

## Class VI Porosity Determined

### CTV V

#### **Porosity determination**

Porosity is derived from multiple open hole well logs and available core data from wells close to the AOR as shown in Figure 1. These values, that have a half-foot resolution, are upscaled into the geological model and distributed using Sequential Gaussian simulation in the upper injection zone and Gaussian random function simulation in the lower injection zone respectively.

Formation porosity is determined one of two ways: from bulk density using 2.65 grams per cubic centimeter (g/cc) matrix density as calibrated from core grain density and core porosity data, or from compressional sonic using 55.5 microseconds per foot ( $\mu\text{sec}/\text{ft}$ ) matrix slowness and the Wyllie time-average equation Wyllie et al., 1956. See **Table 1** for the Wyllie compaction factors estimated in each zone.

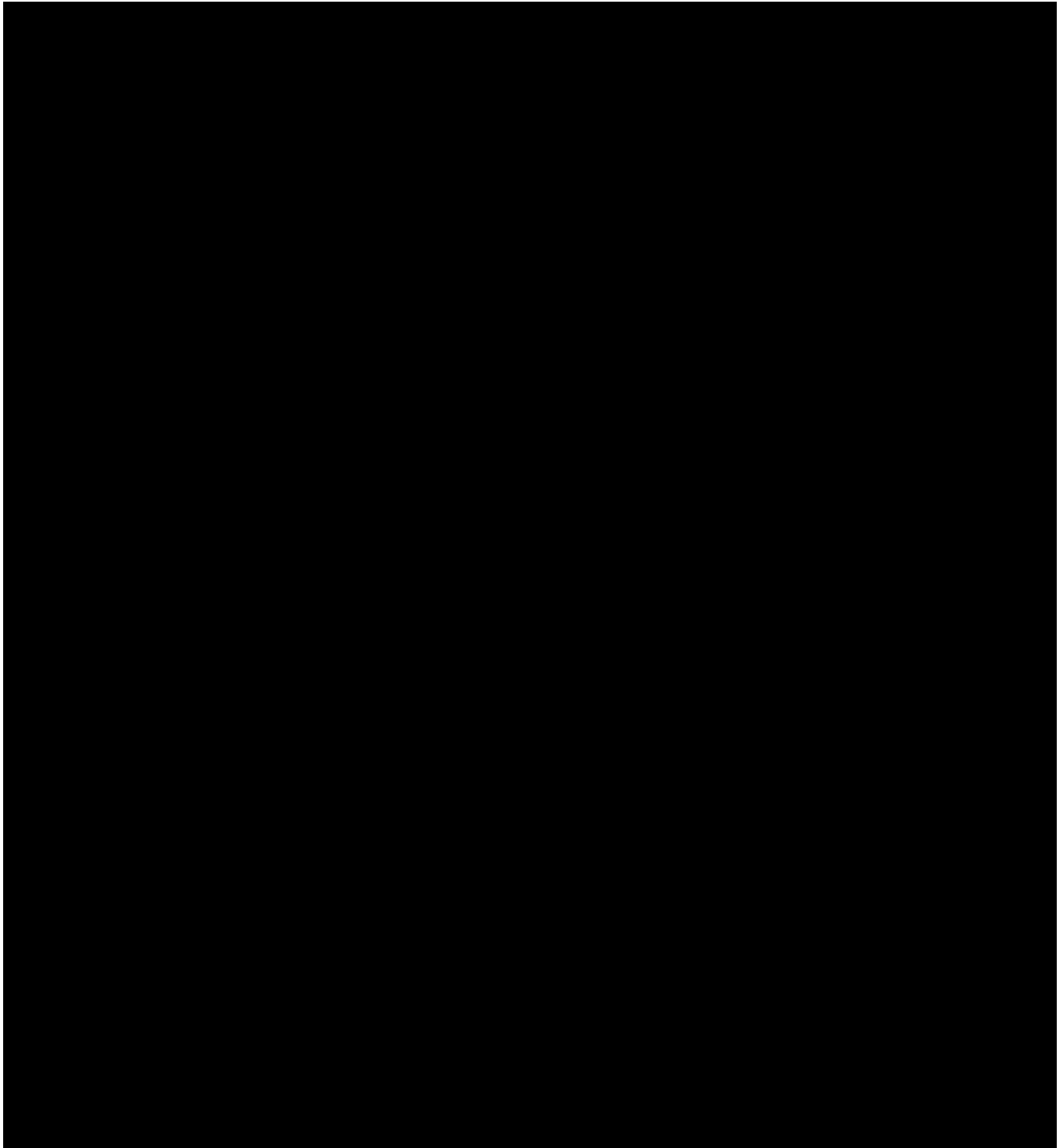
Comparison of the calculated porosity and permeability transform to log generated permeability (Timur-Coates method) from a nuclear magnetic resonance (NMR) log in the [REDACTED] is almost 1:1 and matches rotary sidewall core permeability (Figure 2). Also, Figure 2 shows the calculated model curves within the AoR.

