# Appendix 9

# AoR Determination and Workflow

Geostock Sandia

## AoR and COI Determination

Appendix 9 is a supplement to the discussion in *Module B. AoR and CA Plan Section 6.2 AoR Delineations.* **Figures 9.2 to 9.6** demonstrate a map view of the Cone of Influence (COI) for each of the injection intervals respectively. The methodology for determining the COI and AoR is discussed in *Module B. AoR and CA Plan Section 6.0.* **Figure 9.1** is a documentation of the maps created for the Critical pressure in each of the injection intervals based upon the methodology mentioned above. The equations used to generate the COI and determine AoR are documented below.

### Hydrostatic Head of Mud - $H_m$

$$[(\boldsymbol{Z} - \mathbf{50}) * (\mathbf{0.052} * \boldsymbol{Mud\ Weight}) - (\boldsymbol{Z} * \boldsymbol{P_g})]$$

Where:

Z = Depth

50 = Assumption that entire well bore is not full of mud; a 50-foot conservative set back

0.052 = conversion factor for Mud Weight to feet

Mud Weight = Average Mud Weight in lb/gal observed from well log headers in the Area of Investigation
**9.3 lb/gal was used for Project Blue*

$P_g$: pressure gradient
**The lower Hosston and Cotton Valley used 0.433 psi/ft*

**Gel Column friction - Gf**

$$\frac{((Z - 50') * 20 * .00333)}{Well\ Bore\ Dia}$$

Where:

Z: Depth

50': Assumption that entire well bore is not full of mud; a 50-foot conservative set back

20: Assumption for weight of Gel

.00333: Conversion factor for Gel Weight to feet

Well Bore Dia: Max well bore diameter observed in the Area of Investigation

**Critical pressure - CP**

$$CP = H_m + G_f$$

Where:

$H_m$: Hydrostatic Head of Mud

Gf: Gel Column friction

**Cone of influence – COI**

$$COI = CP - \Delta P$$

Where:

**CP**: Critical Pressure

$\Delta P$: Change in formation pressure at the End of $CO_2$ injection relative to initial formation pressure

