Pilot Energy

Progressing Approval & Development of Cliff Head CCS Project

Northern Perth Basin, WA

22 February 2023

PILOT ENERGY LIMITED
ASX:PGY

Compliance Statements

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Competent Persons Statement
This announcement contains information on conventional petroleum resources which is based on and fairly represents information and supporting documentation reviewed by Dr Xingjin Wang, a Petroleum Engineer with over 30 years' experience and a Master in Petroleum Engineering from the University of New South Wales and a PhD in applied Geology from the University of New South Wales. Dr Wang is an active member of the SPE and PESA and is qualified in accordance with ASX listing rule 5.1. He is a former Director of Pilot Energy Ltd and has consented to the inclusion of this information in the form and context to which it appears.

Authorisation
This presentation has been authorized by the Chairman and Managing Director on behalf of the Board of Directors of Pilot Energy Limited

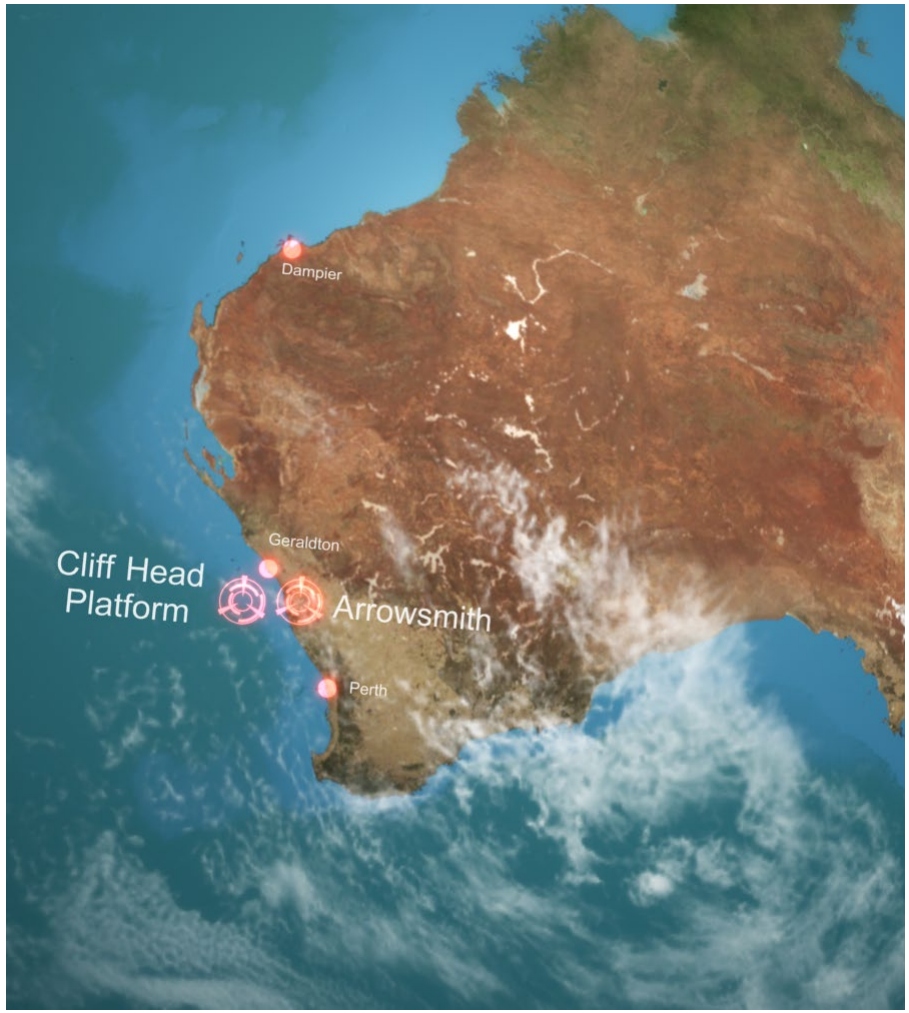
Mid West WSP Feasibility Study Reporting Conditions
Pilot has agreed the following conditions with the ASX in relation to the Mid West WSP feasibility study:

1. The Company must continue to spend funds on its existing and proposed oil and gas projects.
2. The Company must disclose in each quarterly activities report until September 2022, the proportion of expenditure incurred in relation to exploration and evaluation on the oil and gas projects and the Mid West Wind and Solar Project.
3. The Company must disclose as separate line items in each quarterly activities report until September 2022, expenditure incurred in relation to exploration and evaluation on the oil and gas projects and the Mid West Wind and Solar Project.
4. Proceeding beyond the feasibility study stage of the Project (or incurring expenditure in excess of the budgeted feasibility expenditure in relation to the Project) constitutes a change in the nature and scale of the Company's activities in terms of Listing Rule 11.1 and as such the Company will be required to comply with all of the requirements of Chapters 1 and 2 of the Listing Rules before it proceeds beyond the feasibility study or incurs expenditures in excess of the budgeted feasibility expenditure on the Project.

Cliff Head CCS – Project Overview

Key enabler of low cost clean hydrogen and ammonia production for the Mid West Clean Energy Project

- Cliff Head CCS Project is an integral part of the Mid West Clean Energy Project
- Brownfield re-development utilizing existing Cliff Head Oil Field onshore/offshore facilities
- Ready end-of-life offshore reservoir in WA Mid West with Commonwealth with clear regulatory pathway to CCS
- Minimal risk and capex requirements due to straight-forward adaptive re-use of existing plant, pipelines, wells, platform and reservoir
- Project to include onshore CO2 capture/aggregation and offshore CO2 injection facilities
- Proximity to ready accessible market with up to ~1.0 million tpa of easy-to-capture CO2 emissions sources
- Aims to provide over 1.0 million tpa of permanent CO2 storage continuing through 2050
- Focused on delivering an initial project LCoS of less than A$20/tonne of CO2
- Foundation for future development of clean hydrogen and ammonia production
- Targeting first CO2 injection by 2026



