



17 October 2024

ASX Announcement

Ramsay Project - Helium Testing Update

Testing results of up to 36.9% purity¹ for Helium recorded at the well head/surface. Recent independent and in-house studies confirm Helium purity levels, additional flow data, and the identification of broad target zones for further drilling.

Highlights:

- **Gold Hydrogen continues to evaluate the chemistry, geotechnical data and flow rates relating to the successful completion of the inaugural Ramsay Project drill program.**
- **Results achieved to date confirm that the Ramsay Project has significant potential to be a commercially attractive Natural Hydrogen and Helium producer.**
- **CSIRO reporting and data confirms the highest Helium purities ever sampled in groundwater in Australia by the CSIRO noble gas laboratory, ranging from purity levels of 20% to 25%¹ (50,000 times the concentration in the atmosphere).**
- **The Helium flow testing program has confirmed Helium to surface, with helium content increasing as the hole stabilized (refer Figure 1). World-leading Helium purity levels sampled up to 36.9%¹ at the well head during testing.**
- **Samples of Helium were successfully obtained for specialist composition and isotopic analysis in specialist laboratories in Australia, London and Paris, with final results expected shortly.**
- **Drill analysis identified potential 180m thick and extremely high-purity Kulpara Dolomite zone which featured positive Helium shows in the Stage 1 exploration well testing of Ramsay 2.**
- **2D seismic survey results indicate further optimal locations across a regional play for future drilling in PEL 687, for both Natural Hydrogen and Helium. Current and historical evidence confirms the presence of both Natural Hydrogen and Helium in numerous locations across the permit (refer Figure 3).**
- **The Company is preparing new drilling and exploration designs to optimize the extraction of both Natural Hydrogen (1.3 billion Kg Best Estimate Prospective Resource) and Helium (41 BcF Best Estimate Prospective Resource) for its next drilling campaign. Refer Tables 4 and 5 for full details of Prospective Resources.**

¹ All Helium sample results have been corrected for air contamination

- **CSIRO reporting and data confirmed the highest Helium purities ever sampled in groundwater in Australia by the CSIRO noble gas laboratory ranging from 20% to 25%²** – CSIRO reporting and data on samples taken during Stage 1 on groundwater samples of well testing from March and April in the granitic basement at 1005m and Kulpara dolomite at 712m depth consistently in a range from 20% to 25%² that these are the highest purities of Helium ever sampled in groundwater in Australia by the CSIRO noble gas laboratory.
- **Samples and analysis undertaken by revealed Helium purity levels sampled up to 36.9%² at the well head which is believed to be world leading** - Testing and analysis received to date for the exploration well testing of Ramsay 1 and Ramsay 2 showed up to 36.9% purity² for Helium recorded in the separator at the well head, on an air and nitrogen corrected basis. This is in addition to other pressurized downhole samples reporting 20% to 25%². These results are believed to be currently the highest ever recorded purities for Helium in the world on an air-corrected basis.
- **Exploration flow testing results** – The testing program proved that Helium can be extracted to the surface, and the graph in **Figure 1** confirms the ongoing increase in purity during testing as the well cleaned up. This location showed water ingress during testing but the analysis indicated that Ramsay 1 could flow up to 100 MScf/day with water on an unconstrained basis.
- **Seismic survey results** - Based on the review of the 575-line kilometer 2D seismic survey, the Company has identified several locations which are higher up the structure, and hence more suitable to test the flow potential of the prognosed Ramsay accumulations.
- **Isotopic analysis** – Samples of Helium were successfully obtained for specialist composition and isotopic analysis in world-leading laboratories in Australia, London and Paris. The Company is expecting the final reports from the analysis of these samples shortly.
- **Testing and verification by Petrolab** - The pressurised downhole samples have been tested and analysed by Petrolab in Adelaide for consistency. Two of the results from Stage 1 exploration well testing (12.6%² He, and 17.9%² He) are in addition to the 17.5%² He result disclosed by the Company in its 6 and 19 December 2023 and 25 March 2024 ASX releases.
- **Potentially prolific 180m thick Kulpara Dolomite Helium zone** – The Company has previously reported that multiple and significant Helium spikes and readings were recorded from the mud gas through the initial drilling phase in the Kulpara Dolomite section. During the Stage 1 exploration well testing of Ramsay 2, the Company perforated five (5) individual sections in the Kulpara Dolomite formation and obtained downhole pressurised water samples confirming Helium concentrations in the separated gas of 12.6%² at 642m, and 17.9%² at 712m which is in addition to the Helium concentration of 17.5%² found in the MDT sample taken at 778m (**Refer Figure 2 and Table 1 below**).

