HW-5.1: Pore Pressure Prediction—Eugene Island 330—Answer Sheet

Goal:

This homework supplements the discussion of pore pressure prediction discussed in Chapter 5 (Flemings, 2021). We will predict pressure in the E.I.-330 A20ST well. See Chapter 5, Figures 5.4-5.6, and 5.13, (Flemings, 2021)). We will use the normal compaction trend parameters that you derived in HW5.1. We will both calculate by hand and use the spreadsheet **‘NCT\_Spread\_sheet\_and\_PPP\_EI-330’** to predict the pressure.

# Hubbert Approach

Goal: Use Hubbert’s approach to predict pore pressure in the E.I.-330 A20ST well. See Chapter 5, Figures 5.4-5.6.

# Approach:

 Eq. 1

 Eq. 2

 Eq. 3

 Eq. 4

Based on the normal compaction trend shown in Figure 1 (i.e. , calculate the pore pressure (u) and fill in Table 1 and then plot these values in Figure 2. Double your value of  and re-calculate the pore pressure and place in the right column of Table 1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Depth (ft) | n | Uh (PSI) | v (PSI) | u (Eq. 4) (PSI)**2.54 x 10-4** PSI-1 | u (Eq. 4) (PSI)=5.1 x 10-4 PSI-1 |
| 4714 | 0.24 | 2091 | 4123 | 1937 | 3030 |
| 6657 | 0.25 | 2951 | 5987 | 3991 | 4989 |
| 7231 | 0.31 | 3206 | 6543 | 5547 | 6045 |
| 7854 | 0.30 | 3482 | 7157 | 6009 | 6583 |

**Table 2.** *Exercise for estimating pore pressure at EI-330.*

*Example Calculation:*

**Figure 1:** *Compression curve from NCT Exercise. This analysis shows* . (Eq. 3)

Figure 2: The hand-calculated points are shown and the prediction from the spreadsheet **‘NCT\_Spread\_sheet\_and\_PPP\_EI-330’ is overlain**

Bowers
Calculate the value of the pore pressure and fill in the table below and then plot these values in Figure 2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Depth (ft)** | **Vel (ft/s)** | **Uh (psi)** | **Sv (psi)** | **u (psi)** | **v'** |
| 4717 | 8102 | 2189 | 4239 | 2080 | 2159 |
| 5258 | 8289 | 2440 | 4754 | 2442 | 2312 |
| 5945 | 8439 | 2757 | 5423 | 2986 | 2437 |
| 7210 | 6668 | 3345 | 6638 | 5595 | 1043 |
| 7854 | 6788 | 3644 | 7273 | 6142 | 1131 |

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*Fig. 3. The hand-calculated points are shown and the prediction from the spreadsheet* ***‘NCT\_Spread\_sheet\_and\_PPP\_EI-330’ is overlain***