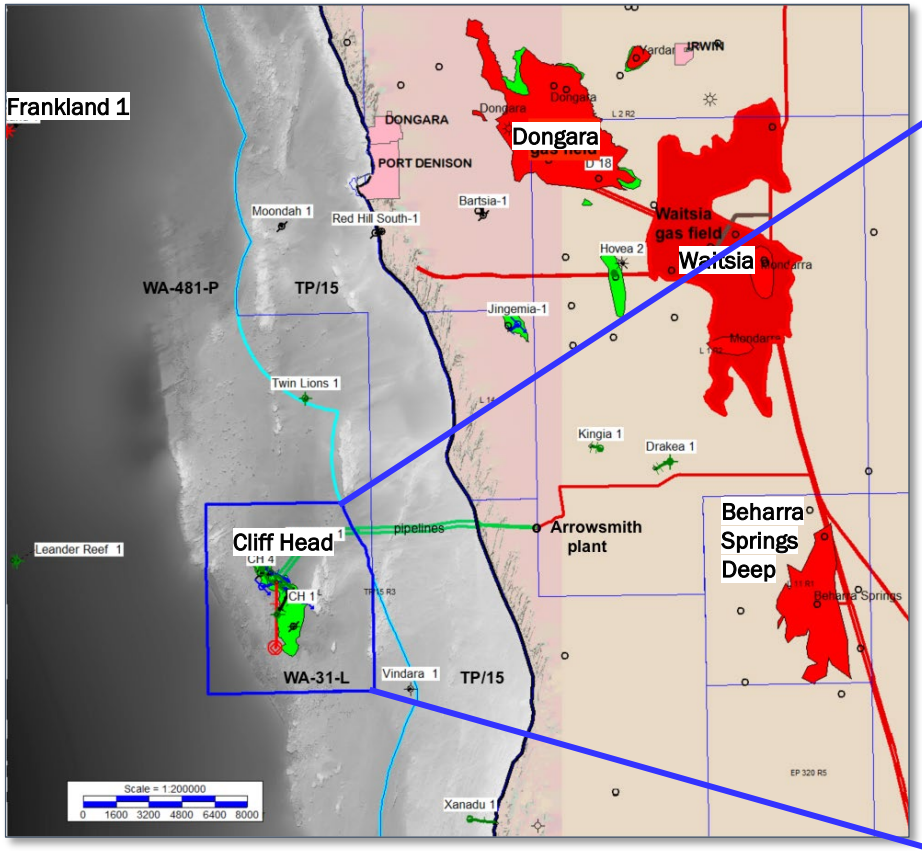
Cliff Head CCS Project - the journey so far.....

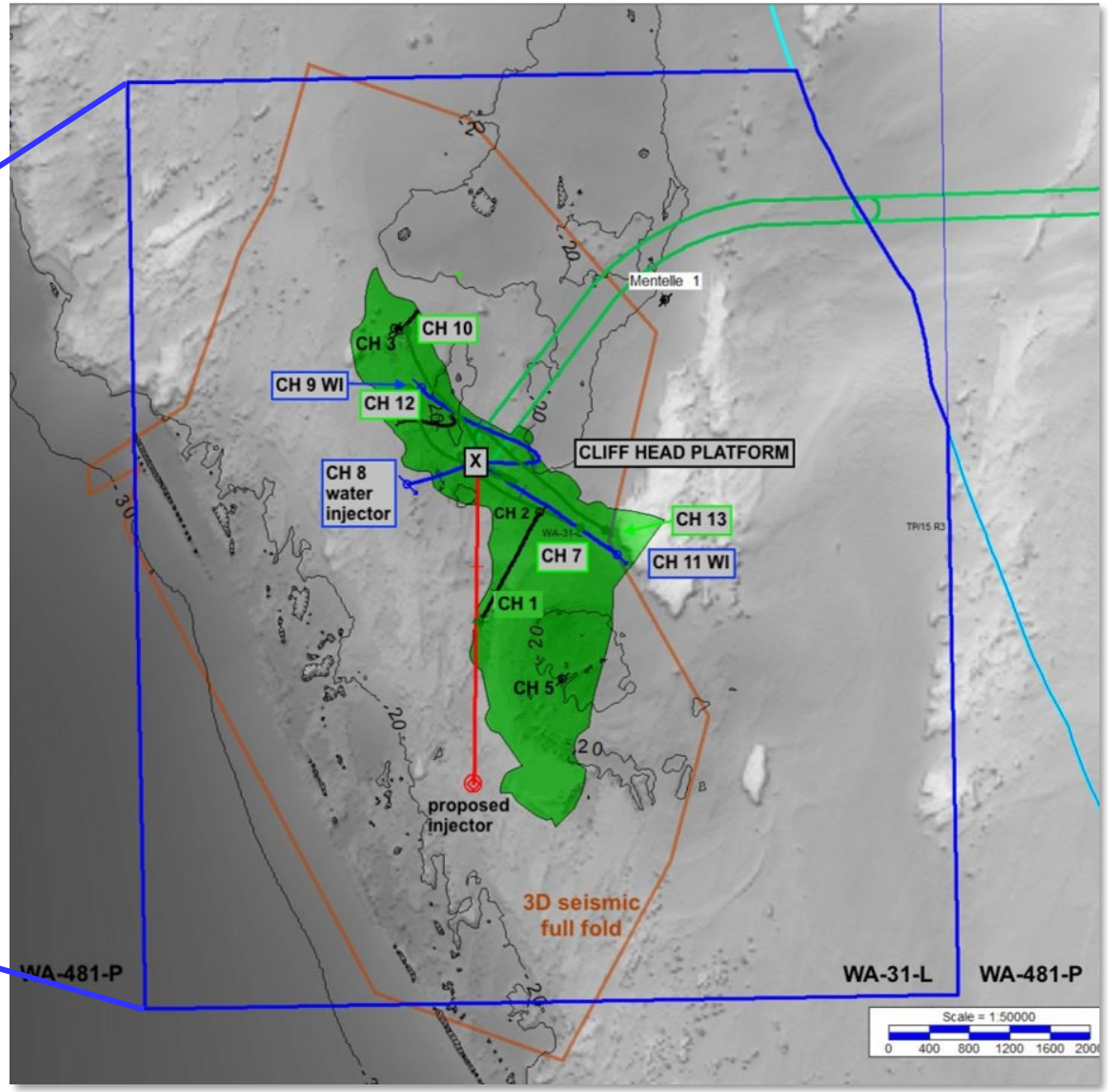
Established but historically untested Commonwealth regulatory pathway

- Legislation – OPGGSA - providing for CCS in Commonwealth Waters has been in place since 2006
- Applicable regulations have also been in place since 2011 and application guidelines since 2019
- An application for an Identified Storage Formation (ISFm) over the Cliff Head Field submitted late 2022
- This is the first ever application seeking approval of a declaration of an ISFm under OPGGSA (2006)
- Additional information may be required by NOPTA during assessment
- Subject to ISFm being approved, Pilot will proceed with lodging application for a GHG Injection License
- Engagement with DCCEEW for environmental approval process commenced
- Pilot aiming to commence CCS operations by 2026