² All Helium sample results have been corrected for air contamination

- **Permeable formations** – The formations tested in the Ramsay 1 and Ramsay 2 wells have resulted in both Natural Hydrogen and Helium being detected at surface after allowing a period of shut-in at each well site. The results from the well testing program received to date have demonstrated the permeability in the Natural Hydrogen and Helium reservoir sections, which was one of the key objectives of the well testing program, and represented a significant derisking milestone for the Company. The follow-up Stage 2 testing was conducted by installing a downhole pump to clean up the water out of the formation, and at the same time stripping the gas with separator at surface. A high productivity index up to 34 bbl/day/psi was calculated from Ramsay 1 with average gas-water-ratio (GWR) of 3.05 scf/bbl. The Company is now studying future development options to extract free Natural Hydrogen and Helium from new wells to be drilled in up-dip locations, coupled with stripping the gas at surface from water in a downdip location.

Gold Hydrogen Managing Director, Neil McDonald said: *“The results that we continue to receive are highly encouraging. As an overview of our achievements to date, we have identified a potentially prolific 180m thick Helium-bearing section of the Kulpara Dolomite formation, we have recorded Helium at surface in the separator at world-leading purities of 36.9%³, in addition to the CSIRO dissolved gas in water results of 20% to 25%³ purity, as well as three pressurised and verified samples of 17.9%³, 12.6%³ and 17.5%³ purity for Helium at different depths ranging from 642m through to 778m during Stage 1 testing at Ramsay 2. As there has been extremely limited exploration for Helium in a non-petroleum system undertaken to date, it remains open as to where the final limits will eventually be. We have very large prospective resources for both Natural Hydrogen and Helium, covering only a portion of the Ramsay Project permit. We look forward to receiving further results of the international isotopic analysis, and planning for future commercialisation of this rare and potentially large world class Natural Hydrogen and Helium project.”*

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 Exploration Well Testing Operations on the Ramsay 1 and Ramsay 2 Wells

The primary objective of the Ramsay 1 and Ramsay 2 well testing program was to obtain gas and fluid samples for compositional and isotopic analysis. This has been achieved, and samples have been sent to established local and international third-party laboratories in Australia, London and Paris.

Secondary objectives of the well testing program included the recovery of Natural Hydrogen and Helium at surface from reservoir fluid and gas with pressure measurements. These objectives have also been achieved, with additional recovered samples dispatched to the same international third-party laboratories.

³ All Helium samples have been corrected for air contamination

From the complete suite of well testing data being compiled, Gold Hydrogen will better understand the characteristics of the sub-surface formations and the potential Natural Hydrogen and Helium reservoirs. This data will assist the Company in gaining technical insights into how the Ramsay Project area could be further explored and appraised, including optimising future well designs and testing strategies, as well as providing input for a future pilot plant / proof-of-concept plant design.

Well Testing - Compositional Analysis Results - Helium

As previously reported, the Company recorded a concentration of Helium of up to 17.5%⁴, in the MDT sample taken at 778m during the drilling of Ramsay 2. During the Stage 1 well testing program, the Company obtained two (2) pressurised gas samples with Helium concentrations of 12.6%⁴ at 642m, and 17.9%⁴ at 712m and, during the Stage 2 well testing program, Ramsay 1 recorded gas to surface at the separator of purities up to 36.9%⁴ on an air and nitrogen corrected basis (refer **Figure 1** and **Tables 1 and 2** below for full details). The recorded Helium concentrations showed a consistent increase during the Stage 2 flow testing period of Ramsay 1, and did not appear to have reached a stable value at the end of the testing period.

These Helium concentrations are currently believed to be the highest found in the world in a non-petroleum system. By comparison, a recent large discovery reported by Pulsar Helium found a Helium concentration of 13.8% (prior to any possible air-correction) from its Jetstream 1 well in Minnesota, USA⁵.

Future Activities

Based on the integration of the drilling and testing results with the newly acquired Ramsay 2D data, Gold Hydrogen is in the process of planning a new drilling and data acquisition campaign to delineate the Ramsay Natural Hydrogen and Helium accumulation.

This will involve a number of wells, specifically targeting the different pay zones within the identified structure and using a modified well design to enable testing of the different zones with zonal specific testing configurations. The data from these wells will constrain the pilot project area and design, with the aim of demonstrating the commercial production potential of both Natural Hydrogen and Helium from the Ramsay Project.

