

**19 December 2023**  
**ASX Announcement**

## **Ramsay 2 Update**

# **Very High Hydrogen Concentrations up to 86% Purity Found Along with the Very High Helium Concentrations**

### **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. Very High Hydrogen Concentrations up to 86%**

- Post drill analysis of the mudgas samples and the calibrated real time mudgas log data reveal very high air-corrected hydrogen concentrations, reaching up to 86% at shallow levels from 194m through to 536m in the Parara and Kulpara formations.
- These measurements validate the historic results from Ramsay Oil Bore 1 (1931) and confirm the presence of a hydrogen play at shallow depths in the Ramsay Project Area which aligns very closely with the results of Ramsay 1 (October 2023).
- Mud gas data, calibrated with isotube analysis, shows the fractured granitic basement contains significant levels of hydrogen within the open fractures, in line with pre-drill model underpinning the prospective resource assessment.
- Flow testing of completed wells will ultimately confirm hydrogen concentrations, flow rates, and hence the commerciality of the hydrogen play.

#### **3. World-Class Helium Concentrations of 6.8% raw gas:**

- Previously reported drilling results from MDT samples revealed 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 confirm helium concentrations, flow rates, and thus commerciality.

#### 4. 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 ensured the credibility of results.

#### 5. Comprehensive Analysis:

- In the drilling process, the testing equipment detected both hydrogen and helium in the mudgas, with samples of the mudgas analysed from key target zones.
- Multiple target zones have found hydrogen bearing through drilling and logging at various depths and these zones align closely with the original Ramsay oil Bore 1 (1931) results.

#### 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 laterally extensive hydrogen reservoir and a prolific helium system at the Ramsay project site. Subsequent exploration, analysis and future flow testing will provide a clearer picture of this promising opportunity.

**In response to the hydrogen and helium findings at Ramsay 2, Gold Hydrogen's Managing Director, Neil McDonald said:**

*"These hydrogen and helium results from Ramsay 2 are truly world-class and groundbreaking. The drilling of Ramsay 2 and the collection of extensive data during this program has enabled the company to not only confirm and validate the historical results but also identify multiple target zones for both hydrogen and helium. These findings further affirm 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, they 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 an update on the Ramsay 2 exploration well results.

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 production testing.

Mud gas data was recorded, in real time during the drilling of Ramsay 2, with mud gas samples collected at regular intervals in isotubes. The analysis of the mud gas samples from isotubes reveal their content is closely aligned with the real time mud gas log readings, allowing for the quantitative use of the real time mud gas log data for hydrogen concentration measurements. The mud gas log data confirms very high concentrations of hydrogen through the Parara Limestones and the Kulpara Formation at air corrected levels of up to 86%, with the highest hydrogen level measured from a zone between 194 and 199mMD (see **Table 2** and **Figure 1**). These hydrogen levels align with the measurement taken at shallow depths while drilling the historic Ramsay Oil Bore 1 in 1931 that confirmed air corrected hydrogen levels of 76% at 240.8m and then the Ramsay 1 well drilled in October 2023 which recorded an air corrected hydrogen level of 73% at 240m. In addition, high hydrogen levels were found in Ramsay 2 in zones around 288mMD and 531mMD, which align closely with the historic Ramsay Oil Bore 1 well, where hydrogen was recorded at 262m and 508m. See the summary of initial testing results for hydrogen below in **Table 2**.

As previously reported, the real time mud gas analysis also recorded the presence of high helium concentrations within the mud gas the Kulpara and Wilnulta Formations (see **Figure 1**). Further to this, two MDT samples recovered from 778mMD at the base of the Kulpara Formation 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 depth of these sample results, the Company considers that the presence of oxygen and nitrogen is likely to originate from the formation. Further testing and analysis will confirm this for both Ramsay 1 and Ramsay 2.

While drilling the basement, the real time mud gas logging tool recorded high hydrogen and helium values within a zone associated with a large open fracture (see **Figure 1**). Analysis of gas captured in isotubes and iso jars from the basement confirm the high levels of hydrogen as measured in the mud gas. This validates the model that the hydrogen and helium are likely sourced from the basement and that the fractured basement still contains significant concentrations of hydrogen and associated helium in the open fractures.

These results from Ramsay 1 and Ramsay 2 demonstrate that the reported historic hydrogen measurements can be replicated at multiple drill sites with modern drilling technology. They prove there are laterally extensive hydrogen and helium plays present at the location of the Ramsay Project, both in the shallow reservoirs and in the fractured basement in line with the predrill prospective resource assessment. Flow testing of the Ramsay 1 and Ramsay 2 wells will be required to establish the flow rates of both the hydrogen and the helium from the various zones.