Location of Cliff Head Oil Field, WA-31-L, Western Australia

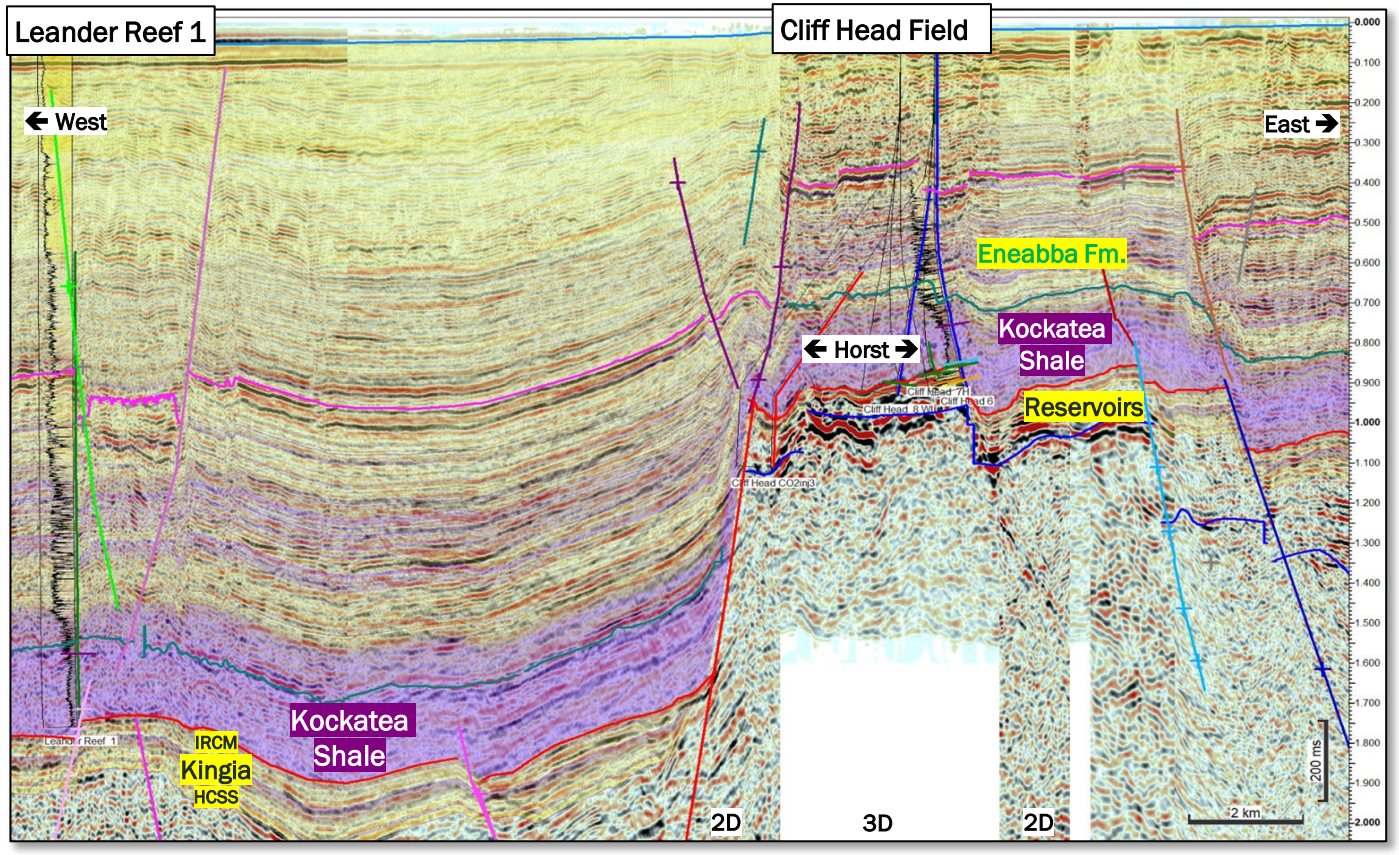
Situated in Federal Waters, Offshore North Perth Basin

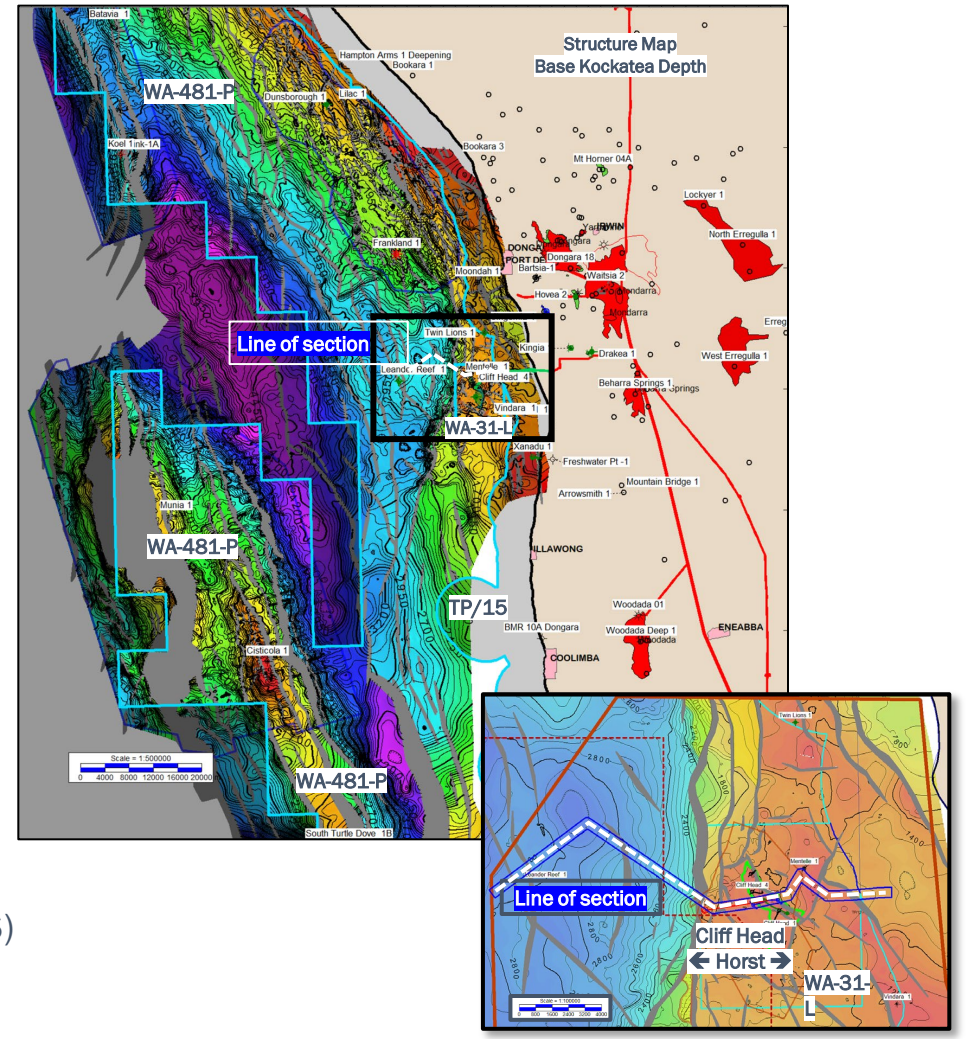




Regional Geology of the Storage System

The Cliff Head Field is located on a large structural horst





- Regional seal is the thick & “highly plastic” Kockatea Shale (~500m thick)
- Reservoir units are Irwin River Coal Measures (IRCM), Kingia Sst & High Cliff Sst (HCSS)
- Faults and stress regime are considerations
- Existing infrastructure and comprehensive technical database