In parallel, an extensive 3D seismic survey is being considered over the Ramsay Project area, to illuminate the stratigraphic and structural subsurface complexities, in order to facilitate detailed resource assessments and to optimise drilling locations for future exploration and appraisal wells.

The Ramsay 2D regional seismic data has revealed several Natural Hydrogen and Helium prospects, some of which will be tested with dedicated exploration wells. Selection and timing of these wells will be done in conjunction with the delineation drilling activities, in order to take advantage of the presence of the drilling rig and experienced crew.

⁴ All Helium sample results have been corrected for air contamination

⁵ <https://www.startribune.com/helium-gas-drilling-iron-range-minnesota-pulsar-edelgas-duluth-metals/600351052/>

Groundbreaking Exploration Testing for Both Natural Hydrogen and Helium

The Ramsay Project well testing program was 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 represent the initial steps of an exciting journey, which is not dissimilar to that undertaken by various world-renowned and ultimately successful oil and gas projects, such as 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. The Company anticipates a similar path forward for its 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 its 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 appraise and develop over time and with continued success.

There is very little data available for dedicated Natural Hydrogen and Helium wells anywhere in the world due to the lack of analogue wells. 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.⁶

Helium is extremely valuable and indicatively, longer-term contracted bulk pricing is expected to approximate USD450 or AUD\$675 per Mcf (thousand cubic feet).⁷

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 (circa 575km) regional 2D seismic project has been finalised, and is now in the process of being interpreted and analysed alongside the Company's other datasets. The objectives for the seismic program were 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.

⁶ "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/)

⁷ February 2024, www.noblehelium.com.au, quoting Kornbluth Helium Consulting.



Planning is also underway for further exploration activities which includes testing of additional prospective structures, and the design of a potential 3D seismic survey over the larger Ramsay area.

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 75,332km². 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 8,107km² 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 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](https://twitter.com/GHY_ASX)), and copies of market releases will be emailed to all interested parties who register via info@goldhydrogen.com.au



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

On behalf of the Board
Karl Schlobohm
Company Secretary

For Company Enquiries Contact:

Neil McDonald – Managing Director
nmcdonald@goldhydrogen.com.au
+61 7 3521 8038

Karl Schlobohm – Company Secretary / CFO
kschlobohm@goldhydrogen.com.au
+61 7 3521 8038

For Media Enquiries Contact:

Matthew Doman – Crestview Strategy
matthew.doman@crestviewstrategy.com
+61 421 888 858

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.

