

6 December 2023
ASX Announcement

**Exploration Update: Very High Helium Concentrations Found
at Ramsay 2**

Key Highlights:

1. Completion of Ramsay 2 Well:

- On 1 December, 2023, Ramsay 2 achieved its final Total Depth (TD) of 1068mMD. Logging operations have been successfully completed, and casing has been securely cemented in place.

2. World-Class Helium Concentrations of 6.8%:

- Drilling results reveal very high helium concentrations, reaching up to 6.8% in raw gas from the Kulpara Formation.
- These values would potentially make the Ramsay Project a world-class helium project if they were replicated across the tenement.
- Exploring for helium in a non-petroleum system is groundbreaking, and flow testing of completed wells will ultimately be required to confirm helium concentrations, flow rates, and thus commerciality.

3. Robust Testing Protocols:

- Samples were meticulously collected down the well. Schlumberger (now SLB) conducted the tests, and independent validation by a specialized third-party laboratory ensures the credibility of results.

4. Comparative Excellence:

- Globally, commercially producing helium at less than 1% is commonplace.

5. Comprehensive Analysis:

- In the drilling process, the testing equipment detected both hydrogen and helium. Additional mud gas samples were extracted from key target zones. Ongoing analysis by a specialized third-party laboratory is underway to further confirm the integrity of the results and enhance our understanding of the helium system.

6. Exploration Potential:

- Despite being only the second well in the Company's exploration program, multiple data points throughout the drilling campaign indicate the potential for a significant helium reservoir and a prolific helium system at the Ramsay project site, complementing the established hydrogen play. Subsequent exploration, analysis and future flow testing will provide a clearer picture of this promising opportunity.



In response to the helium findings at Ramsay 2, Gold Hydrogen’s Managing Director, Neil McDonald said:

“These initial helium results from Ramsay 2 are truly world-class. While we were already pleasantly surprised by the previously tested and announced helium found at Ramsay 1, the results from Ramsay 2 of 6.8% helium in the raw gas do not come as a complete shock. Just last week, I had the privilege of attending the World Natural Hydrogen Conference (HNAT), where international scientists shared theories about the simultaneous discovery of helium alongside natural hydrogen. These findings further affirm our commitment to pioneering advancements in the field and underscore the global significance of the Ramsay project.”

The results noted above, although from proven and respected testing methodologies and standards, are samples only and will be advanced with further exploration, analysis and future flow testing. Although Gold Hydrogen is early in its exploration program, these results support the view of the Company that the Ramsay Project has the potential to become a world class natural hydrogen and helium development.

Further to previous market releases regarding its flagship Ramsay Natural Hydrogen Project, the Directors of Gold Hydrogen Limited (**Gold Hydrogen**, ASX: **GHY**, the **Company**) are pleased to provide a preliminary update on the Ramsay 2 exploration well results.

Due to the success of Ramsay 1, it was decided to fast track the exploration program and to drill Ramsay 2, located as shown in **Figure 1**. Drilling at Ramsay 2 commenced on 17 November 2023, and was completed at a total depth of 1068m with all well activities finalised on 1 December 2023. The well was left fully cased and suspended to facilitate potential flow testing.

Mud gas samples were collected and analysed in real time during the drilling of Ramsay 2. This analysis of the mud gas revealed multiple zones with high hydrogen concentrations through the Parara Limestones, the Kulpara Formation and the granitic basement. Laboratory testing is ongoing, with further results to be received in the next week by the Company. A further update will be provided by the Company once all results have been received, compiled and analysed.

Additionally, the real time mud gas analysis recorded the presence of helium, and high helium concentrations were noted within the mud gas while drilling the lower part of the Kulpara Formation, the underlying Winulta Formation, and the basement. Two samples undertaken by SLB were recovered from 778mMD at the base of the Kulpara Formation and their associated gas composition was analysed by a specialised third party lab. Those samples were found to contain 6.8% and 6.1% helium as part of the raw gas composition. The laboratory also advised the Company of air corrected values of 17.5% and 15.9% helium for these samples by mathematically subtracting assumed air contamination due to the presence of oxygen in the sample. Given the fact that both oxygen and nitrogen have now been encountered in both wells, the Company considers that the presence of oxygen and nitrogen in the samples is likely to originate from the formation. Further testing and analysis will confirm this for both Ramsay 1 and Ramsay 2.