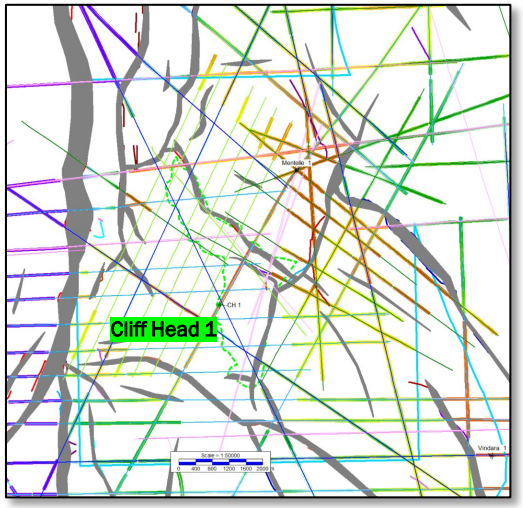
Seismic data

Extensive 2D and 3D data sets

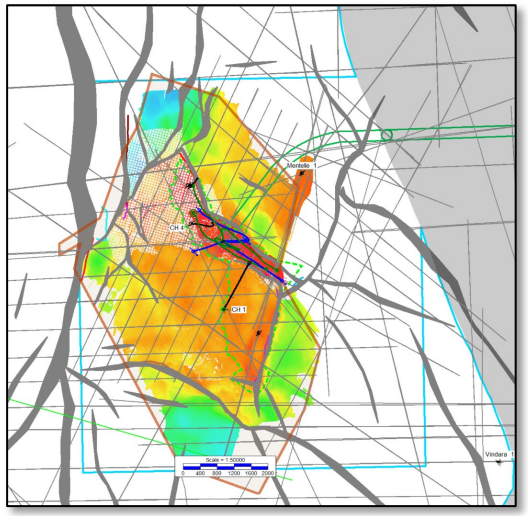
Seismic acquisition

Oil phase

- 2D seismic, 1982, 1999, 2002 – Cliff Head discovery
- 3D seismic, 2003 – post discovery
- Tied to exploration and appraisal wells –
- Seismic interpretation inward looking



2002 – 2D seismic only

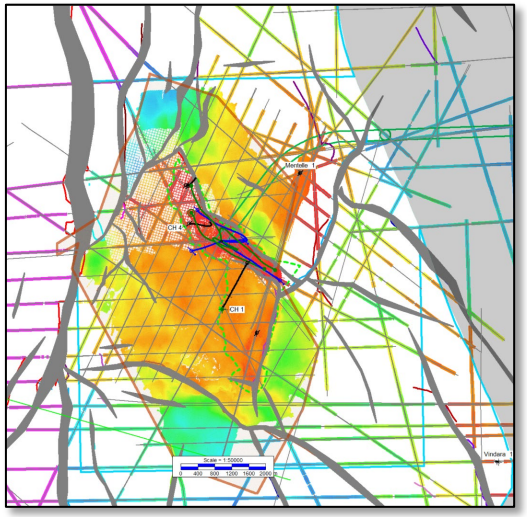


2003 – CH 3D

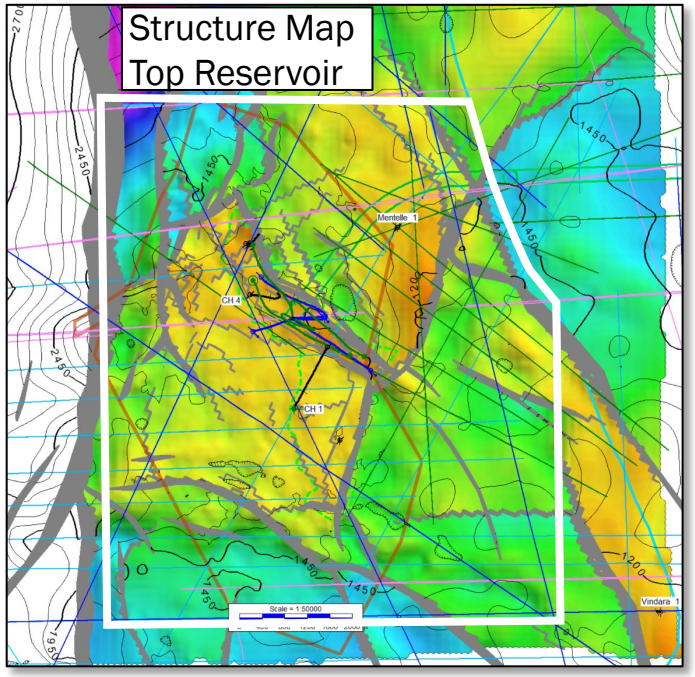
Seismic re-interpretation

CCS application

- 2022 – revise and extend mapping to the full license area to support GHG capture model
- Outward looking, regional

