Doc # 2619252

Note to File
Chevron USA
Union Pacific 113x22
API: 103-08606
Rio Blanco County

November 23, 2020

Question: Is cement coverage above the Navajo Formation adequate to contain injected fluids in the Navajo? See enclosed snippet of CBL (Doc # 401943962) below.

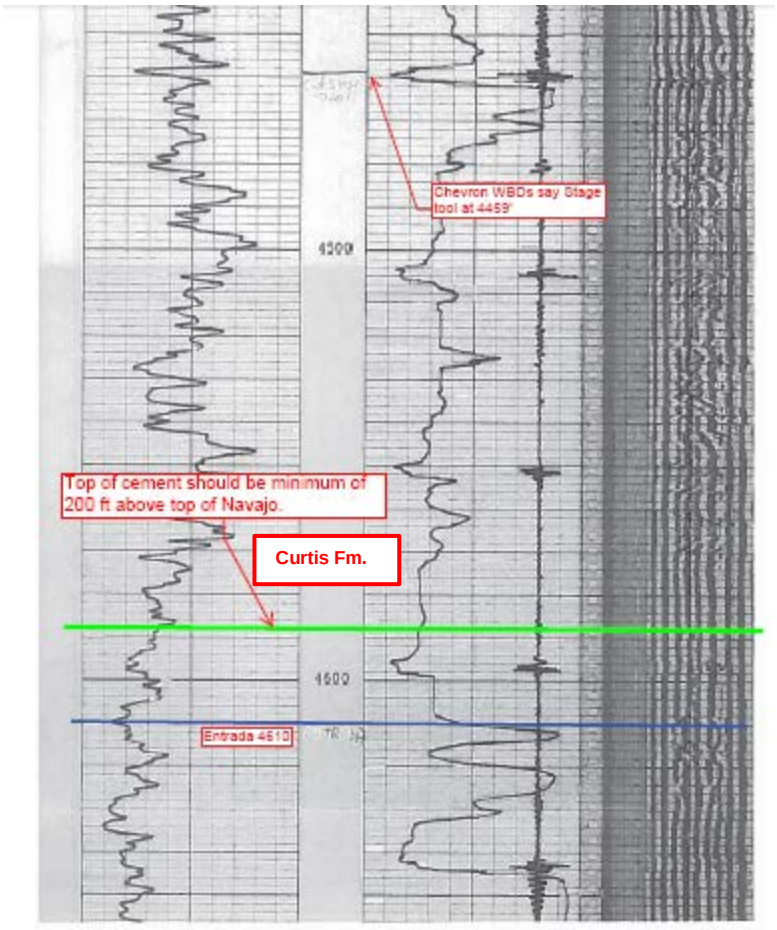
Most of the intended injection zone, the Navajo Formation, has no cement coverage. The 1st String cement job evidently topped out right at the base of the Navajo at 5377 ft. The Carmel Formation, 58 ft thick, overlies the Navajo. Cement over the Carmel appears to be adequate as a seal.

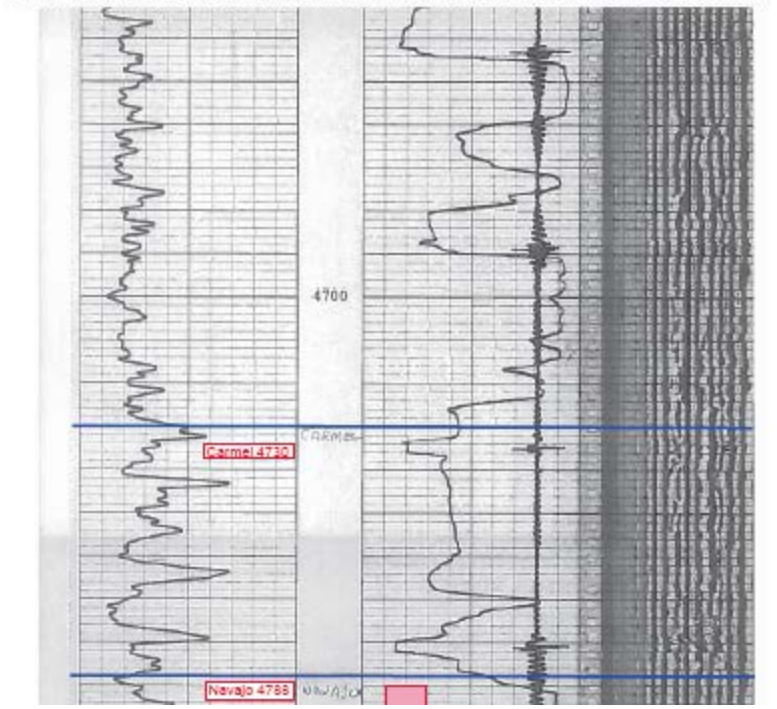
The Entrada Formation overlies the Carmel. The basal Entrada, 4690-4734, looks uncemented. Above that to the top of the Entrada (4610, 120 ft) there appear to be alternating cement filled and uncemented zones 10-20 ft thick. However, little difference is apparent in the VDL track in these intervals indicating there is likely poorly bonded cement present. While the CBL curve reminds one of "sandy" and "shaley" beds this is not actually reflected in the Gamma Ray curve. The CBL-Gamma Ray and Induction log suite suggest a mixed interval of thin sands and shales with sands dominant. Good cement is present from the base up across the Curtis Formation which overlies the Entrada.

Could Chevron successfully squeeze the uncemented zones in the Entrada to improve sealing along the casing? The answer is probably no. Chevron's explanation is that cement from the DV tool at 4459 ft fell downhole along the casing. Evidently the "fall" was at least to the top of the Entrada at 4610 ft. Below that is an interval with an "erratic" pattern of "cement" and "no cement". This "erratic" interval is probably still part of the "fall". Requiring Chevron to attempt perf and squeeze operations within the Entrada "erratic" interval would probably prove futile because circulation in the uncemented wellbore areas could not be established in the short intervals needed. Bullheading cement into an interval or a suicide squeeze would likely have questionable benefit. COGCC prefers to leave the casing intact (not perforated) to maintain casing integrity. In COGCC's opinion cement coverage across the Carmel and Entrada is acceptable and cannot practically be improved.

Additionally: The extensive perforations and sands in the Navajo Formation should preferentially accept injected fluids without them tending to move uphole along the casing. Bradenhead monitoring will assist to detect any lack of isolation that may develop as a result of injection.

Bob Koehler
UIC Lead


Chevron WBDs say Stage tool at 4459'
4500
Top of cement should be minimum of 200 ft above top of Navajo.
Curtis Fm.
4600
Entrada 4610


4700
Carmel 4730
Navajo 4788