to 4 m/s
3. 5 to 5.5 m/s
4. 6 to 7 m/s
5. 8 to 9 m/s

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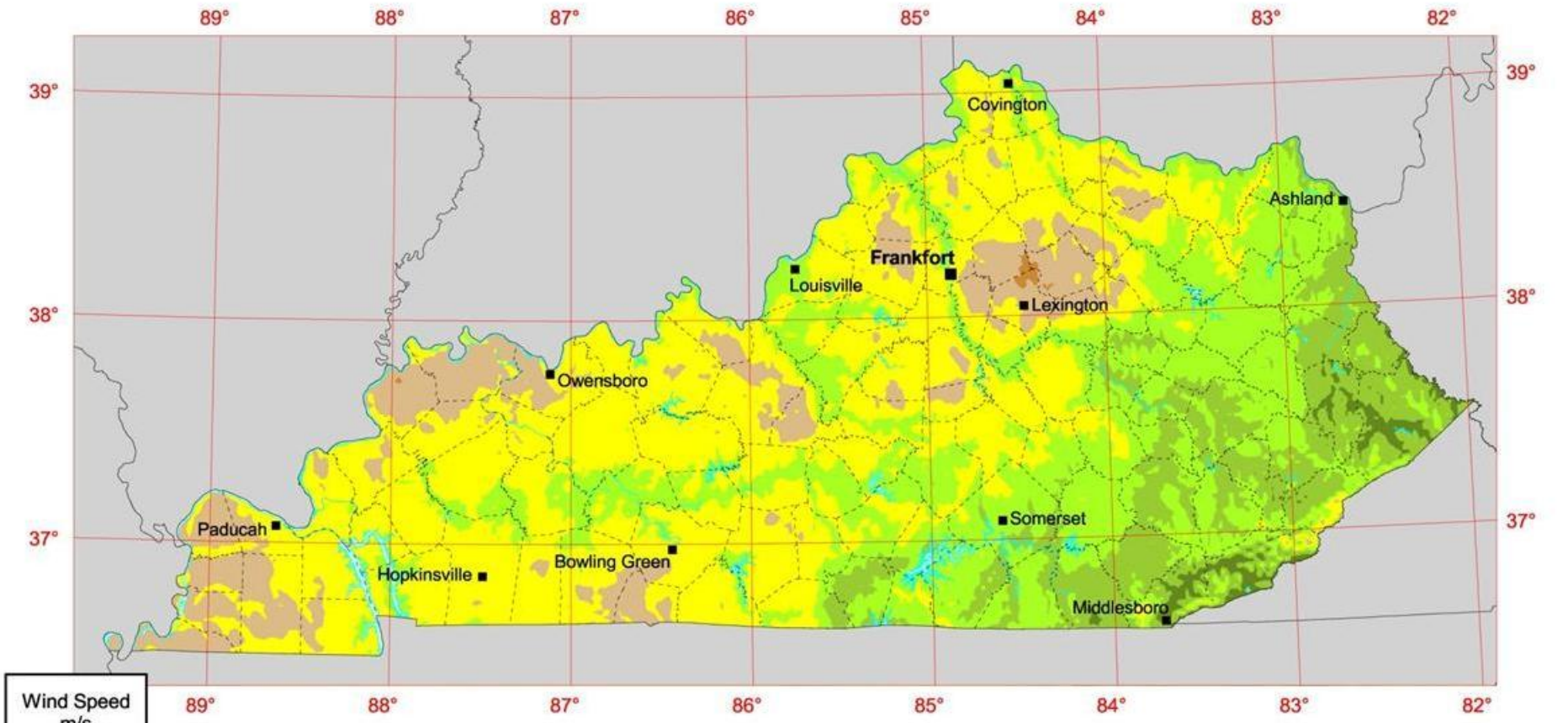
Kentucky - Annual Average Wind Speed at 80 m



Wind Speed m/s

- > 10.0
- 10.0
- 9.5
- 9.0
- 8.5
- 8.0
- 7.5
- 7.0
- 6.5
- 6.0
- 5.5
- 5.0
- 4.5
- 4.0
- < 4.0

50 0 50 100 150 Kilometers

25 0 25 50 75 100 Miles

Source: Wind resource estimates developed by AWS Truewind, LLC for windNavigator®. Web: http://navigator.awstruewind.com | www.awstruewind.com. Spatial resolution of wind resource data: 2.5 km. Projection: UTM Zone 16 WGS84.