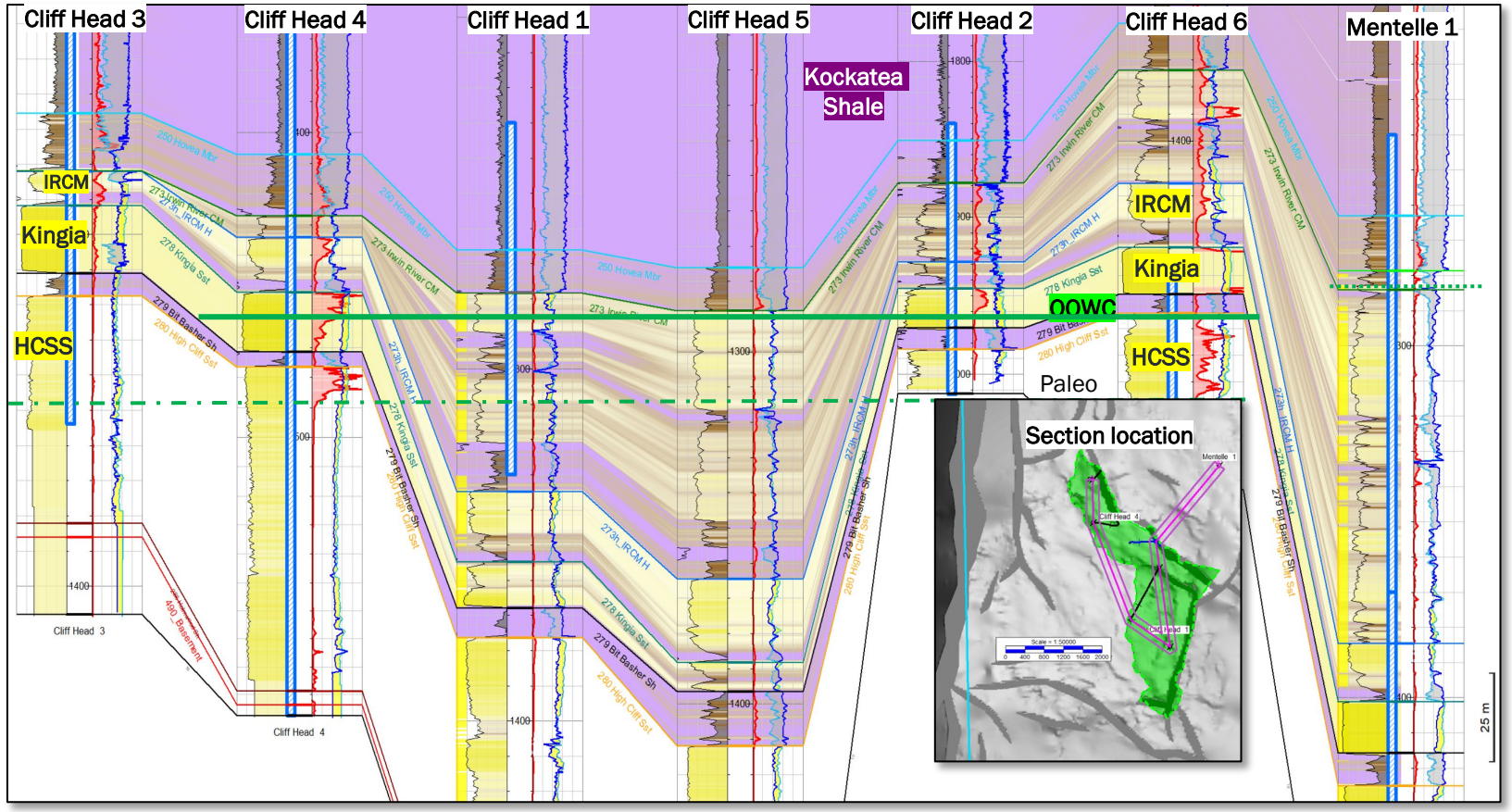


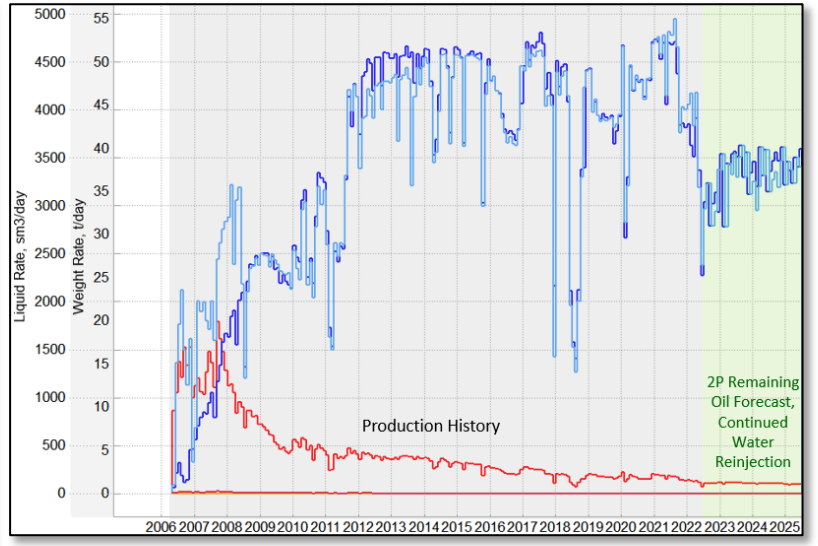
2022 revise, extend



Well and production data

Extensive and long-term production and injection history





Production & Injection history

- Volume and pressure
- Re-injection volume & pressure

Injection history with no evidence of leakage, fault reactivation or induced seismicity substantially de-risks Cliff Head CCS Project

Timeline of drilling

- Cliff Head 1 discovery 2002
- Appraisal 2, 3, 4 (2003) and Appraisal 5, 6 (2005)
- Development 7, 8, 9, 10, 11, 12, 13 (2006)
- Offset exploration; Mentelle 1, Twin Lions 1, Vindara 1

Comprehensive suite

- LWD and Wireline logs
- Core and plugs
- Leak-off, caliper, FMI

Declaration of Storage Formation

Detailed Regulations - OPGGS Act Regulations Schedule 1

Suitability Determinant	Element	Assessment Program
Overarching	CO2 source, compositions, injector locations, rates, volumes and durations	Injection rates, location agreed
Geology of the Storage Formation	Exploration and production history, seals, reservoirs, faults, wells (integrity), reactivity, stress regime, rock strength, fault seal integrity, seismicity	New static model constructed; full geomechanical assessment of rocks and faults completed; charge history of field assessed
Plume Migration & Predictions	CO2 injection and migration modelling	Development plan produced and plume migration model
Engineering Enhancements	What if any engineering enhancements are intended	Completed as part of plume modelling, construction of site plan
Spatial Extent of the Storage Formation	Extent of the plume from the start of injection to plume stabilisation	Plume modelling to establish plume will remain within the ISFm with stabilization achieved after approximately 100 years

AUSTRALIA

Offshore Petroleum and Greenhouse Gas Storage (Greenhouse Gas Injection and Storage) Regulations 2011

Select Legislative Instrument No. 107, 2011

made under the

Offshore Petroleum and Greenhouse Gas Storage Act 2006

Compilation No. 1

Compilation date:	1 October 2020
Includes amendments up to:	F2020L01186
Registered:	26 October 2020

Schedule 1—Information in application for declaration of a part of a storage formation as identified greenhouse gas storage formation

Part 1—Information about the storage formation

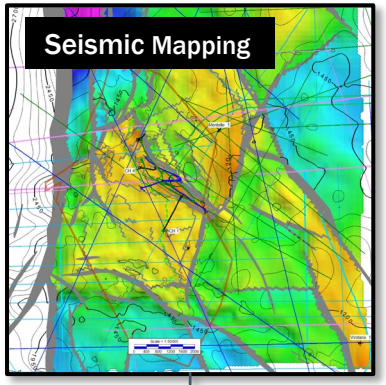
Part 2—Information about plume migration

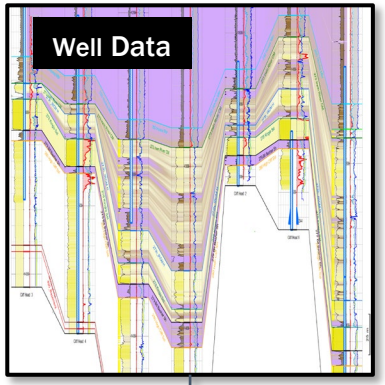
Part 3—Information about engineering enhancements

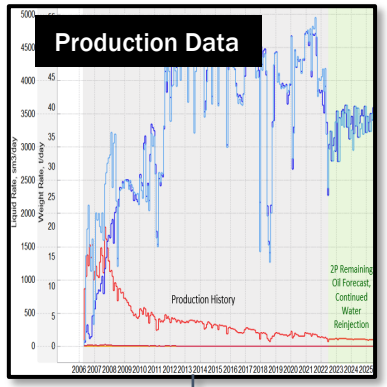
Part 4—Information about estimated spatial extent of the storage formation

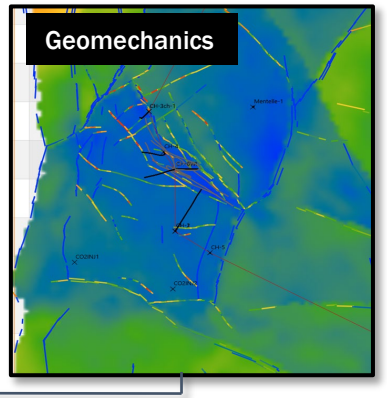
CCS Approval Journey

Focussing in on project viability driven by rigorous geoscience and engineering against suitability









