278

McDonald, Jeffrey

om: Gilmore, Tyler J [Tyler.Gilmore@pnnl.gov]
nt: Saturday, March 15, 2014 9:40 AM
To: McDonald, Jeffrey
Cc: Greenhagen, Andrew; Bayer, MaryRose; Appriou, Delphine; Lanigan, David C
Subject: Pressure front elevation and New Maps
Attachments: 2014-DCL-AqPressDiff_Mines_60yr-001_03-14.png; 2014-DCL-AqPressDiff_OilGas_Struc_60yr-001_03-14.png; 2014-DCL-AqPressDiff_SurfWater_60yr-001_03-14.png; 2014-DCL-AqPressDiff_WaterWell_60yr-001_03-14.png

Jeff,
Attached are the new AoR maps with the "Draft" taken off. We also cleaned up the legends and made other minor modifications that provide better clarity on what was being presented on the maps. Most importantly,we made changes to the map with the Oil and Gas wells and the structural features identified within the AoR. Most of the structural features identified within the AoR were published in Treworgy (1981) , but were then disproven by Nelson (1995). The features disproven by Nelson (1995) are :

- Drake White Hall anticline
- Greenbridge anticline
- Lowder anticline
- Modesto anticline
- Waverly anticline

These features have been removed from the map.

nces:

gy, J. D, 1981. Structural Features in Illinois: A Compendium. Illinois Institute of Natural Resources, State Geological Survey Division, Circular 519, 23p. plus 1 plate.

WJ. 1995. *Structural Features in Illinois*. Bulletin 100, Illinois State Geological Survey, Champaign, Illinois

Please use the attached maps in the plans.

We also wanted to provide some additional clarification on our response to your question from Wednesday (3/12); *"What elevation (depth) pressure differential and plume boundary were plotted in figure 3.24 (RAI2)? The 20 yr. example is below."* Below is a discussion of what was provided on 3/13.

- *Figure 3.24 of the RAI2 shows the **Gas** Pressure Differential plotted at the center of the node representing the top of the **Elmhurst** (-3224 ft elevation at the location of the Stratigraphic well). At the time the RAI2 response was submitted, we were considering the top of the Elmhurst as the top of the injection zone.*

- *Figure 2 in the recently submitted draft PISC plan, shows the **Aqueous** Pressure Differential plotted at the center of the node of numerical model layer **Lombard5** (-3157.5 ft elevation at the location of the Stratigraphic well). This is because the injection zone was recently redefined to be the top of the Lombard5.*

- *The numerical model layer depths/elevations vary spatially due to structural dip, etc.*