Gold Hydrogen Managing Director, Neil McDonald further said:

*"These initial results from our two wells are world class. While 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)**

<b>Name:</b>	<b>Ramsay 2</b>
<b>Location (UTM zone 53 GDA2020)</b>	
<b>X</b>	747,761.61
<b>Y</b>	6149371.41
<b>Permit</b>	PEL687
<b>Entity holders(s)</b>	Gold Hydrogen 100%
<b>Resources</b>	Hydrogen
<b>Formation</b>	Parara Lst, Kulpara Fm and basement
<b>Gross thickness and net pay thickness</b>	Gross thickness Parara Lst 278m, Kulpara Fm 344m and basement minimum 218m
<b>Geological rock type</b>	Limestones, Dolomites and fractured Granites
<b>Depth of the zones tested</b>	194-199mMD/288-293mMD/531-536mMD/995-1010mMD
<b>Type of test and duration</b>	Calibrated mud gas log data and isotubes
<b>Phase recovered</b>	Gas
<b>Other types of recovery</b>	N/A
<b>Flow rates, choke size, volumes recovered</b>	N/A
<b>Fracture stimulation</b>	None
<b>Material non hydrocarbons</b>	CO2 and Nitrogen

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

**Table 2 – Summary of Hydrogen Results for Ramsay 1 and Ramsay 2**

	Ramsay 2		Ramsay 1		Ramsay 1 oil	
Formation	DQ1000		Isojar		Fluid Sample	
	Depth (m)	H2 %	Depth (m)	H2 %	Depth (m)	H2 %
Parara	194 - 199	86.26%	240	73.30%	240	76%
Parara	288 - 293	81.76%			260	73.10%
Kulpara	531 - 536	80.92%			507	89.30%

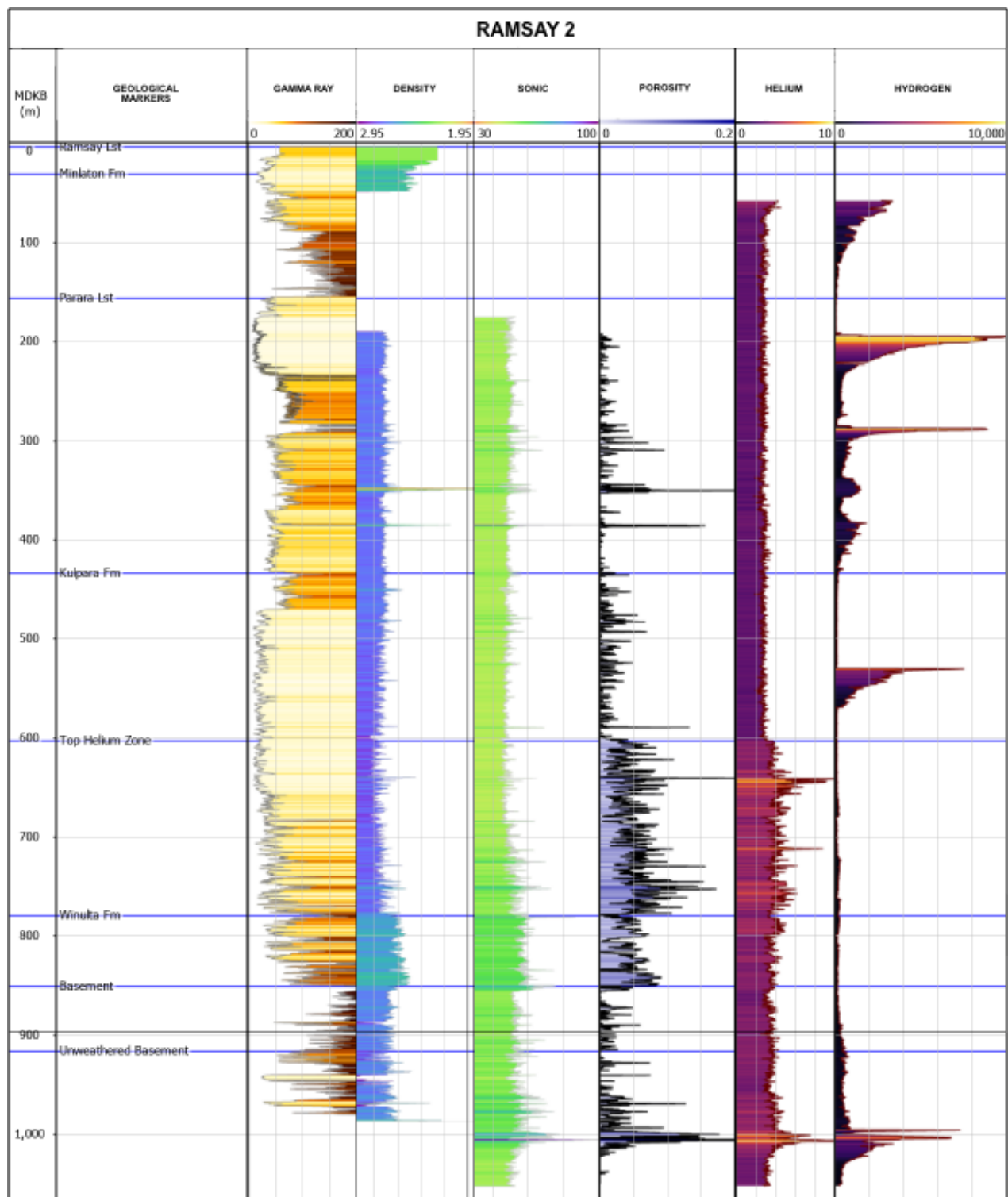


Figure 1: Ramsay 2 well with logs, including the helium and hydrogen continuous mud gas logs

### **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, 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 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 75,332km<sup>2</sup>. 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 is attached as **Table 3**.

Gold Hydrogen is also the preferred applicant for four (4) gas storage exploration licenses applications (GSELA) covering an area of 8,107km<sup>2</sup> 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](http://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](mailto: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 2: Location of Ramsay 1 and 2 Relative to the Historic Ramsay Oil Bore



**Table 3 – 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.

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