STATIC GEOLOGICAL MODEL

DYNAMIC GEOLOGICAL MODEL

Update static model,
re-run dynamic model,
review plume extent

CCS Capacity

Sensitivity check

Project Plan

CO_2 injection rates
Pressure management
H_2O removal
Sensitivity modelling

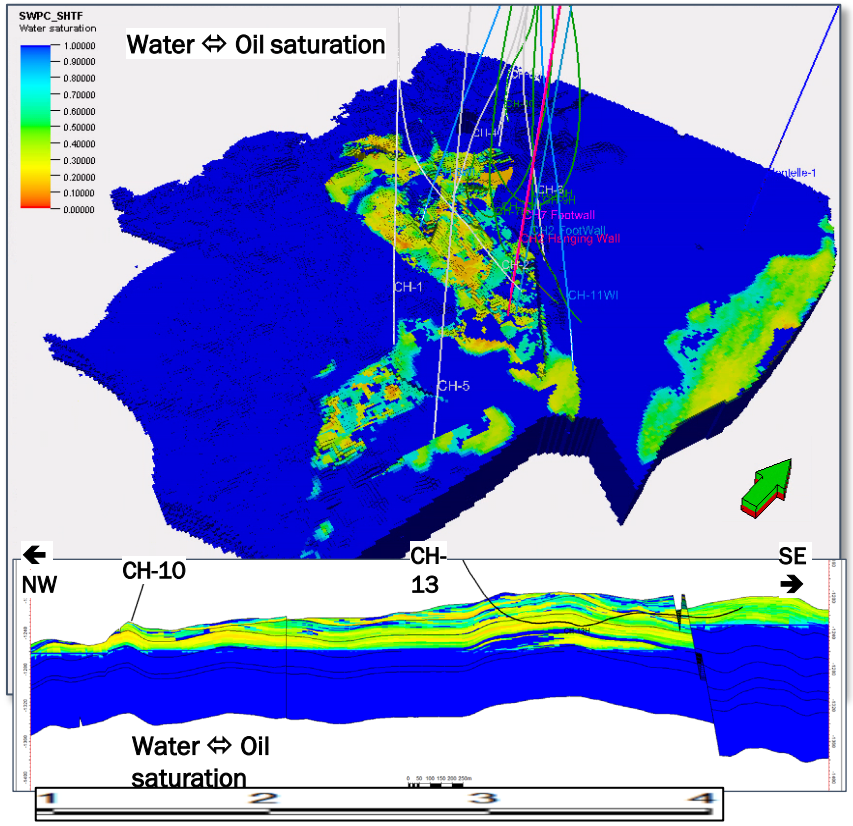
Application for DoSF

Static and dynamic modelling – production then storage

Historical black oil reservoir model used for initial project screening

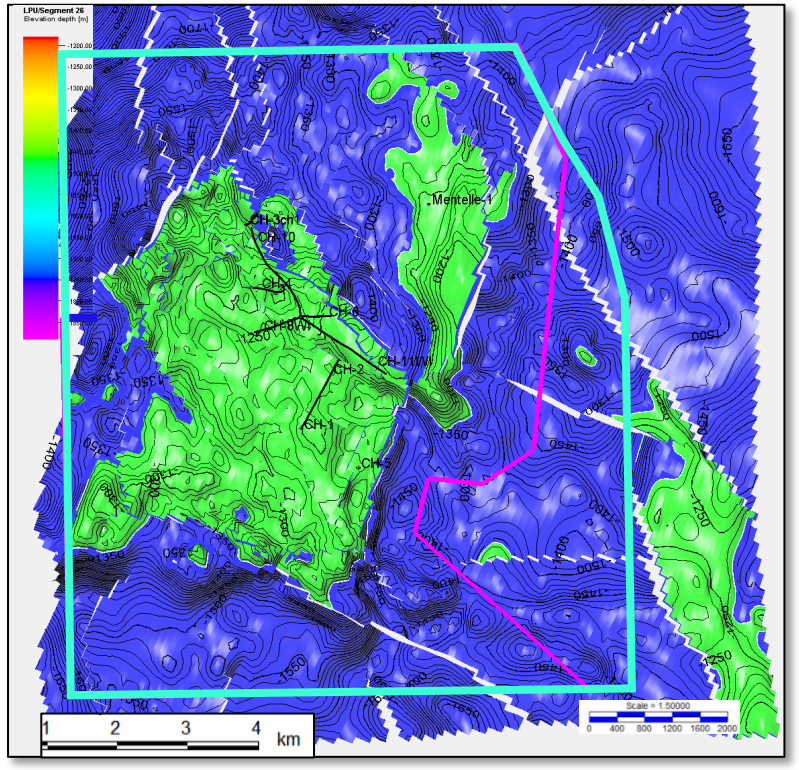
Black Oil model – Production phase

- Geology + Geophysics + Engineering ➔ Static model
- Production history matching ➔ Dynamic model
- Revised and updated through to 2020



Revised Static and Dynamic model - CO_2 injection phase

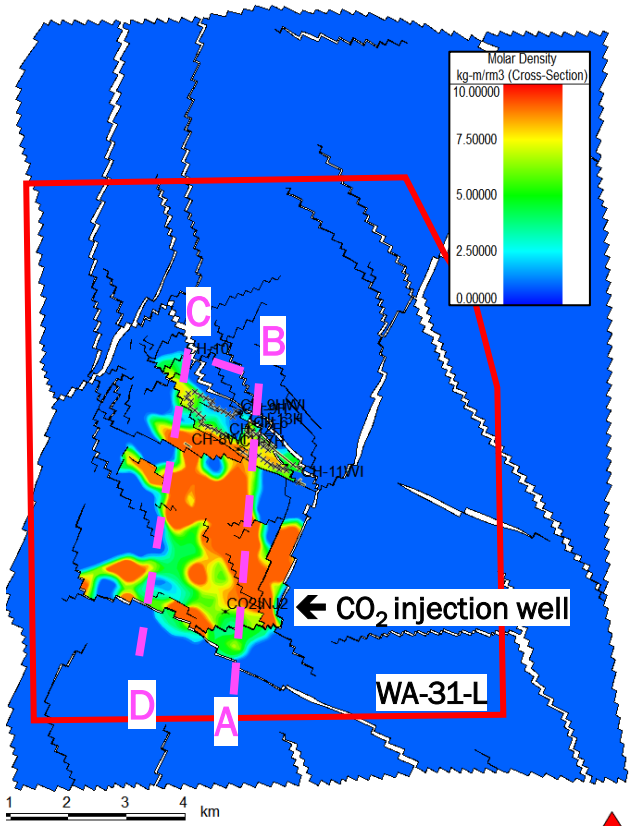
- Revised and extended to license boundary and natural constraints;
  - Saddle / spill to north, and Geraldton fault to west
  - Identify storage areas (attics) within WA-31-L