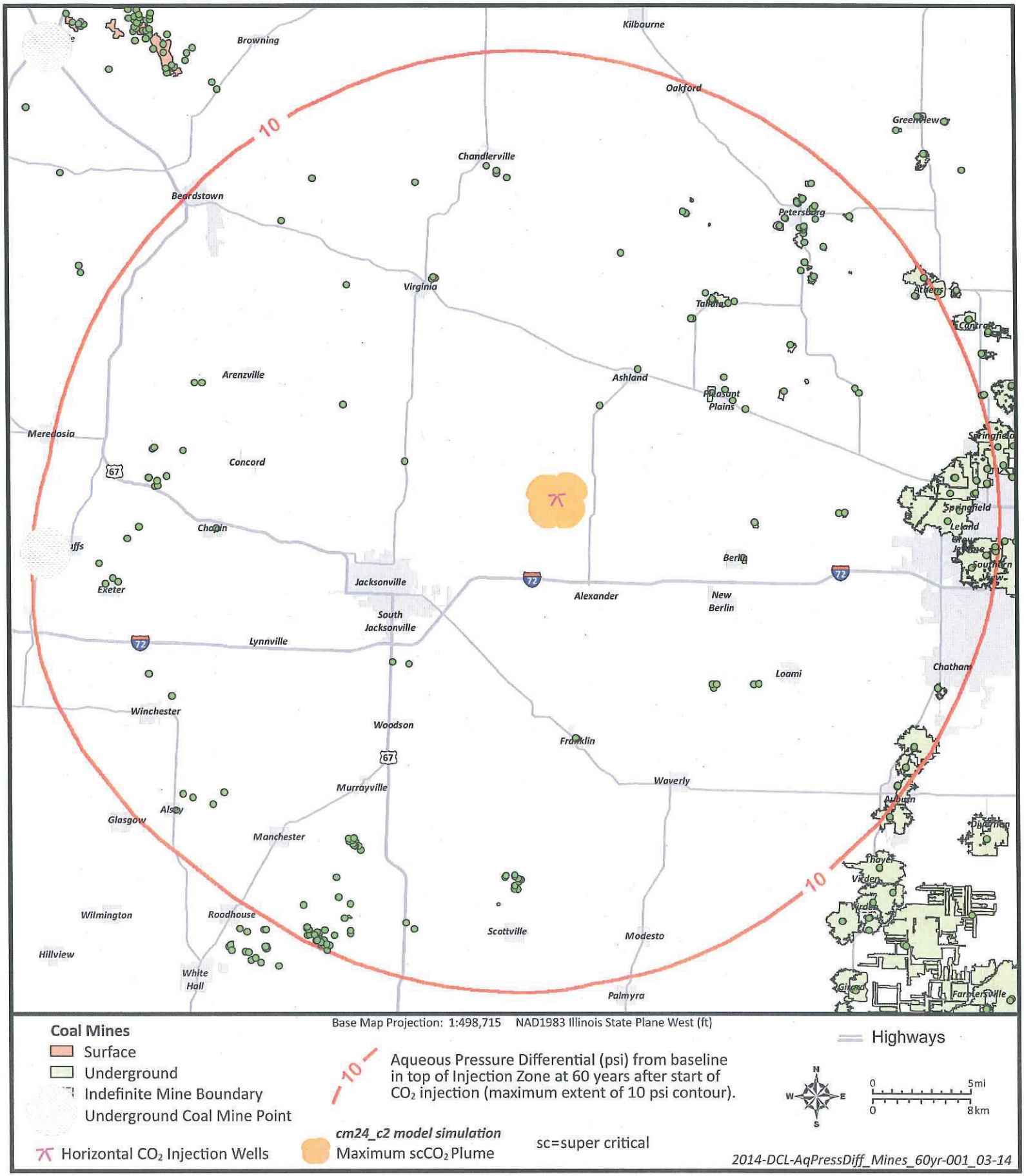
- *The gas pressure is equal to the aqueous pressure in areas where there is no scCO2.*

- *Because the AoR is now being defined based on the pressure differential, it is more appropriate to provide plots of the aqueous pressure, as that is the driving force for brine migration, particularly in areas outside the plume boundary.*

- *The plume extent (or boundary) on both maps is defined by the contour line within which 99% of the vertically integrated scCO2 mass is contained. This calculation is described in section 3.1.7 of the UIC permit application Rev 1.0. Therefore, the plume extent does not represent a particular depth or layer top.*

We know so much information has passed hands that it is hard to keep track of it all, but what might help us provide you with what you need is for us to understand the context behind the questions. We puzzled over the elevation question for some time. We should be able to provide better answers if you let us know what the thinking is behind the question.

We are currently working on your other two requests 1) provide criteria for how the new pressure monitoring well will be located and 2) request for well test procedures. And should have responses back to you next week.
Thanks
Tyler



Base Map Projection: 1:498,715 NAD1983 Illinois State Plane West (ft)

Coal Mines
- Surface
- Underground
- Indefinite Mine Boundary
- Underground Coal Mine Point

Horizontal CO_2 Injection Wells

10 — Aqueous Pressure Differential (psi) from baseline in top of Injection Zone at 60 years after start of CO_2 injection (maximum extent of 10 psi contour).