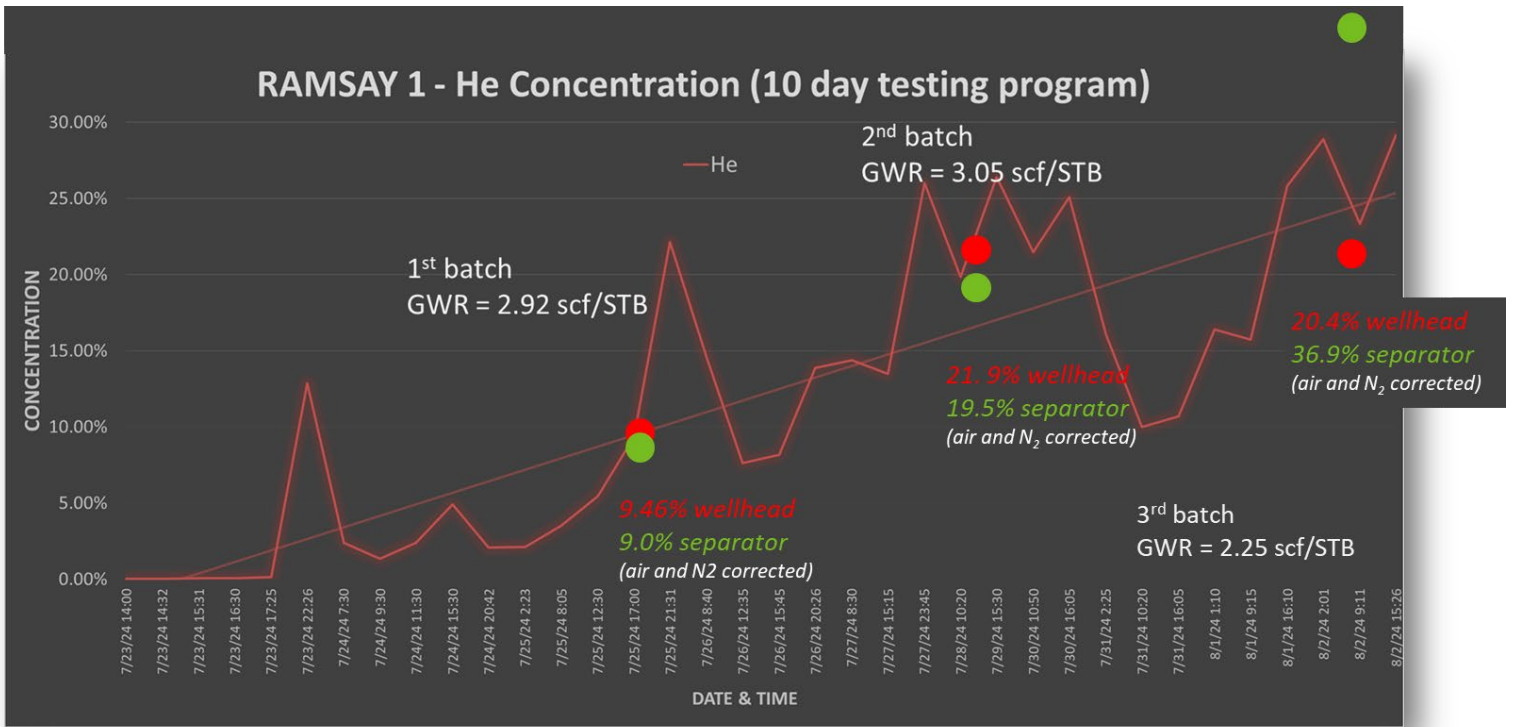


Figure 1. Ramsay 1 He concentrations (air and nitrogen corrected) measured during the testing of the open Helium zone. The concentrations consistently increase over the testing period, with wellhead sample laboratory analysis confirming the separator measurement.



