

Piceance BMA Casing and Cement Standards for Geologic Isolation

BMA, parts of Parachute Field and Grand Valley Field. Geologic markers consistent with operator-reported Fort Union tops in the Parachute and Grand Valley fields were used by COGCC Staff to correlate Fort Union tops presented on annotated type logs in Appendix A. However, as indicated in Section 1.0 of this report, the Fort Union is not prominent on logs for fields in the BMA. Rather, the stratigraphically-equivalent Fort Union interval has log characteristics similar to underlying portions of the Middle Wasatch, and therefore, the Fort Union is considered a confining unit for fields in the BMA, consistent with the Middle Wasatch, rather than an aquifer. COGCC Staff believes that the graphic presented above is more characteristic of portions of the Piceance Basin to the northwest, as it relates to the Fort Union Formation.

7.23 Digital Formation Studies

COGCC retained a petrophysical consultant, Digital Formation, to evaluate open hole logs in the Mamm Creek Field and Rulison Field in attempt to determine the presence, mobility, and salinity of water in the Wasatch, Ohio Creek, and Upper Mesaverde formations. COGCC selected wells that had both resistivity and neutron-density logs for the Mamm Creek Field Study for comparison of two analysis methods. Eight wells per field were evaluated using comparisons between Spontaneous Potential (SP) analysis and traditional Archie analysis (resistivity-porosity method).

Overall report results were similar in both fields, but COGCC Staff considered the results conflicting and inconclusive because of a lack of clean, thick sands in the Wasatch Formation. In many cases, there was little correlation between the salinities from Archie analysis and from the SP log. Digital Formation expressed higher confidence in the ~~SP Archie~~ results [*correction on 5/31/2016, DDA*], but EPA guidance indicates that these methods may be unreliable when the results do not agree:

“If both logging methods [SP and Resistivity-Porosity] are used to calculate TDS concentrations for a single well with no water analysis available, and both estimates are close, a conservative approach would be to choose the lower TDS concentration [this was not the case with Digital Formation’s calculations; variance between the two methods was generally high in the Wasatch Formation]. If the difference becomes large, differing by a factor greater than 2, and a review of the input data reveals no obvious errors, accurate TDS concentrations can not be determined from geophysical logs.” (Survey of Methods to Determine Total Dissolved Solids Concentrations, EPA, September, 1988)

This contention regarding accuracy of TDS calculations using log data is supported by statements provided by operators that log analysis techniques are unreliable for determination of water salinity in the Piceance Basin because of bed thickness, shale content, and gas saturation (see Statement 1 by Williams in Section 7.24 below).