cm24_c2 model simulation
Maximum $scCO_2$ Plume

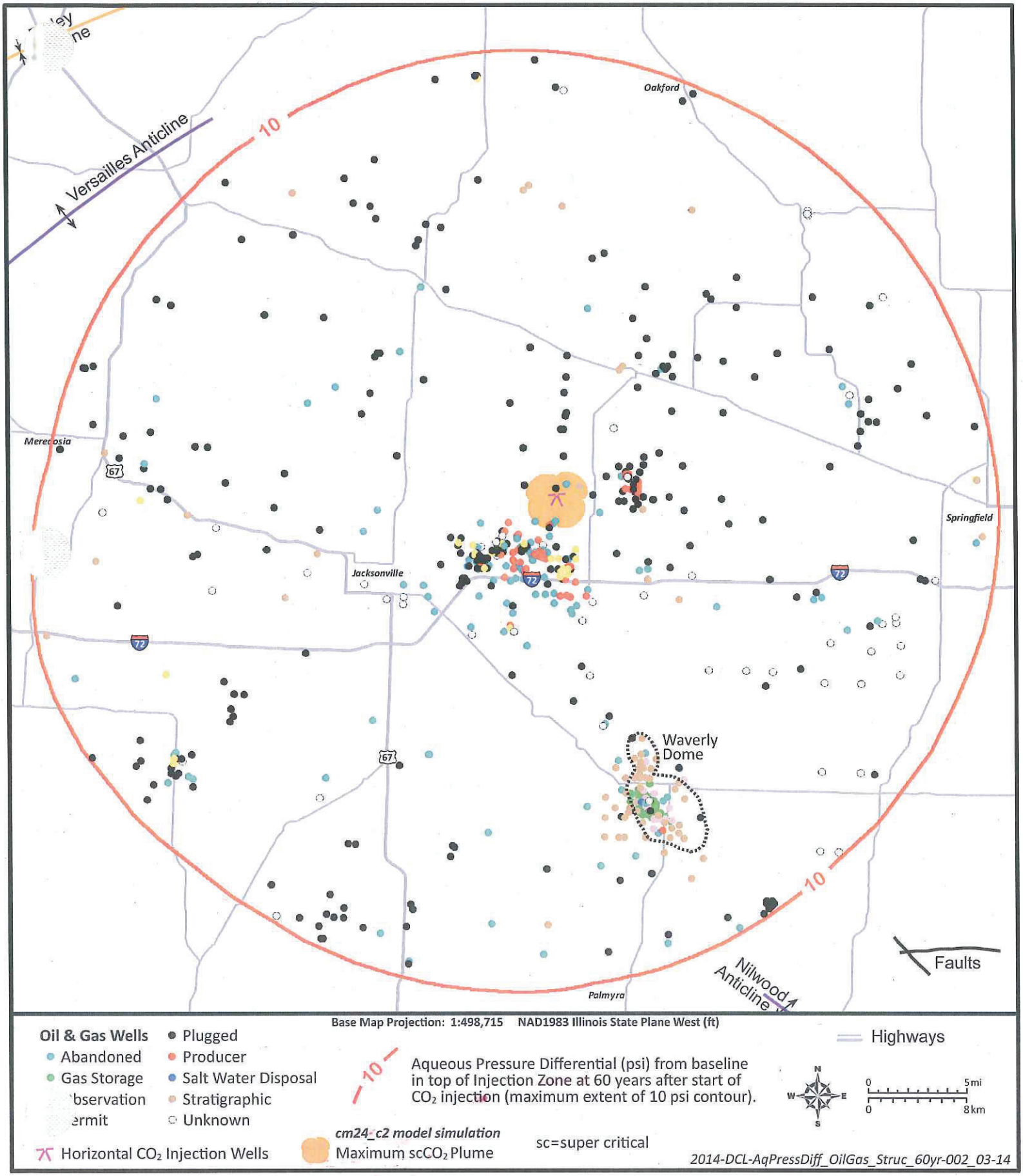
sc=super critical

Highways

N W E S

0 5mi
0 8km

2014-DCL-AqPressDiff_Mines_60yr-001_03-14



Base Map Projection: 1:498,715 NAD1983 Illinois State Plane West (ft)

Oil & Gas Wells
- Abandoned
- Gas Storage
- Observation
- Permit
- Plugged
- Producer
- Salt Water Disposal
- Stratigraphic
- Unknown

Horizontal CO_2 Injection Wells

10 — Aqueous Pressure Differential (psi) from baseline in top of Injection Zone at 60 years after start of CO_2 injection (maximum extent of 10 psi contour).

