# 25 March 2024

# ASX Announcement

# Ramsay Project

# Interim Exploration Well Testing Update

## Confirmation of up to 17.5% Purity for Helium - Ranks Amongst the Highest Purity Levels Globally

**Highlights:**

- **Interim Test Update –** Successful exploration well testing operations, which are pioneering for both Natural Hydrogen and Helium in a non-petroleum system, are nearing completion at the site of the Company's successful Ramsay 1 and Ramsay 2 exploration wells. Operations have now been suspended to provide the crews with a mandatory work break, and will resume after Easter.
- **Testing Objectives –** to obtain samples of both Natural Hydrogen and Helium for specialist composition and isotopic analysis in world-leading laboratories and to extract both Natural Hydrogen and Helium to surface. Both have been achieved.
- **World Leading Helium Purity Levels -** Testing and analysis to date following the drilling of both Ramsay 1 and Ramsay 2 **confirms up to 17.5% purity for Helium** in the MDT sample taken from the Ramsay 2 well, on an air-corrected basis. This provides clarification of the results disclosed by the Company in its 6 and 19 December 2023 ASX releases. These results are believed to be amongst the highest ever recorded purities for Helium in the world.
- **Permeable Formation –** Results demonstrate that the formation is permeable and producing fluids and gas from all of the formations tested to date, and has produced both Natural Hydrogen Helium to the surface. Permeability and ability to flow gas to surface was one of the key objectives of testing, and a significant derisking milestone for the Company.
- **Next stage of Testing –** based on these promising results it is now appropriate to conduct a longer term extended exploration production test to understand how future wells will perform during the production phase of the project. **Stage 2** testing will concentrate on producing the well (via a down hole pump or other process to remove the formation fluid) while monitoring gas rates at surface. This information will then feed into the design of a future proof-of-concept Natural Hydrogen and Helium pilot plant.

Gold Hydrogen Managing Director, Neil McDonald said: *"To have found and confirmed both Natural Hydrogen at up to 86% purity and Helium up to 17.5% air-corrected purity in our Ramsay 1 and 2 wells is truly amazing. And to also evidence from our Stage 1 well testing that we are recovering both Natural Hydrogen and Helium to surface from multiple formations at such an early testing stage indicates that we are well on the journey to produce both Natural Hydrogen and Helium at commercial levels as we ultimately progress. We have very large prospective resources for both gases, and that is only over a portion of the Ramsay Project permit. We look forward to the recommencement of testing in April."*

The Directors of Gold Hydrogen Limited (**Gold Hydrogen**, ASX: **GHY**, the **Company**) are pleased to provide an operational update on the Company's groundbreaking Ramsay Project on the Yorke Peninsula, prospective for both Natural Hydrogen and Helium.

## Overview of Initial well Exploration Testing Operations on the Ramsay 1 and Ramsay 2 Wells

The primary objective of the Ramsay 1 and Ramsay 2 well testing program is to obtain gas and fluid samples for compositional and isotopic analysis, which will be undertaken by established local and international third-party laboratories. This was achieved by the initial testing program, with further samples to be collected following the resumption of testing activities in April.

Secondary objectives of the well testing program include the recovery of Natural Hydrogen and Helium at surface from reservoir fluid and gas inflow into the well bore, and quantifying the inflow rates. These objectives have been achieved by the initial testing program, and will continue to be pursued following the resumption of testing activities in April.

Well testing operations have been taking place with sampling conducted by SGS together with Petro Lab and CSIRO. The gas fluid samples will be sent to various local and international laboratories for full gas composition and noble gas isotope analysis. Ongoing data and results will be received periodically, but it is expected that these analyses will take several months to fully complete.

From the well testing data obtained, Gold Hydrogen will better understand the characteristics of the Natural Hydrogen and Helium reservoirs. The data obtained will assist the Company in gaining technical insights into how the Ramsay Project area could be further explored and appraised, including future well designs and testing designs, as well as providing input for a future pilot plant / proof-of-concept plant design.

## Well Testing - Interim Results

The initial results from the Ramsay 1 well test demonstrate that Natural Hydrogen can be recovered at the surface from fluid flow from reservoir below the total loss zone at 316mMD. This confirms the Company's interpretation that not only are Natural Hydrogen and Helium present in the different reservoir units at the Ramsay 1 location (as per Ramsay 1 MDT results recorded at the time of drilling), but it also confirms that both can be recovered at the top of the well bore through natural fluid flow from a large bare foot completion.