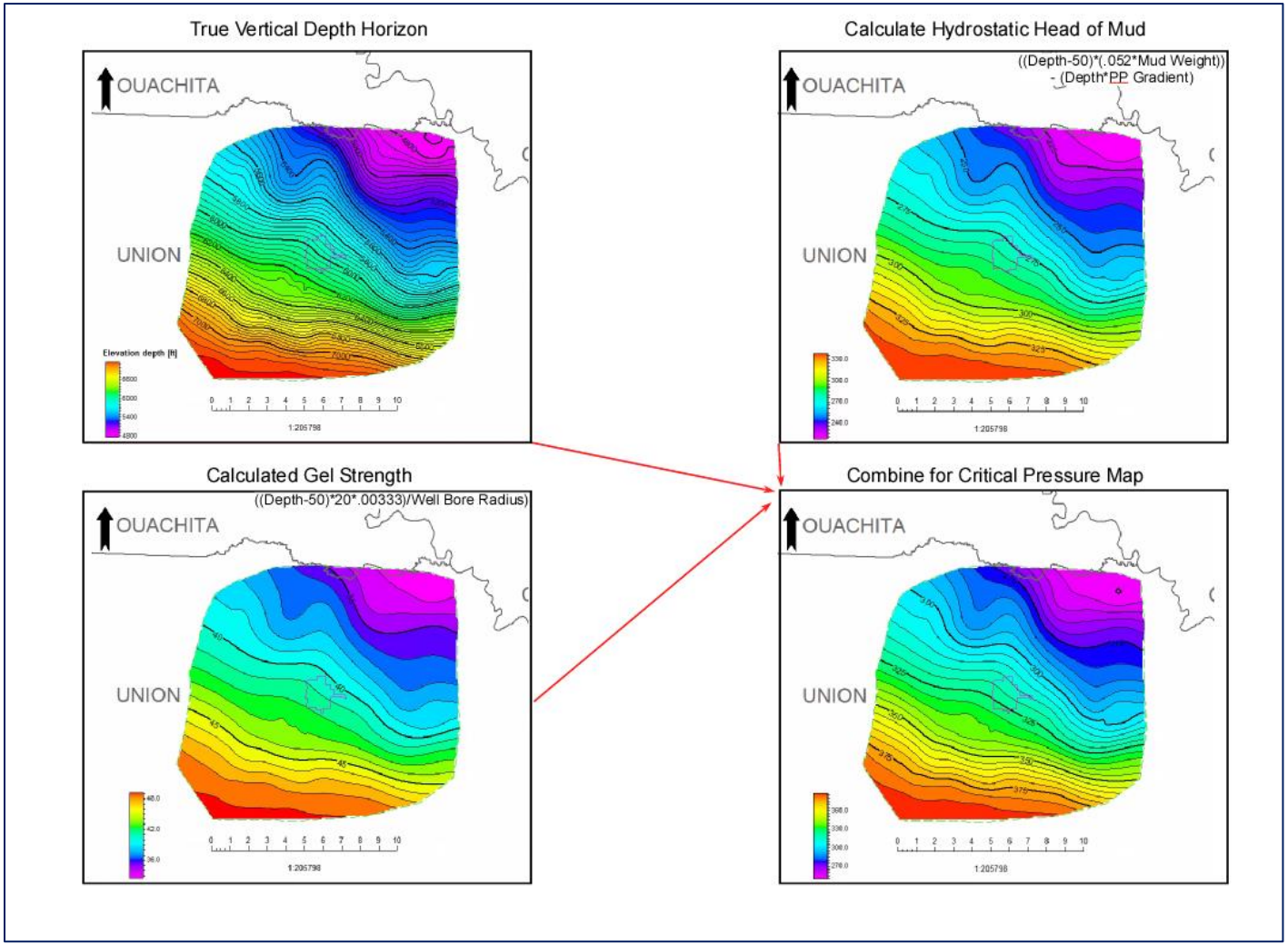


**Figure 9.1: Critical Pressure Determination demonstration**

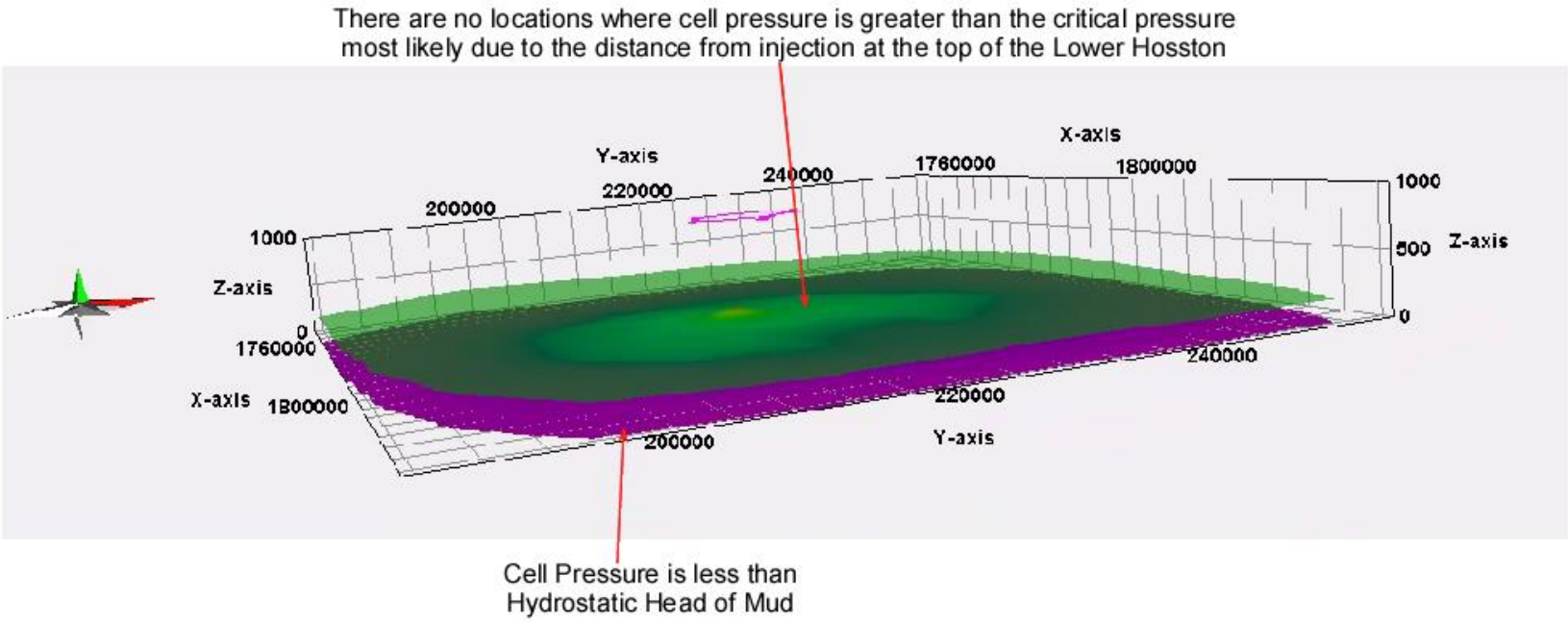


