



Australia's National
Science Agency

GISERA | Gas Industry Social and Environmental Research Alliance

Progress report

Improved approaches to long-term monitoring of
decommissioned onshore gas wells



QGC



Santos



Australian Government
Department of Industry, Science,
Energy and Resources



Supported by
Government of
South Australia



Progress against project milestones

Progress against milestones/tasks are approved by the GISERA Director, acting with authority in accordance with the GISERA Alliance Agreement.

Progress against project milestones/tasks is indicated by two methods: Traffic light reports and descriptive Project schedule reports.

1. Traffic light reports in the Project Schedule Table below show progress using a simple colour code:

- **Green:**

- Milestone fully met according to schedule.
- Project is expected to continue to deliver according to plan.
- Milestone payment is approved.

- **Amber:**

- Milestone largely met according to schedule.
- Project has experienced delays or difficulties that will be overcome by next milestone, enabling project to return to delivery according to plan by next milestone.
- Milestone payment is withheld.
- Milestone payment withheld for second of two successive amber lights; project review initiated and undertaken by GISERA Director.

- **Red:**

- Milestone not met according to schedule.
- Problems in meeting milestone are likely to impact subsequent project delivery, such that revisions to project timing, scope or budget must be considered.
- Milestone payment is withheld.
- Project review initiated by GISERA Director.

2. Progress Schedule Reports outline task objectives and outputs and describe, in the 'progress report' section, the means and extent to which progress towards tasks has been made.

Project schedule table

TASK NUMBER	TASK DESCRIPTION	SCHEDULED START	SCHEDULED FINISH	COMMENT
1	Review of well integrity risks for decommissioned wells	Sept-19	Dec-19	
2	Assessment of decommissioned wells in the Northern Territory and establishment of monitoring parameters	Dec-19	Apr-20	
3	Evaluation of long-term monitoring methods for decommissioned wells	Mar-20	Aug-20	
4	Alternative decommissioning approaches to reduce post-decommissioning well integrity risks	Jun-20	Jul-20	
5	Develop an approach for assessing the appropriate monitoring to implement on a well	Jul-20	Oct-20	
6	Final reporting	Oct-20	Dec-20	

Project schedule report

TASK 1: Review of the contributing factors and their impacts on the integrity of decommissioned wells and develop a risk assessment approach

BACKGROUND

Decommissioning wells at the end of their lifecycle may impose a risk to the surrounding environment due to the probability of creation of leakage pathways. Therefore, it is of utmost importance to determine the crucial factors which contribute to the creation of leakage pathways and subsequently compromise the integrity of the decommissioned wells. The associated risks of leakage pathways formation should be identified to be able to perform risk assessment analyses.

TASK OBJECTIVES

1. Review worldwide literature on well integrity failure mechanisms.
2. Review worldwide literature on well integrity failures for decommissioned wells.
3. Review risk assessment methodologies appropriate for well integrity, particularly post-decommissioning.
4. Develop a generic risk assessment approach for assessing post-decommissioning well integrity risks, possible failure modes, and key parameters that determine risk.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

An internal report summarizing the literature and risk assessment approach. This internal report will be incorporated into the project's final report.

PROGRESS REPORT

Task 1 has been completed with the internal report provided to GISERA.

TASK 2: Review of well integrity risks for decommissioned wells in the Northern Territory and establishment of monitoring parameters

BACKGROUND

The NT has a range of petroleum resources including shale resources that are under active exploration and conventional resources that have been produced for a long period of time. This task will use existing wells as case studies for applying the risk assessment methodology to a number of wells to determine well integrity risks post-decommissioning. Based on this risk assessment, the critical parameters that contribute to well integrity risk in decommissioned wells will be used to determine parameters that could be monitored. Consideration will be given to whether any parameters provide a warning of potential well integrity.

TASK OBJECTIVES

1. Using the approach developed in Task 1, performing a risk assessment to gain a better understating of the potential hazards concerning decommissioned wells in the Northern Territory using example wells.
2. Develop monitoring criteria based on failure modes identified in the risk assessment.

3. Conduct a workshop with regulator, industry, and technical experts to ground truth the risk assessment and monitoring criteria.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

An internal report summarising the results of the risk assessment and monitoring criteria. This internal report will be incorporated into the project's final report.

PROGRESS REPORT

The risk assessment component has been completed. Further refinement of the manner in which the assessment has been approached to include features of the GBA causal network approach and bow-tie diagrams to allow focus on the risks to key well integrity elements. The risk assessment will be included as an appendix to the final project report.