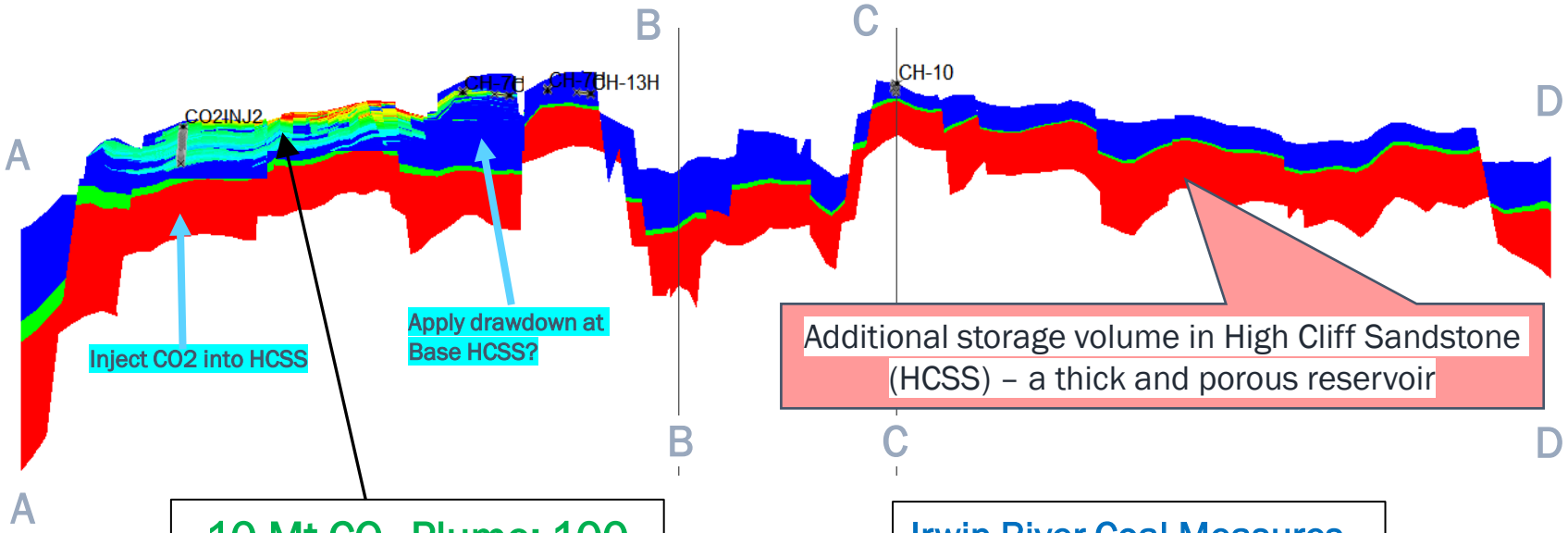


Dynamic modeling – create and test injection scenarios

New build fit-for-purpose CCS static and dynamic reservoir modelling

- Injection into IRCM oil reservoir on flank, water withdrawal at crest
- The plume travels from the southerly injection site, moving through the upper IRCM due to buoyancy
- Some migration into the underlying HCSS via fault juxtaposition
- Pressure management is required





10 Mt CO_2 Plume: 100 Years after End Injection

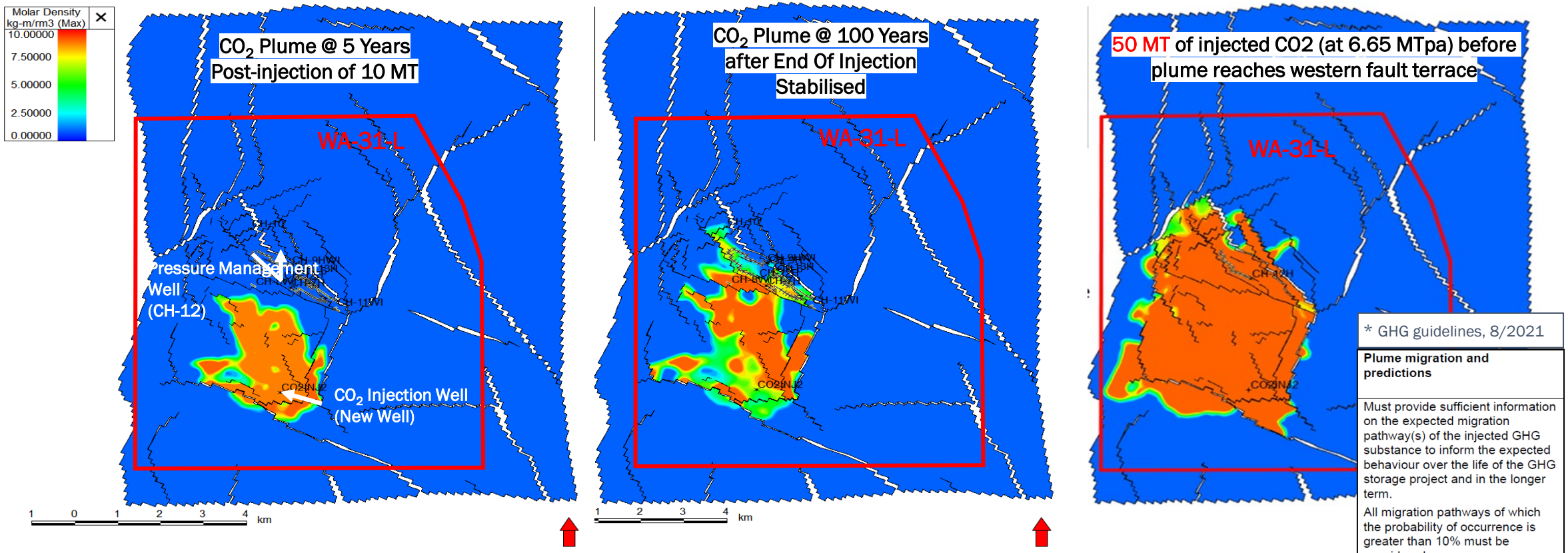
Irwin River Coal Measures
Bit Basher Shale
High Cliff Sandstone

Dynamic modeling – plume extent and containment

Fundamentally determination of storage formation suitability focuses on potential “end” of project

Objectives set by OPGGSA

- Extent at end of injection
- Stabilised extent 100 years post injection, within license area
- Less than 10% chance of contact with potential leak point*



* GHG guidelines, 8/2021

Plume migration and predictions
Must provide sufficient information on the expected migration pathway(s) of the injected GHG substance to inform the expected behaviour over the life of the GHG storage project and in the longer term.
All migration pathways of which the probability of occurrence is greater than 10% must be considered.

Risk Assessment – is it safe?

Containment Objectives

- Top Seal
  - Effectiveness and within failure limit
- Fault considerations;
  - What if/when the plume reaches the faults?
  - Pressure at which reactivation might occur?