cm24_c2 model simulation
Maximum $scCO_2$ Plume

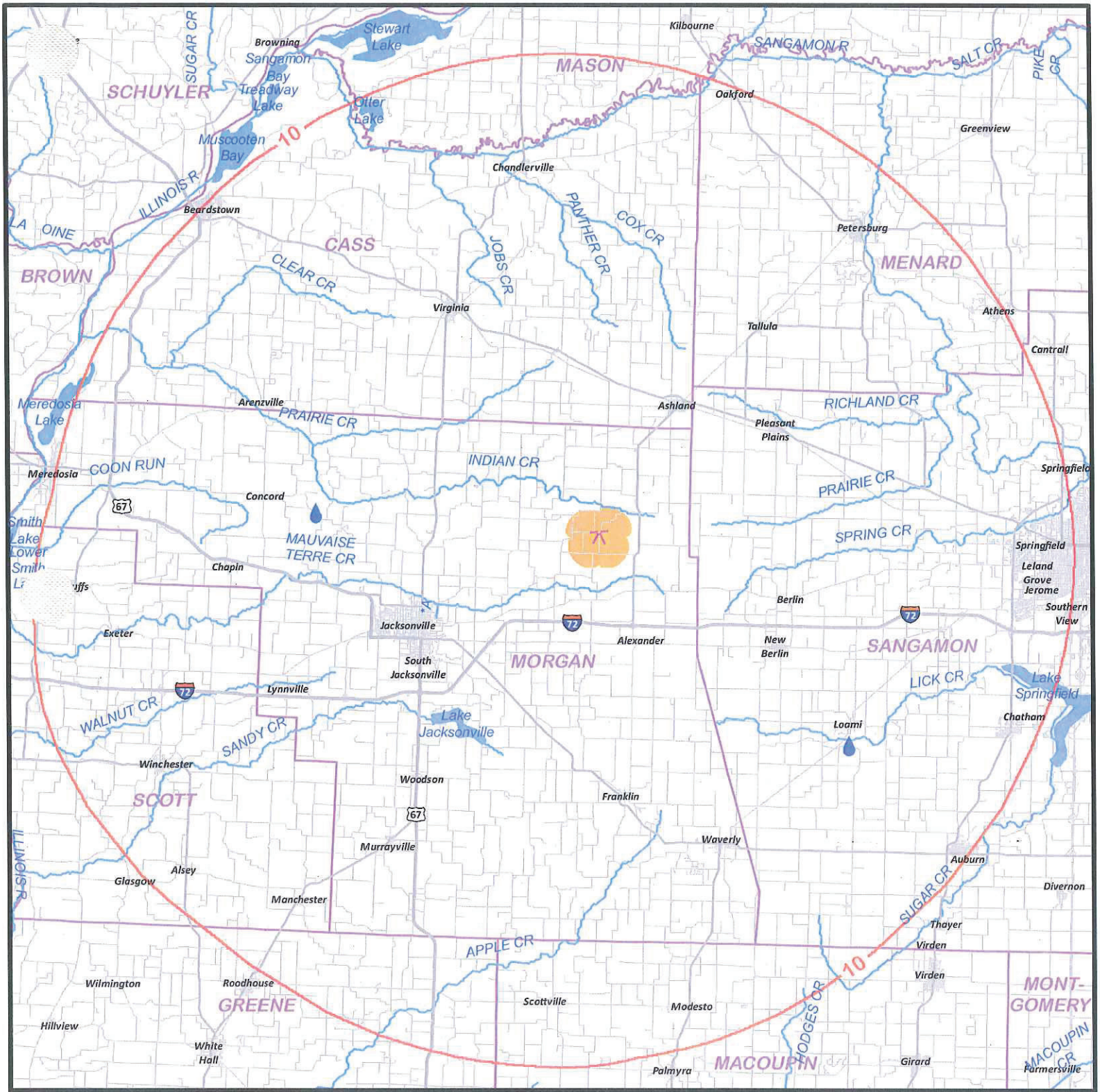
sc=super critical

Highways

N W E S

0 5mi
0 8km

2014-DCL-AqPressDiff_OilGas_Struc_60yr-002_03-14



Base Map Projection: 1:498,715 NAD1983 Illinois State Plane West (ft)

County
Lakes
Rivers
Springs
Roads & Highways
Horizontal CO_2 Injection Wells

10 Aqueous Pressure Differential (psi) from baseline in top of Injection Zone at 60 years after start of CO_2 injection (maximum extent of 10 psi contour).