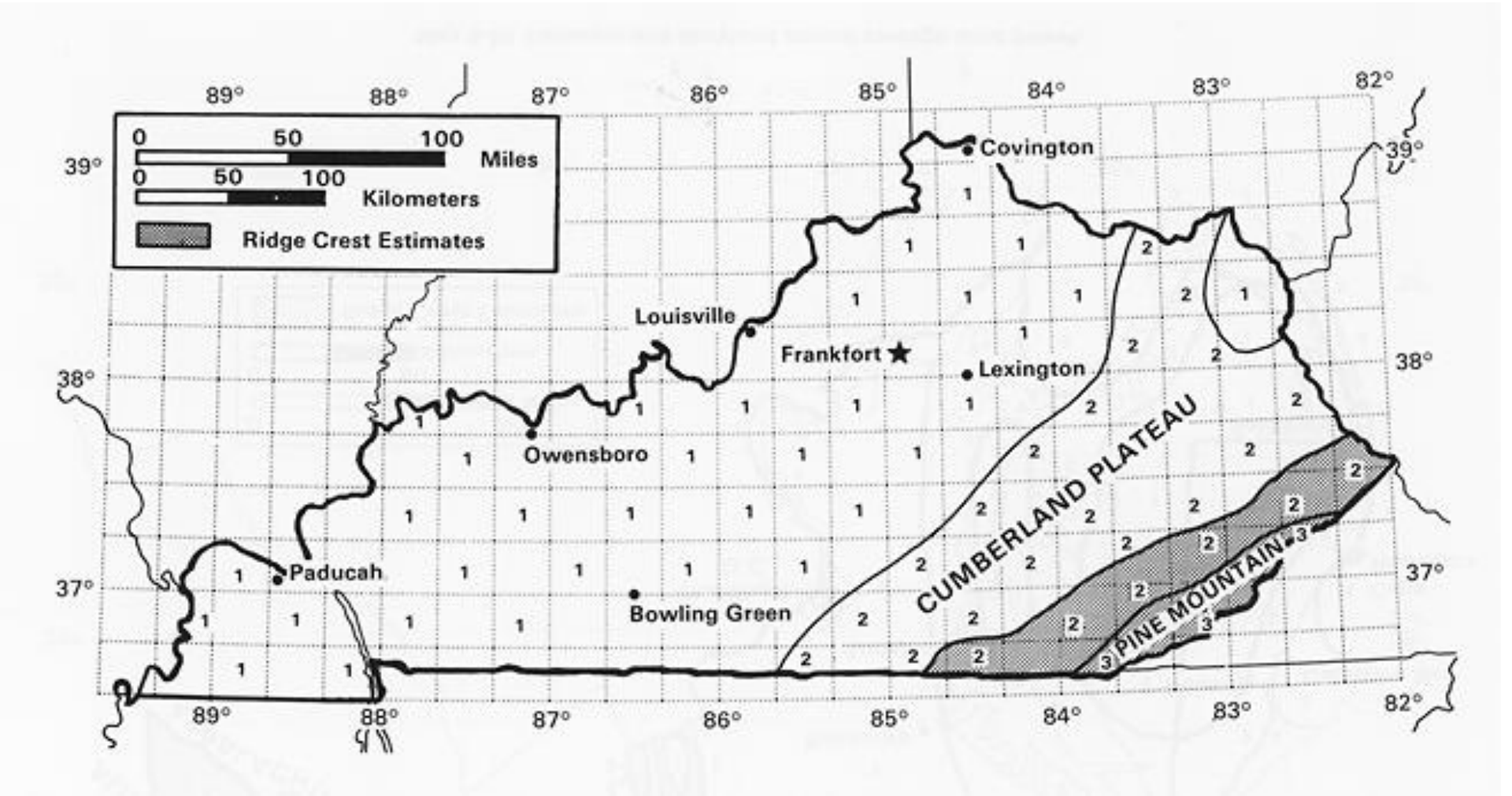
AWS Truewind

NREL National Renewable Energy Laboratory

Innovation for Our Energy Future

19-JAN-2010 2.1.1

Kentucky Annual Average Wind Power: Minimum Wind Class Required = 3



http://rredc.nrel.gov/wind/pubs/atlas/maps/chap3/3-29m.html

6. According to the Commonwealth of Kentucky Alternative Energy Facilities Site Bank, the PGDP site is best suited for which type of alternative energy plant?

1. Nuclear
2. Solar
3. Biomass
4. Clean coal
5. Other

NREL (http://www.nrel.gov/solar/news/2010/888.html),
NASA Atmospheric Science Data Center (http://eosweb.larc.nasa.gov/sse/)

6. According to the Commonwealth of Kentucky Alternative Energy Facilities Site Bank, the PGDP site is best suited for which type of alternative energy plant?

1. Nuclear (70%)
2. Solar (59%)
3. Biomass (83%)
4. Clean coal (79%)
5. Other

Source: kysitebank.com

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