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| Title: Precipice Sandstone groundwater salinity estimated from CSEM  Project Leader: | | Demonstration Project:  CTSCo |
| Project Number:  Status: Under Development | Commencement: 2018  Completion: | Total Budget:  ANLEC R&D Contribution: |

***The Context***

The salinity of the Precipice Sandstone is an important constraint on the stakeholder support and regulatory approval for the Surat Basin as a potential carbon geosequestration storage site. Deep groundwater salinity is generally derived from laboratory analysis of groundwater samples collected by petroleum exploration drilling. In the southern Surat Basin there are very few petroleum wells in the area of geosequestration interest, and of the available wells, many of the recovered water samples are heavily contaminated with drilling mud filtrate. Also, many of the petroleum wells were drilled in 1960-1970s and therefore have only basic wireline logs.

This project is a desktop modelling exercise of representative rock and fluid properties from surface to Base Precipice Sandstone under a range of depths from near outcrop to 2.5 km in the southern Surat Basin.

***Unknowns***

The salinity of the groundwater in the Precipice Sandstone in the axis of the Mimosa Synline in the southern Surat Basin and how to assess it from surface-based geophysical methods.

***Research Objective***

This project aims to map the distribution of the potable/non-potable Precipice Sandstone groundwater in the southern Surat Basin through CSEM salinity modelling.

***New Knowledge***

* A review of surface deployed geophysical techniques to discriminate and assess the salinity of the groundwater within the Precipice Sandstone within the deeper areas of the Surat Basin.
* An initial 2D cross-section model of the Surat Basin rock and fluid property distributions, coal thickness and depth that would influence the Controlled Source Electromagnetic (CSEM) response.
* Correlation between Precipice water chemistry and CSEM responses with depth.
* Desktop assessment of the likely range of uncertainty of the technique and options to reduce uncertainty based on the design (geometry etc.) of the surface operational plan.
* Report on the workflow, process, results of modeling issues and interpretation of theoretical data from a CSEM survey.
* Recommendations for the design and cost of a CSEM survey.

***Work Program***

* Literature review of currently available surface deployed geophysical techniques with potential to map Precipice Sandstone groundwater salinity.
* Compiling a Surat Basin formation rock and fluid properties to construct a desktop, theoretical model for forward prediction of its CSEM response with depth. Consistency of understanding of these properties by the Researcher and Proponent will be a key quality assurance step in this aspect of the project.
* Testing the forward model to assess the sensitivity of the change in Precipice Sandstone water salinity.
* A sensitivity analysis (Tornado Plot) of rock, fluid property changes above the Precipice Sandstone and depth variations that could mask or lead to erroneous interpretation of the Precipice Sandstone water salinity.
* Prepare a conceptual CSEM Field acquisition program (design, time, resources, cost) to test the technique between CTSCo-defined set of Control Well locations.

***Milestones***

### Milestone 1: Literature review

### Milestone 2: Build a conceptual model of Surat rock and fluid properties

### Milestone 3: Test and analyse the forward CSEM model responses to variations in Surat Basin rock and fluid responses

### Milestone 4: Conceptual field acquisition and interpretation plan to address the Project Problem (Precipice Sandstone groundwater salinity mapping)