cm24_c2 model simulation
Maximum $scCO_2$ Plume

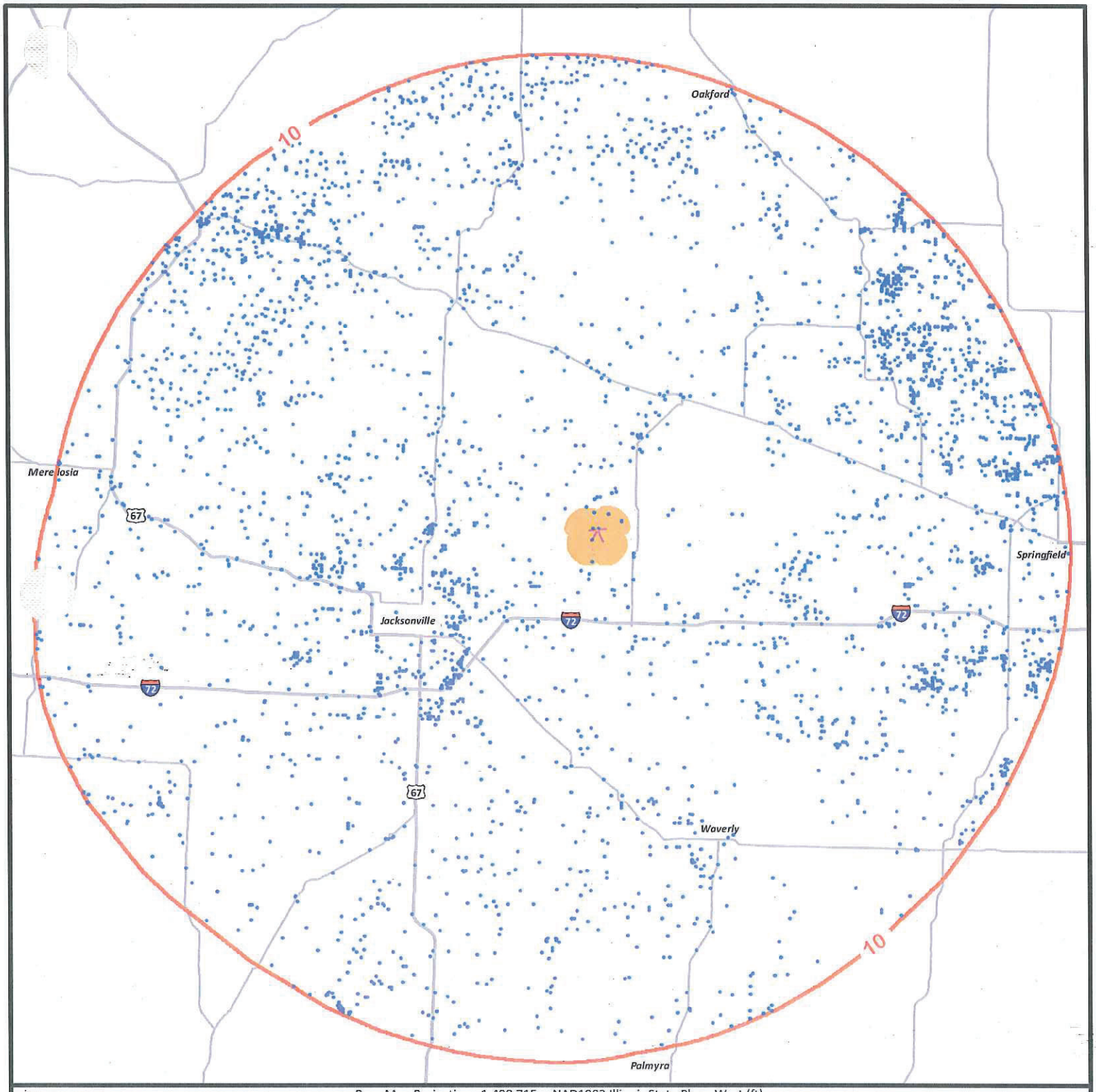
sc=super critical

There are no State, Tribal, or Territory boundaries within the map area.

N W E S

0 5mi
0 8km

2014-DCL-AqPressDiff_SurfWater_60yr-001_03-14



Base Map Projection: 1:498,715 NAD1983 Illinois State Plane West (ft)

Water Wells

Highways

10 Aqueous Pressure Differential (psi) from baseline in top of Injection Zone at 60 years after start of CO_2 injection (maximum extent of 10 psi contour).

N W E S

0 5mi

0 8km

Horizontal CO_2 Injection Wells

cm24_c2 model simulation

Maximum $scCO_2$ Plume

sc=super critical

2014-DCL-AqPressDiff_WaterWell_60yr-001_03-14