Discovering helium without the presence of a petroleum system is unusual and without extensive precedent. These measured helium concentrations are well above average global industry concentration levels reported, and further testing will be required to confirm the final flow rates and helium concentration levels. The origin of the oxygen and nitrogen in the samples is subject of further analysis of the overall hydrogen and helium generation process in the area. In any event, these raw gas composition helium concentrations are potentially world class. They confirm the theory that the basement is generating helium in significant amounts, and that the overlying weathered zone and younger stratigraphy may act as a reservoir retaining the helium in commercial concentrations. Future flow testing of the Ramsay 1 and Ramsay 2 wells will seek to further confirm this theory.

Helium is a valuable and rare commodity, and its unique properties give it a widespread usage in the medical industry, scientific research, space exploration, diving, and energy industry applications. There are a limited number of commercial resources in the USA and Russia and there is currently no way to manufacture helium artificially. As a result, its price fluctuates based on global demand, geopolitical interventions and overall declining supply.

These Ramsay 2 well results follow on from those of the Ramsay 1 well, where the Company previously announced that helium was found at 3.6% on an air corrected basis as advised by the third-party laboratory by mathematically subtracting assumed air contamination. As noted above, the Company now considers that air correction may not be applicable to this sample, and that the presence of oxygen and nitrogen in the sample is likely to originate from the formation. Further testing will confirm this for both wells. The Company advises that the raw gas composition analysis for this sample from Ramsay 1 yielded 1.4% helium. The tested sample from Ramsay 1 was recovered from the granitic basement and indicates there is a potentially significant helium system present within the Ramsay Project area. These helium results are in addition to the already established hydrogen play within the area.

Gold Hydrogen Managing Director, Neil McDonald further said:

“The results from our two wells are truly exciting, solidifying the Ramsay project area as a rich source of both natural hydrogen and helium. These findings validate our strategic decision to fast-track the drilling of our second well, and they provide us with the momentum to expand the project significantly in 2024. Whilst it's early days, these results position us on the path to achieving Australia's first-ever natural hydrogen and helium project. We are eager to continue our exploration, driven by the potential for significant advancements in the energy sector.”

Table 1 – Listing Rule 5.30 Information (Preliminary)

Name:	Ramsay 2
Location (UTM zone 53 GDA2020)	
X	747,761.61
Y	6149371.41
Permit	PEL687
Entity holders	Gold Hydrogen 100%
Resources	Helium
Formation	Kulpara Fm and Winulta Fm
Gross thickness and net pay thickness*	246m Gross
Geological rock type	Dolomites and Dolomitic Sandstones
Depth of the zones tested	778mMD
Type of test and duration	MDT
Phase recovered	Water
Other types of recovery	N/A
Flow rates, choke size, volumes recovered	N/A
Fracture stimulation	None
Material non hydrocarbons	Nitrogen

** Insufficient information is presently available to determine net pay thickness.*

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 hydrogen (and helium), but also due to the location of the project within agricultural areas and the proximity to National Parks on both Yorke Peninsula and Kangaroo Island, requiring significant landholder and community engagement. The worldwide, Australian and South Australian Governments 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 gas in a potentially extensive natural hydrogen province in South Australia. This region has only recently had its natural hydrogen potential identified by the Company. The domestic and global demand for hydrogen, combined with new natural hydrogen exploration techniques and experienced personnel, provides Gold Hydrogen with an extraordinary opportunity to define and ultimately develop a new natural hydrogen gas province.

The combined natural hydrogen permit area of the Gold Hydrogen group is approximately 75,332km². Gold Hydrogen holds one granted petroleum 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 exploration within South Australia.

The Company's Prospective Resource Statement for natural hydrogen is attached as **Table 2**. Helium has also been found in the Company's first two exploration wells.

Gold Hydrogen is also the preferred applicant for four (4) gas storage exploration licenses applications (GSELA) covering an area of 8,107km² 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 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](https://twitter.com/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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Figure 1: Location of Ramsay 1 and 2 Relative to the Historic Ramsay Oil Bore

Table 2 – 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

The Prospective Resource Statement 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.



The Prospective Resource Statement has been included in this announcement under the approval of Mr Billy Hadi Subrata, Chief Engineer 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 date of 30 September 2021, 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.