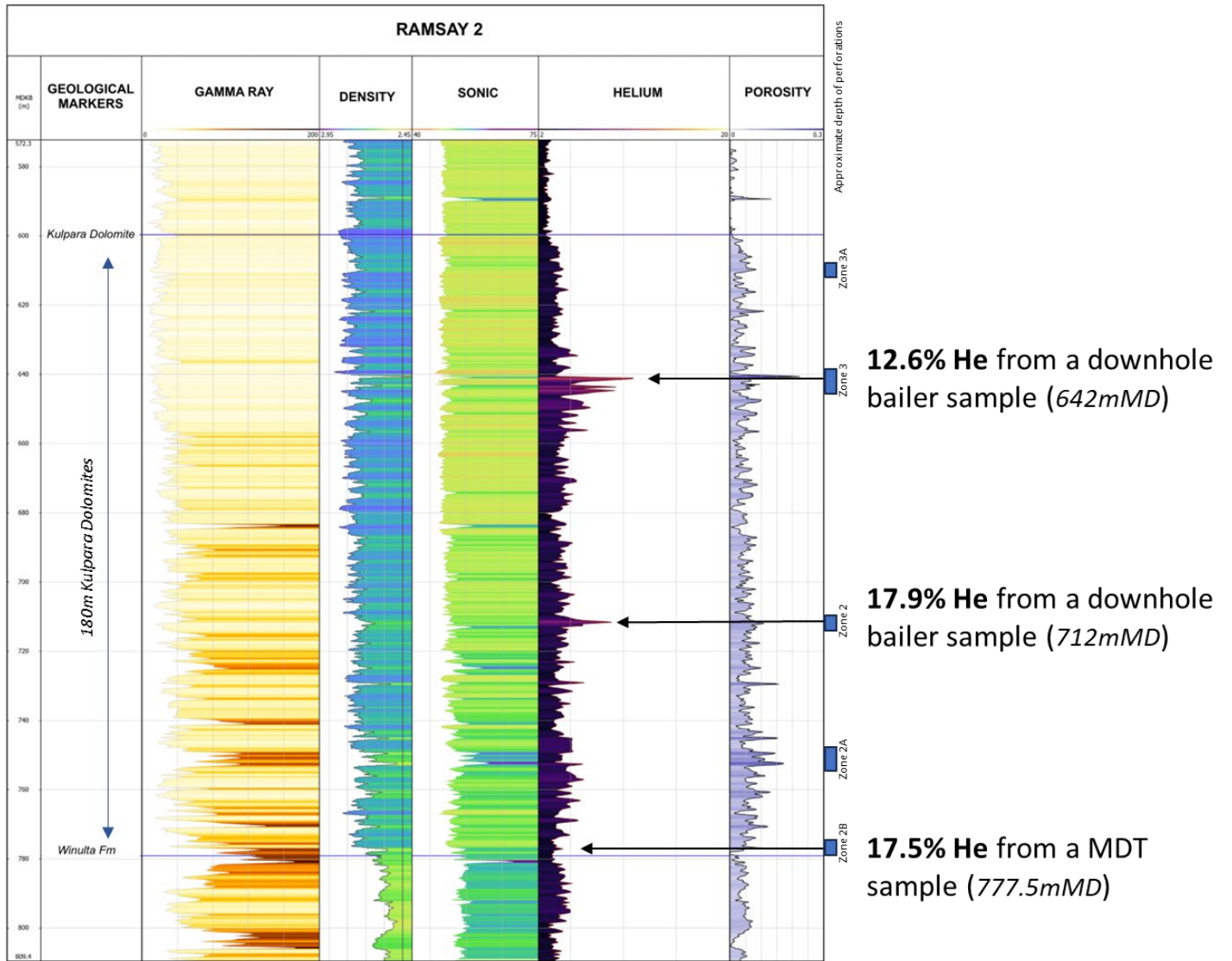


Figure 2. Ramsay 2 logs over the Kulpara Dolomite section with bailer sample and MDT depths and air corrected Helium concentrations