## **TABLES**

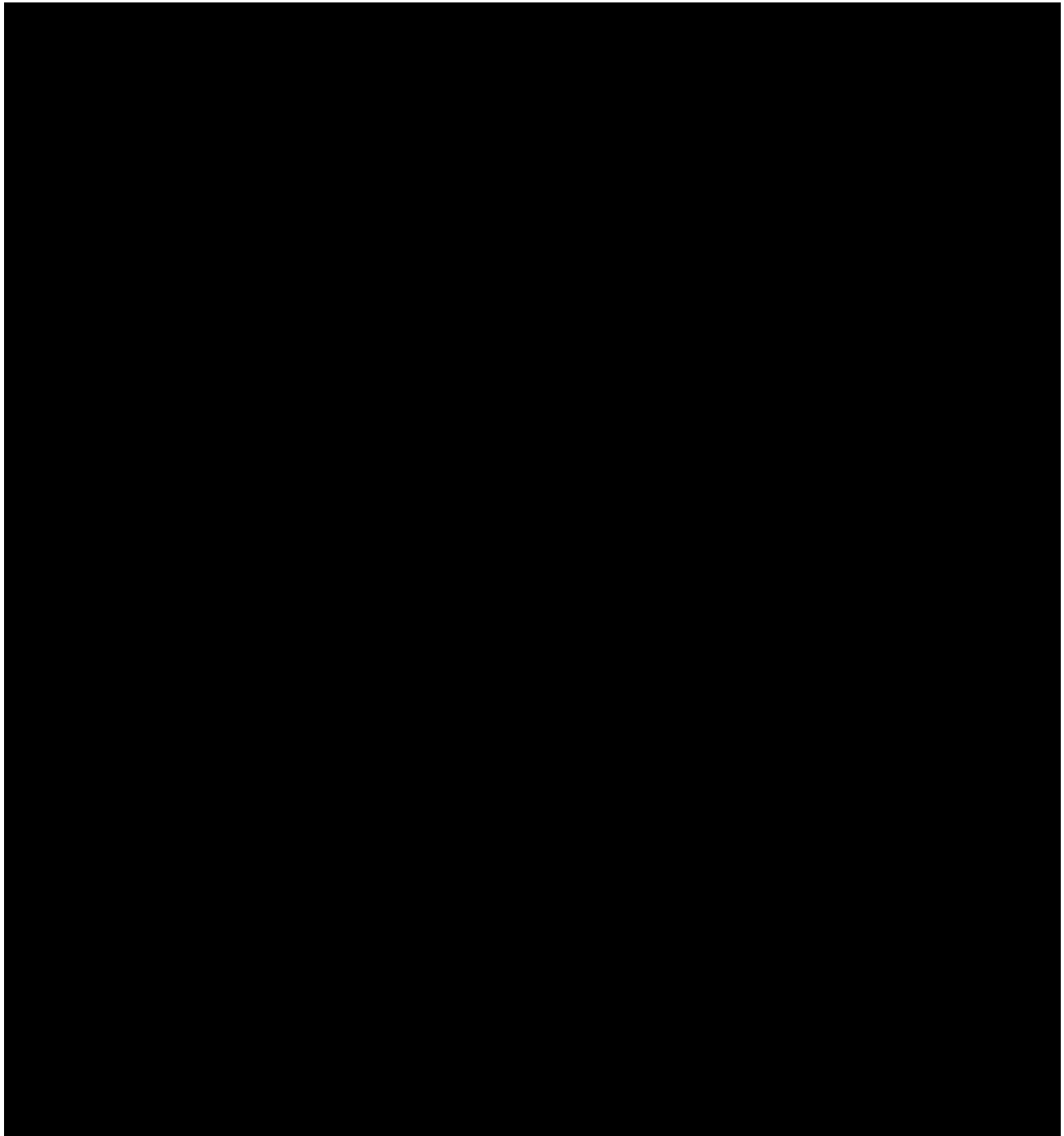
**Table 1.** Sonic porosity equations by zone

| Zones | Sonic Porosity Equation | Wyllie Compaction Factor |
|-------|-------------------------|--------------------------|
|       | Wyllie                  | 1.3                      |
|       | Wyllie                  | 1.2                      |
|       | Wyllie                  | 1.0                      |

## **FIGURES**



**Figure 1.** Map showing location of wells relative to the AoR.



**Figure 2.** Example log from the [REDACTED] The last track shows a comparison of the permeability calculated from the transform (black) shown in **Figure 2.4-2** to permeability calculated from an NMR log (green) and rotary sidewall core permeability (red dots). Track 1: Correlation and caliper logs. Track 2: Measured depth. Track 3: Vertical depth and vertical subsea depth. Track 4: Zones. Track 5: Resistivity. Track 6: Compressional sonic, density, and neutron logs. Track 7: NMR total porosity and bound fluid. Track 8: Volume of clay. Track 9: Porosity calculated from density and NMR total porosity (green). Track 10: Permeability calculated using permeability transform and NMR Timur-Coates permeability (green).