The well test of Ramsay 2 is progressing, with initial results from the deeper zones indicating that permeability in the fractured basement and dolomitic Kulpara sections are exceeding expectations and allowing free fluid flow into the well bore. Both Natural Hydrogen and Helium were recovered at surface during the different inflow tests, and the in-depth analysis of the various samples acquired and the inflow rates is ongoing, and will continue following the resumption of testing activities in April.

Analysis of the recovered gas at surface from Ramsay 1 indicated levels of oxygen comparable with the composition of the lifting gas used to evacuate the fluid from the well bore. This suggests no oxygen enrichment occurs from in-situ gas from within the reservoirs, and this is supporting the view that no measurable free oxygen is present in the fractures and pores space in the different reservoir units. Oxygen measured within the MDT samples taken from Ramsay 1 and Ramsay 2 is therefore most likely to be air contamination, rather than a true compositional measurement of the gas from the reservoir pore space.

As outlined in the Company's previous ASX releases of 6 and 19 December 2023, the MDT sample recovered from 778mMD during the drilling of Ramsay 2 recorded a raw Helium concentration of up to 6.8% with significant amounts of oxygen present in the MDT sample. Based on the observations of the recently completed Ramsay 1 well test, this MDT sample will require correction for the interpreted air contamination, resulting in a most likely true concentration of Helium in the MDT sample recorded during the drilling of Ramsay 2 of up to 17.5%.

This is believed to be among the highest concentrations of Helium found in the world and which could be attributed to its presence in a non-petroleum system setting. By comparison, a recent large discovery reported by Pulsar Helium found a Helium concentration of 13.8% (prior to any required air-correction) from Jetstream 1 well in Minnesota, USA1.

Well testing at Ramsay 1 has been finalised, and testing of Ramsay 2 is around 70% complete. Testing has now been suspended due to limits on the well test crews' continuous working days, and will recommence in early April.

## Stage 2 Well Testing Operations and Planning

Stage 1 well testing of Ramsay 1 has demonstrated that Natural Hydrogen can be recovered at the surface from fluid flow from reservoir.

The Stage 1 well test of Ramsay 2 is progressing, with initial results from the deeper zones indicating that permeability in the fractured basement and dolomitic Kulpara sections are exceeding expectations and allowing free fluid flow into the well bore. Both Natural Hydrogen and Helium were recovered at surface during the different inflow tests, and the in-depth analysis of the various samples acquired and the inflow rates is ongoing, and will continue following the resumption of testing activities in April.

[1] https://www.startribune.com/Helium-gas-drilling-iron-range-minnesota-pulsar-edelgas-duluth-metals/600351052/

These results have given the Company confidence to move to a Stage 2, extended exploration production style test, that will provide additional information on how future development / production wells may behave. This further information will feed into the design of a future proof-of-concept pilot plant.

Planning is underway for Stage 2.

## Groundbreaking Exploration Testing for Both Natural Hydrogen and Helium

This well testing program is the first dedicated Natural Hydrogen and Helium well test operation conducted in Australia, and to the Company's knowledge, it is likely one of only a few in the world.

The Company considers this to be the start of an exciting journey, which is not dissimilar to that undertaken by various world-renowned and ultimately successful oil and gas projects, like the early days in the CSG and shale industries. For those particular resources, the exploration and completion techniques were developed and optimised over time, improving project economics and ultimately leading to major projects being developed. We anticipate a similar path forward for our Natural Hydrogen and Helium prospective resources, although the timeframe may be quicker as drilling and completions technologies developed for other gas resources may be applicable to our Natural Hydrogen and Helium projects.

## First Key Step on the Journey to Future Potential Development

The Company is of the view that the Ramsay Project contains significant prospective resources of both Natural Hydrogen and Helium, with large scale potential that it is aiming to be potentially developed over time.

There is very little data available for dedicated Natural Hydrogen wells anywhere in the world due to the lack of analogue wells. Accordingly, there is inherent uncertainty with regard to the expected outcomes of the Ramsay 1 and Ramsay 2 exploration well testing program. To the Company's knowledge, the only Natural Hydrogen field currently in production is located in Mali, West Africa, where Natural Hydrogen production is used to power the small town of Bourakebougou. It has been reported that the Natural Hydrogen wells in Mali do not have any decline in production and are continually regenerating and producing at the same rate.[2]

Helium is extremely valuable and indicatively, longer-term bulk pricing is expected to approximate USD450 per Mcf (thousand cubic feet).[3]

[2] "Natural Hydrogen: a new source of carbon free and renewable energy that can compete with hydrocarbons", First Break Volume 40, October 2022 (available via www.goldHydrogen.com.au/technical-articles/ )
[3] February 2024, www.nobleHelium.com.au , quoting Konbluth Consulting.