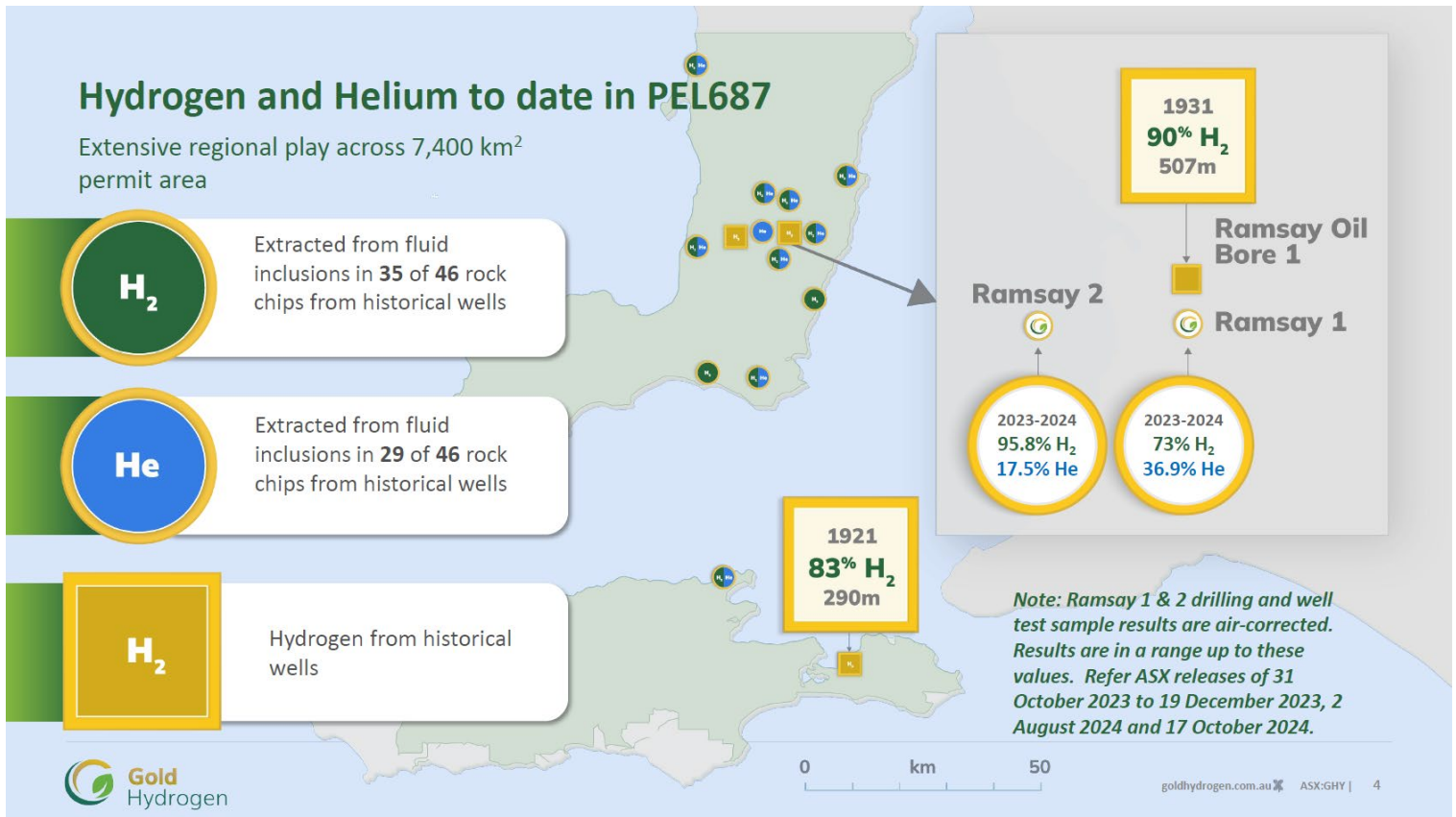


Figure 3 – Various data points indicating the presence of Natural Hydrogen and Helium in PEL 687



Table 1 – Sample Analysis Table – Ramsay 2 Well – Stage 1 Testing

Name:	Ramsay 2		
Location (UTM zone 53 GDA2020)			
X	747,761.61		
Y	6149371.41		
Permit	PEL687		
Entity holder(s)	Gold Hydrogen 100%		
Zones tested	1 (MDT)	2	3
Resources	Helium with minor Hydrogen	Helium with minor Hydrogen	Helium with minor Hydrogen
Formation	Kulpara Dolomite	Kulpara Dolomite	Kulpara Dolomite
Gross thickness and net pay thickness	180m Gross	180m Gross	180m Gross
Geological rock type	Dolomite	Dolomite	Dolomite
Depth of the zones tested	778mMD	712mMD	642mMD
Type of test	Pressure test - commingled zone test for few hours follow by overnight build up	Pressure test - commingled zone test for few hours follow by overnight build up	Pressure test - commingled zone test for few hours follow by overnight build up
Phase recovered	Gas/Water	Gas/Water	Gas/Water
Corrected H2 and He concentration in gas recovered from downhole sample	17.52% He	17.9% He	12.6% He
Flow rates, choke size, volumes recovered	Refer to Stage 2 well test	Refer to Stage 2 well test	Refer to Stage 2 well test
Fracture stimulation	None	None	None
Material non hydrocarbons	Nitrogen, Hydrogen	Nitrogen, Hydrogen	Nitrogen, Hydrogen

Table 2 – Sample Analysis Table – Ramsay 1 Well – Stage 2

Name:	Ramsay 1
Location (UTM zone 53 GDA2020)	
X	748,208.07
Y	6149545.7
Permit	PEL687
Entity holders	Gold Hydrogen 100%
Zones tested	Zone 2 and 3
Resources	Helium
Formation	Kulpara Dolomite
Gross thickness and net pay thickness	180m Gross
Geological rock type	Dolomite
Depth of the zones tested	900 mMD
Type of test	Commingled pressure test
Phase recovered	Gas/Water
Corrected H₂ and He concentration in gas recovered from downhole sample	36.9% He
Flow rates, choke size, volumes recovered	1 Mscf/day gas constraint by pump capacity and flow intermittently with water; choke size 20/64 inch; volumes recovered 0.55 Mscf
Fracture stimulation	None
Material non hydrocarbons	Nitrogen, Hydrogen

Table 3 - Summary of Preliminary Results on Additional Samples (as released 2 August 2024)

Name:	Ramsay 2		
Location (UTM zone 53 GDA2020)			
X	747,707.85		
Y	6149385.46		
Permit	PEL687		
Entity holders	Gold Hydrogen 100%		
Zones tested	Zone 1	Zone 2 and 3	Zone 7 and 8
Resources	Helium	Helium	Hydrogen
Formation	Granite Basement	Kulpara Dolomite	Parara Limestone
Gross thickness and net pay thickness	>200m Gross	180m Gross	406m Gross
Geological rock type	Granite	Dolomite	Limestone
Depth of the zones tested	1002mMD	712 mMD	197mMD and 289mMD
Type of test	Pressure test	Commingled pressure test	Commingled pressure test
Phase recovered	Gas/Water	Gas/Water	Gas/Water
Corrected H2 and He concentration in gas recovered from downhole sample	20% to 25% He	20% to 25% He	42% H2 (still increasing)
Flow rates, choke size, volumes recovered	TBA		
Fracture stimulation	None	None	None
Material non hydrocarbons	Nitrogen, Hydrogen	Nitrogen, Hydrogen	Nitrogen, Helium

Table 4 – 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 5 – 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.