**Figure 9.2: Cone of Influence in the Lower Hosston Injection Zone**

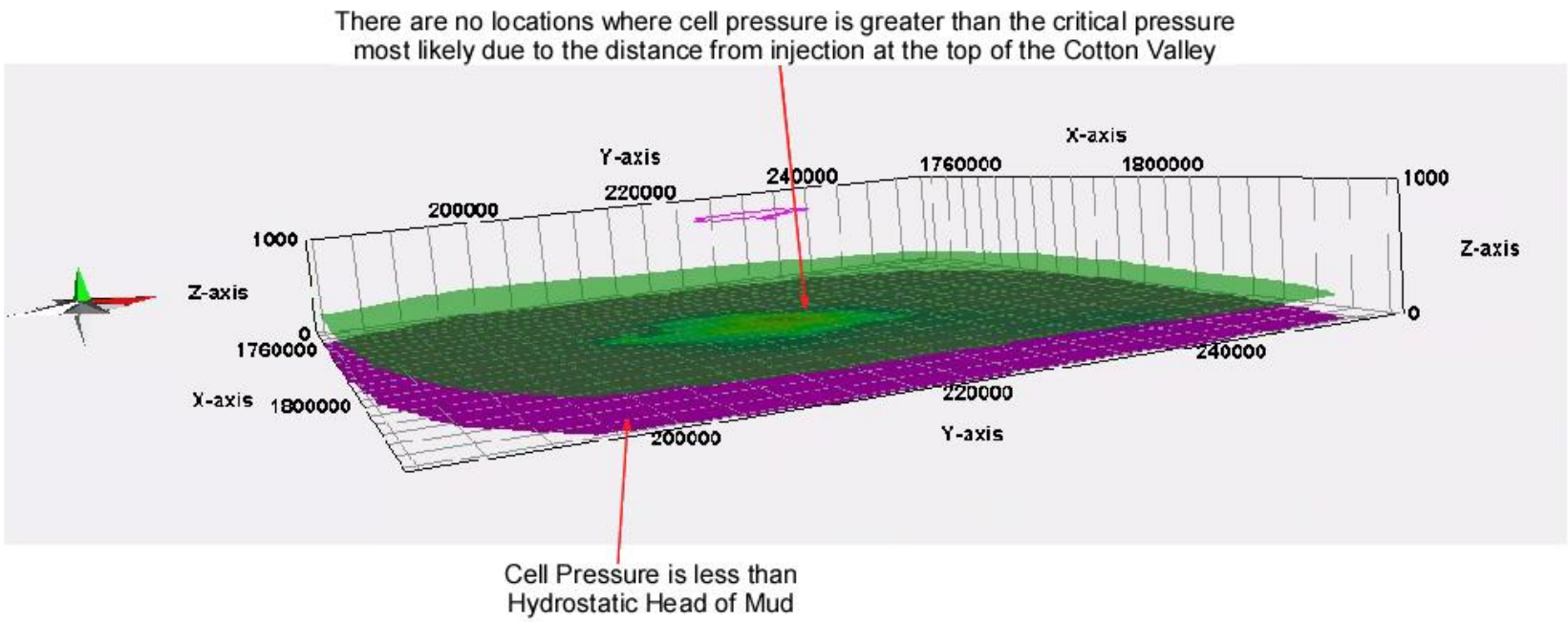


**Figure 9.3: Cone of Influence at top of the Cotton Valley Injection Zone**