Natural Hydrogen has a high energy content, and extracting it even in small quantities may prove commercial for localised applications. Furthermore, given that Helium was also found within both the Ramsay 1 and Ramsay 2 wells, being able to extract and process both gases in small quantities may provide potential short-term commercial and / or proof of concept opportunities to help progress the Ramsay Project.

## Ongoing 2024 Activities

To progress the current focus area of the Ramsay project, and to further explore the balance of PEL 687, a large scale regional 2D seismic project is being designed and costed with acquisition planned for Q2/Q3 2024. The objectives for the seismic program are to assist in the delineation of the potential Natural Hydrogen and Helium accumulation(s), and to support the identification of future drilling targets on the Yorke Peninsula.

Planning is also underway for further exploration drilling activities.

## Important Risk Commentary

It is important to note that there remain both geological and potential development risks associated with the Ramsay Project and the Company's commercial and business objectives. These risks relate to the presence, recovery and potential volumes of both Hydrogen and Helium, but also due to the location of the resource within agricultural areas and the proximity to National Parks on both Yorke Peninsula and Kangaroo Island, requiring significant landholder and community engagement. The worldwide, Federal and South Australian Government and industry efforts to secure Hydrogen as an alternative energy source provides confidence that any technical and social concerns may be overcome.

## About Gold Hydrogen

Gold Hydrogen is focused on the discovery and development of world class Natural Hydrogen and Helium gases in a potentially extensive province in South Australia. This region has recently had its Natural Hydrogen and Helium potential confirmed by the Company via its maiden drilling campaign. The domestic and global demand for Hydrogen and Helium, combined with new exploration techniques and experienced personnel, provides Gold Hydrogen with an extraordinary opportunity to define and ultimately develop a new Natural Hydrogen and Helium gas province.

The combined permit area of the Gold Hydrogen group is approximately 75,332km$^2$. Gold Hydrogen holds one granted exploration license (the Ramsay Project - PEL 687) and its two 100% owned subsidiary companies (White Hydrogen Australia and Byrock Resources) hold an additional seven (7) applications for Natural Hydrogen and Helium exploration within South Australia. Gold Hydrogen is also the preferred applicant for four (4) gas storage exploration licenses applications (GSELA) covering an area of 8,107km$^2$ within the Yorke Peninsula portion of PEL 687 in South Australia. These storage licence applications are in addition to the granted exploration licence and application licences.

The group's permit areas are characterised by low population densities, cooperative stakeholders and aspects of the natural environment suited to the exploration and development of a future Natural Hydrogen and Helium gas province. Gold Hydrogen places considerable importance on close liaison with landholders, traditional owners and all other stakeholders, and this approach has led to the grant of its key tenement PEL 687 in South Australia. The Company intends to continue to invest in these efforts.

**Further Information**

Further information on the Gold Hydrogen group, its projects, and its Board and Management can be found on the Company's website (www.goldHydrogen.com.au) together with a copy of the Company's Replacement Prospectus of 29 November 2022.

Gold Hydrogen also has accounts on LinkedIn and Twitter (@GHY_ASX), and copies of market releases will be emailed to all interested parties who register via info@goldHydrogen.com.au

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This announcement has been authorised for release by the Managing Director.

On behalf of the Board
Karl Schlobohm
Company Secretary

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**Prospective Resource Statements**

The Prospective Resource Statements for Natural Hydrogen and for Helium have been included in this announcement under the approval of Mr Billy Hadi Subrata, Chief Technical Officer for Gold Hydrogen, who is a Qualified Petroleum Reserves and Resources Evaluator. Mr Hadi Subrata confirms that, as at the date of this announcement, there is no change to information or additional information, since the effective dates, that would materially change the estimates of prospective resources quoted.

**Forward Looking Statement / Future Performance**

This announcement may contain certain forward-looking statements and opinion Forward-looking statements, including projections, forecasts and estimates, are provided as a general guide only and should not be relied on as an indication or guarantee of future performance and involve known and unknown risks, uncertainties, assumptions, contingencies and other important factors, many of which are outside the control of the Company and which are subject to change without notice and could cause the actual results, performance or achievements of the Company to be materially different from the future results, performance or achievements expressed or implied by such statements. Past performance is not necessarily a guide to future performance and no representation or warranty is made as to the likelihood of achievement or reasonableness of any forward-looking statements or other forecast. Nothing contained in this announcement, nor any information made available to you is, or and shall be relied upon as, a promise, representation, warranty or guarantee as to the past, present or the future performance of Gold Hydrogen Limited.