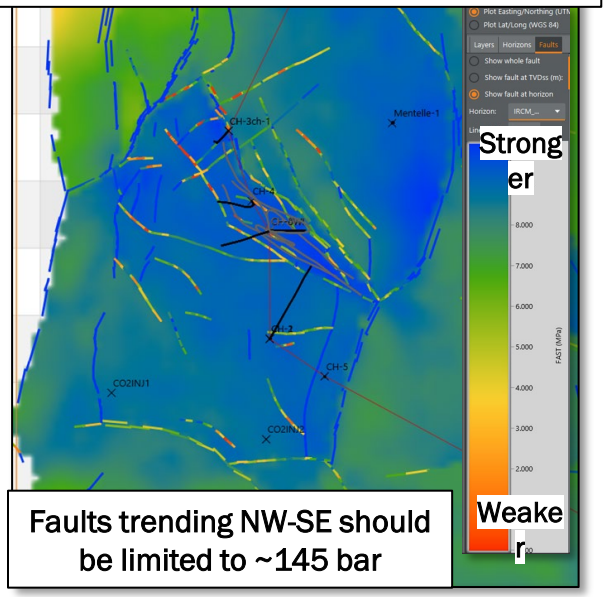
Geomechanical model

- To determine failure limits / orientation of faults & top seal
- Profile and map views

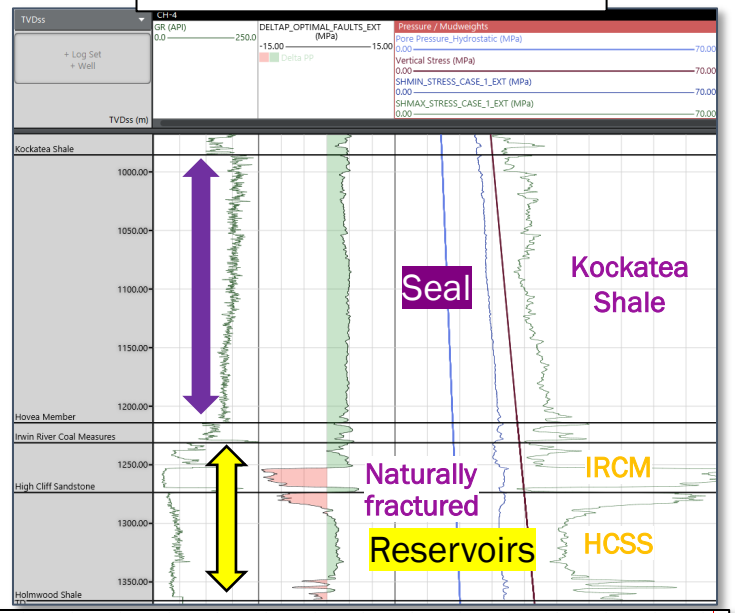
Engineering model and verification

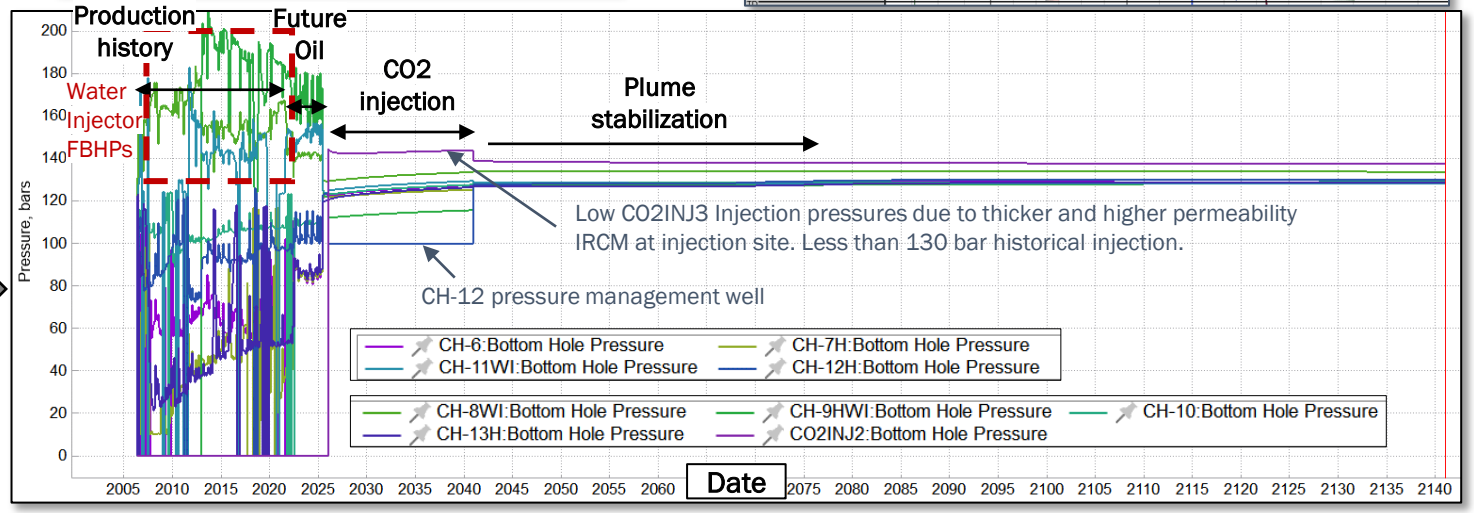
- Injection of CO2 into voidage created by water withdrawal (pressure management wells)
- Historical injection pressure data is invaluable to ground-truth the prediction

Faults trending SW-NE are in compression



Top seal is thick and competent





DoSF application checklist

Robust technical assessment & very conservative storage case complies with OPGGSA Regulations Schedule 1

Suitability Determinant	Element	Assessment Program	Status
Overarching	CO2 source, compositions, injector locations, rates, volumes and durations	Injection rates, location agreed	Assessed, modelled, demonstrated
Geology of the Storage Formation	Exploration and production history, seals, reservoirs, faults, wells (integrity), reactivity, stress regime, rock strength, fault seal integrity, seismicity	New static model constructed; full geomechanical assessment of rocks and faults completed; charge history of field assessed	Assessed, modelled, demonstrated
Plume Migration & Predictions	CO2 injection and migration modelling	Development plan produced and plume migration modelled; one injector and one pressure management well; injection of 665 Kt/annum for 15 years; a total of 10 Mt of CO2 can be injected safely with complete containment	Assessed, modelled, demonstrated; simulated plume will remain within WA-31-L and will remain well within the approximate limits of the Cliff Head Field horst
Engineering Enhancements	Engineering enhancements restricted to pressure management at CH-12	Completed as part of plume modelling, construction of site plan	Assessed, modelled, demonstrated
Spatial Extent of the Storage Formation	Extent of the plume from the start of injection to plume stabilisation	Completed as part of plume modelling; plume will remain within the ISFm with stabilization achieved after approximately 100 years	Assessed, modelled, demonstrated

Conclusions - size of prize

2C storage resource over 10 MT with significant storage upside over 50 MT (P10)

Status

- The initial modelling to support the ISFm application supports a conservative 10 MT
- Significant storage capacity upside over 50 MT
- Sensitivity testing identified the key parameters, and additional dynamic runs measured the low and high side outcomes
- Only the IRCM was actively injected and pressure managed.

Opportunities identified for investigation

- Pressure management scenarios may increase the upside considerably;
- Use of two wells to create an “interference front” causing the plume to spread out?
- Water withdrawal at base of thick and porous HCSS may extend storage volume & duration of injection

Further work

- Modelling of the additional ISFm development scenarios to maximize storage resource is underway by CO2tech

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