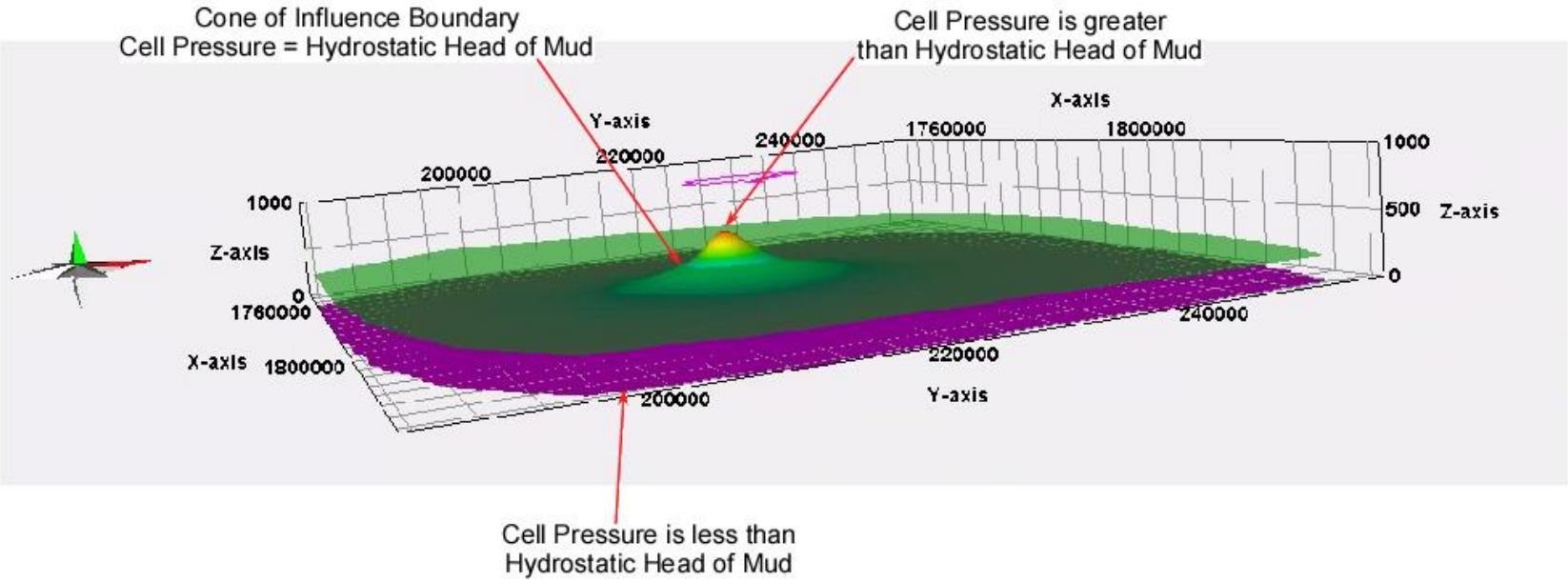


**Figure 9.4: Cone of Influence at the top of the CV3 Injection Interval**

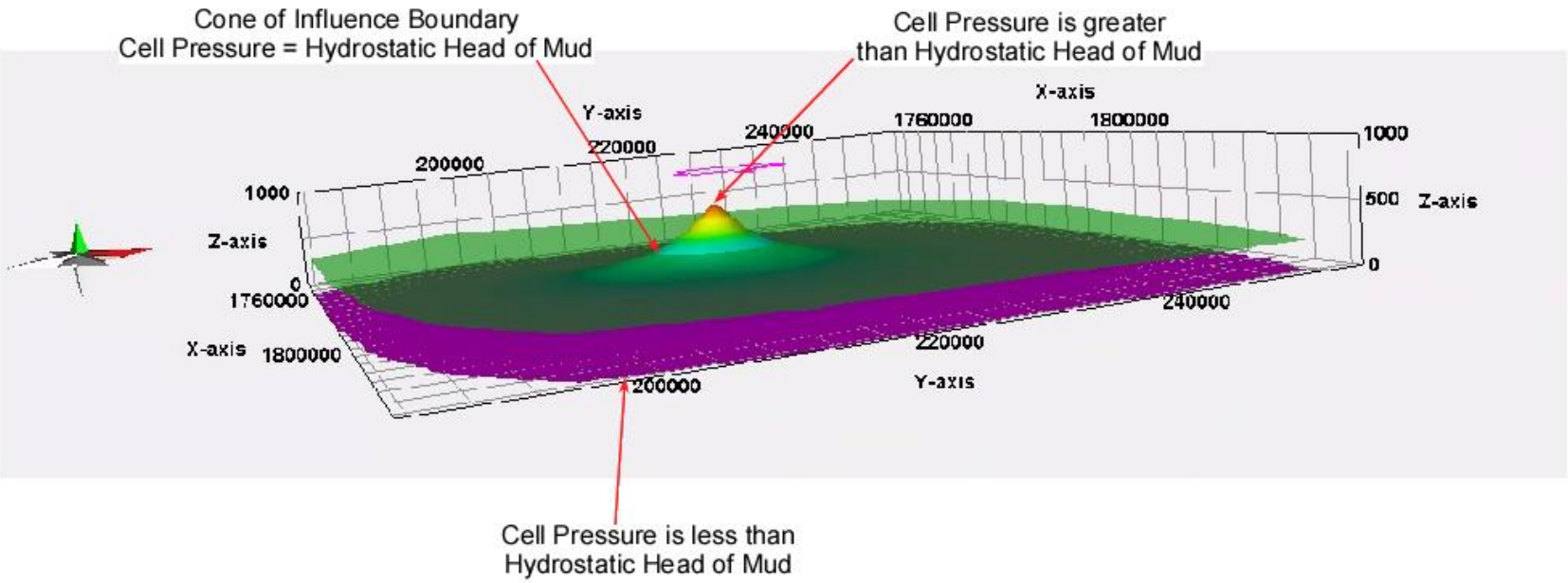