**Table 1 – Prospective Resource Statement for Natural Hydrogen**

| Gold Hydrogen's Ramsay Project: Prospective Resources* of Hydrogen in '000 Tonnes – 30 Sept 2021 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **PEL** | **Prospects** | **SPE PRMS Sub-class** | **1U Low Estimate** | **2U Best Estimate** | **Mean** | **3U High Estimate** | | **Pg** | **Pd** | **Pc** |
| **PEL 687** | **All Prospects and Leads** | | **207** | **1,313** | **4,187** | **8,820** | | **22%** | **48%** | **10%** |
| | | | | | | | | | | |
| **Yorke Peninsula** | | | | | | | | | | |
| PEL 687 | Ramsay FB | Prospect | 124 | 931 | 2,712 | 6,989 | | 22% | 50% | 11% |
| PEL 687 | Ramsay Lst | Prospect | 10 | 70 | 191 | 492 | | 26% | 50% | 13% |
| PEL 687 | Maitland | Lead | 7 | 26 | 40 | 92 | | 17% | 35% | 6% |
| **Kangaroo Island** | | | | | | | | | | |
| PEL 687 | Navigator | Lead | 34 | 152 | 280 | 678 | | 19% | 40% | 8% |
| PEL 687 | Kanmantoo | Prospect | 32 | 134 | 237 | 569 | | 25% | 40% | 10% |

***This estimate of Natural Hydrogen Prospective Resources must be read in conjunction with the notes in the Company's ASX release of 13 January 2023.**

**It should be noted that the estimated quantities of Natural Hydrogen that may potentially be recovered by the application of a future development project(s) relate to undiscovered accumulations. These estimates have both an associated risk of discovery and a risk of development. Further exploration, appraisal and evaluation is required to determine the existence of a significant quantity of potentially recoverable Natural Hydrogen.**

**QPRRE Statement – Natural Hydrogen**

The Prospective Resource Statement for Natural Hydrogen in this announcement is based on, and fairly represents, information and supporting documentation prepared by independent consultants "Teof Rodrigues & Associates" with an effective date of 30 September 2021, and which forms part of the Company's Replacement Prospectus dated 29 November 2022. The Prospective Resource Statement, together with all relevant notes, also appears in the Company's ASX release of 13 January 2023.

**Table 2 – Prospective Resource Statement for Helium**

| Gold Hydrogen Prospective Resources* of Helium in Bcf - Ramsay Project (PEL 687 Yorke Peninsula) 21 February 2024 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PEL** | **Prospects** | **SPE PRMS Sub-class** | **Formation** | **1U Low Estimate** | **2U Best Estimate** | **Mean** | **3U High Estimate** | | **Pg** | **Pd** | **Pc** |
| **PEL 687** | **All Prospects** | | **All Formations Total** | **7** | **41** | **96** | **243** | | **17%** | **60%** | **10%** |
| **PEL 687** | **Ramsay Fault Block** | **Prospect** | Kulpara Formation | 0.8 | 3.6 | 7.0 | 17.1 | | 29% | 60% | 17% |
| | | | Winulta Formation | 0.1 | 0.6 | 1.6 | 4.0 | | 12% | 60% | 7% |
| | | | Fractured Basement | 0.7 | 3.8 | 6.9 | 16.7 | | 13% | 60% | 8% |
| | | | **Total** | **2** | **8** | **15** | **38** | | **20%** | **60%** | **12%** |
| **PEL 687** | **South of Ramsay Fault Block** | **Prospect** | Kulpara Formation | 2.1 | 12.8 | 30.5 | 77.6 | | 23% | 60% | 14% |
| | | | Winulta Formation | 0.3 | 2.4 | 7.7 | 19.8 | | 8% | 60% | 5% |
| | | | Fractured Basement Hilbata Suite | 1.6 | 10.3 | 25.5 | 65.2 | | 12% | 60% | 7% |
| | | | Fractured Basement Yorke Peninsula Heel | 1.4 | 7.7 | 17.0 | 42.7 | | 12% | 60% | 7% |
| | | | **Total** | **5** | **33** | **81** | **205** | | **16%** | **60%** | **10%** |

***This estimate of Helium Prospective Resources must be read in conjunction with the notes in the Company's ASX release of 21 February 2024.**

**It should be noted that the estimated quantities of Helium that may potentially be recovered by the application of a future development project(s) relate to undiscovered accumulations. These estimates have both an associated risk of discovery and a risk of development. Further exploration, appraisal and evaluation is required to determine the existence of a significant quantity of potentially recoverable Helium.**

**QPRRE Statement - Helium**

The Prospective Resource Statement for Helium in this announcement is based on, and fairly represents, information and supporting documentation prepared by independent consultants "Teof Rodrigues & Associates" with an effective date of 21 February 2024, and which was announced by the Company on that date together with the accompanying assumptions and notes.