TASK 3: Evaluation of long-term monitoring methods for decommissioned wells

BACKGROUND

In this task available technologies for monitoring of decommissioned wells will be evaluated, with consideration given to:

1. Direct monitoring of the well at the surface.
2. Direct monitoring of the well in the subsurface; and
3. Indirect monitoring (through monitoring bores for example).

The effectiveness of these monitoring techniques will be reviewed against the potential failure modes identified in Task 2. The implementation of monitoring methods may also introduce additional risks, either to the integrity of the well itself or as a potential additional source of environmental harm (a monitoring bore for example). The risks presented by the different monitoring methods will also be assessed, along with the practicality of their deployment.

TASK OBJECTIVES

1. Review literature for available monitoring techniques for abandoned well.
2. Investigate possible methods for monitoring parameters identified in Task 2
3. Assessment of the practicality, effectiveness, and risks of deploying monitoring techniques identified.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

An internal report summarizing the literature on long-term monitoring techniques and their effectiveness according to wellbore characteristics. This internal report will be incorporated into the projects final report.

PROGRESS REPORT

The review of long-term monitoring methods has been complete and included in the final project report.

TASK 4: Alternative decommissioning approaches to reduce post-decommissioning well integrity risks and monitoring requirements.

BACKGROUND

The monitoring requirements for wells post-decommissioning may be reduced if the risks of well integrity failure can be reduced through the design, operation, and eventual decommissioning of the well. Additionally, the way a well is decommissioned may facilitate different types of monitoring

TASK OBJECTIVES

To conduct a high-level review of well decommissioning approaches that

1. reduce the risk of decommissioned wells losing integrity, based on the risk assessment conducted in Task 2; and
2. facilitate monitoring of well integrity long term.

The current requirements of the NT Code of Practice for Petroleum Activities for well decommissioning will be used as a baseline for this assessment.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

An internal report summarizing alternative approaches to well decommissioning. This internal report will be incorporated into the projects final report.

PROGRESS REPORT

The review of alternative decommissioning methods has been completed. This task was conducted in conjunction with a similar review for project G.6. which is looking at technologies for remediation of methane gas migration and emission along the microfractures/microannuli behind external well casings. This review has been included in the final project report.

TASK 5: Develop an approach for assessing the appropriate monitoring to implement on a decommissioned well.

BACKGROUND

The implementation of long-term monitoring for decommissioned wells is likely to be most effective if that monitoring is designed according to the risk profile presented by the well. A workflow for assessing the risks and selecting appropriate monitoring will help to ensure a consistent approach and consideration of all relevant factors.

TASK OBJECTIVES

Development of a workflow for assessing the post-decommissioning well integrity risks for wells in the NT and the selection of appropriate monitoring methods will be developed. This task will include a workshop with key stakeholders to discuss this workflow.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

The workflow developed in this task will be incorporated into the final report for the project.

PROGRESS REPORT

This milestone is complete. The development of a monitoring approach for decommissioned wells has been completed and included in the final report. Following feedback from the knowledge transfer session, additional information on identifying and locating older decommissioned wells is being added to the final report.

TASK 6: Final report

BACKGROUND

The final report for this project will collate the outputs from task 1 to 5. The report will also include a section on identifying any gaps in the available monitoring technologies and the implications of those gaps, including recommendations for further research.

TASK OBJECTIVES

Synthesize the outputs of tasks 1 to 5.

TASK OUTPUTS AND SPECIFIC DELIVERABLES

A final report bringing together the outputs from all tasks.

PROGRESS REPORT

This milestone is complete. The report is now available for viewing [here](#).

Variations to Project Order

Changes to research Project Orders are approved by the GISERA Director, acting with authority, in accordance with the [GISERA Alliance Agreement](#). Any variations above the GISERA Director's delegation require the approval of the relevant GISERA Research Advisory Committee.

The table below details variations to research Project Order.

Register of changes to Research Project Order

DATE	ISSUE	ACTION	AUTHORISATION

As Australia's national science agency and innovation catalyst, CSIRO is solving the greatest challenges through innovative science and technology.

CSIRO. Unlocking a better future for everyone.

Contact us

1300 363 400
+61 3 9545 2176
csiro.au/contact
csiro.au

For further information

1300 363 400
gisera.csiro.au

GISERA is a collaboration between CSIRO, Commonwealth and state governments and industry established to undertake publicly-reported independent research. The purpose of GISERA is to provide quality assured scientific research and information to communities living in gas development regions focusing on social and environmental topics including: groundwater and surface water, greenhouse gas emissions, biodiversity, land management, the marine environment, and socio-economic impacts. The governance structure for GISERA is designed to provide for and protect research independence and transparency of research.