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| This study | Failing criteria (%) | Hitchon and Brulotte (1994) | Blondes and others (2016) | Possible causes/Reason for criteria |
| 3.5>pH>11 | 26.8 | 5>pH >11 | 4.5>pH >10.5 | Low pH due by acid wash treatment.  High pH caused by cement wash or mud filtrate |
| Charge balance > ±15% | 43.1 | Charge balance >±15% | Charge balance >±15% | Poor quality analysis or transcription errors |
| Mg or Ca concentrations missing | 22.4 | Any of Ca, Mg, Cl or SO4, with either HCO3 or alkalinity, zero, missing, or reported as <or >value | N/A | Incomplete analysis, insufficient sample or very low concentration. |
| N/A | - | Mg>=Ca | Mg>Ca | Loss of CO2 (and Ca2+ in solution) and precipitation of CaCO3 due to delayed analysis. Low overall concentrations. Incorrect entry of Ca+Mg as equivalent Ca, as separate Ca and Mg values. |
| N/A | - | OH reported | N/A | Wash from cement. Poor analysis |
| N/A | - | CO3 reported | N/A | Drilling mud contamination (without significant effect on pH). Poor sampling of separator or treater. |
| N/A | - | (K/Na) × 103  >stratigraphic unit specific value | K>Cl or K>5×Na | Contamination by KCl mud |
| N/A | - | Fe >100mg/l | N/A | Contamination from corrosion products of well |
| No depth | 29.9 | N/A | N/A | Must be assignable to a specific depth |
| No aquifer lithology. | 84.84 | N/A | N/A | Lithologies such as ’other’, ‘conglomerate’, coal (n=33) and anhydrite (n=18) are culled. |
| No Lat/Lon | 7.1 | N/A | N/A | Presence of Lat/Lon is required to estimate temperature at formation-depth. |

Supplementary Table 3. Geochemical and geospatial/other rejection criteria used to filter the PWGD and the rejection criteria used by Hitchon and Brulotte (1994) and Blondes and others (2016). Of the entire database (n=165,960) 93% of all samples failed to meet the criteria specified in this study, leaving a final population of n=11,840. N/A is not applicable; this criteria is not used to discriminate against a sample’s inclusion in the dataset.