**Figure 9.5: Cone of Influence at the top of the CV2 Injection Interval**

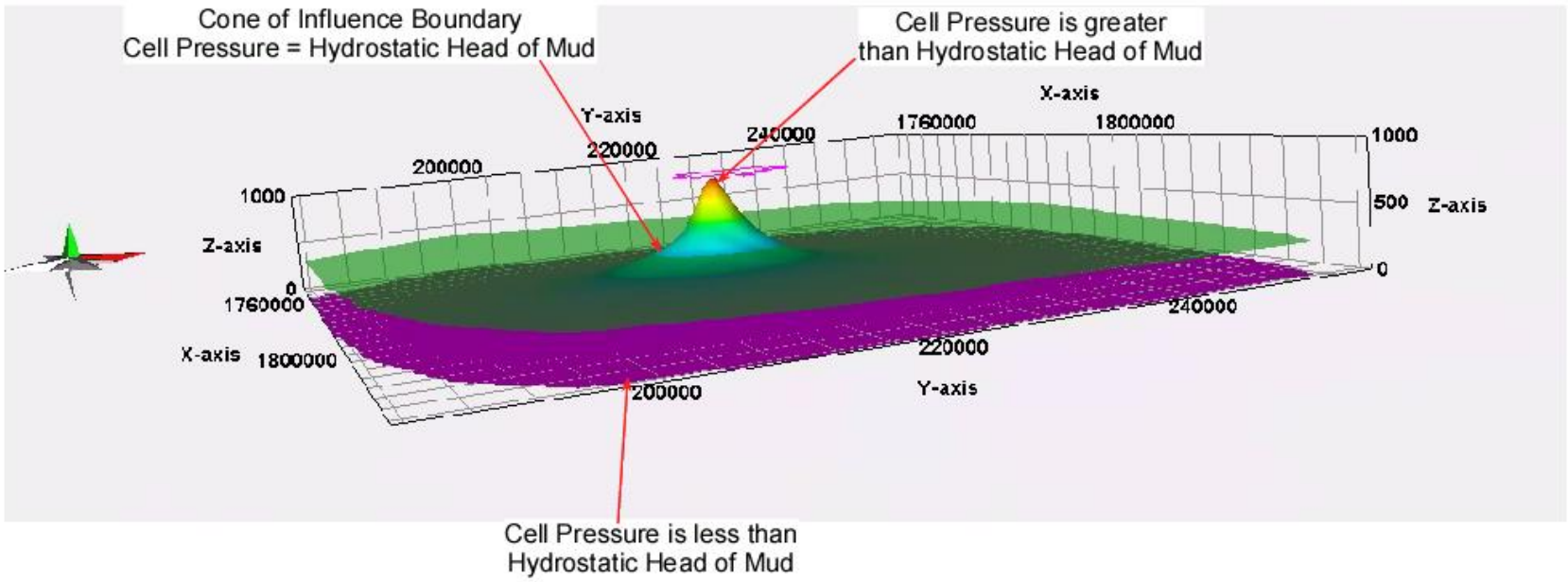


**Figure 9.6: Cone of Influence at the top of the CV1 Injection Interval**