



ASX ANNOUNCEMENT 30 SEPTEMBER 2022

## RETRACTION & REPLACEMENT OF INDEPENDENT TECHNICAL SPECIALIST'S REPORT FOR NOTICE OF GENERAL MEETING

HyTerra Ltd (ASX: HYT) (**HyTerra** or **the Company**) refers to the Independent Technical Specialist's Report on the valuation of the Company's oil and gas interests prepared by RISC Advisory Pty Ltd dated 7 September 2022 (**RISC Report**). The RISC Report was annexed as Annexure E to the Independent Expert's Report prepared by Stantons Corporate Finance Ltd, included as Annexure A to the Company's Notice of General Meeting lodged with ASX on 9 September 2022.

The purpose of this announcement is to retract and replace the RISC Report with the version of the report which is annexed to this announcement (**Revised RISC Report**).

The Revised RISC Report retracts previously disclosed gas in place (**GIP**) and gas initially in place (**GIIP**) estimates that had been made without also disclosing any reserves, contingent or prospective resources. This was due to the requirement for a reservoir recovery rate of hydrogen, for which there is currently no precedent. The Company notes that the inclusion of these estimates was inconsistent with Listing Rule 5.25.3 and requests that Shareholders do not rely on the retracted information as a basis for an investment decision.

The Company confirms that the valuations in the Independent Expert's Report are not impacted by the retraction of the GIP and GIIP estimates, and no changes are required to be made to the information contained in the Independent Expert's Report or the Company's Notice of General Meeting.

Please see attached below a copy of the Revised RISC Report dated 23 September 2022, which is to be read in conjunction with the Notice of General Meeting.

**This ASX announcement has been authorised for release by Alex Neuling, Company Secretary**

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### ABOUT HYTERRA LTD

The first ASX company with a focus on pioneering natural hydrogen. Our mission is to create shareholder value by acquiring, developing and operating future-ready energy projects.



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HyTerra Ltd



*decisions with confidence*

# Independent Technical Specialist Report

Certain assets of HyTerra Ltd and Neutralysis Industries Pty Ltd

For Stantons Corporate Finance Ltd  
on behalf of HyTerra Ltd

September 2022



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**23 September 2022**

Dear Sirs,

**Independent Technical Specialist Report – HyTerra Ltd.**

HyTerra Ltd ('HyTerra') has engaged Stantons Corporate Finance Ltd ('Stantons') to prepare an Independent Expert Report ('IER') for inclusion within a Notice of Meeting to be provided to the shareholders of the company. The shareholders are being asked to approve a proposed transaction of the acquisition of Neutralysis Industries Pty Ltd ('NIPL').

Stantons has engaged RISC Advisory Pty Ltd ('RISC') to provide an Independent Technical Specialist Report ('ITSR'). As per the instruction letter received from Stantons dated 8 March 2022, RISC was to provide a market valuation of:

- HyTerra's existing legacy assets consisting of an 80% interest in the Aolong project located in China,
- HyTerra's potential acquisition of Guanzhou Bofu Investment Co. Ltd., where HyTerra has a Memorandum of Understanding to acquire Guanzhou Bofu Investment Co. Ltd.; and
- NIPL's interest in a Joint Venture Agreement with Natural Hydrogen Energy LLC ('NH2E') comprising exploration and exploitation leases in the United States of America.

RISC has completed our independent technical assessment and valuation and our work is documented in this Independent Technical Specialist Report ('ITSR').

**Independence**

RISC confirms that it is independent of HyTerra, NIPL and NH2E and that RISC is unaware of any circumstance which may compromise that independence.

**Consent**

RISC has consented to this report, in the form and context in which it appears, being included, in its entirety, in the Notice of Meeting.

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## 1. Executive summary

HyTerra Ltd ('HyTerra'), formerly known as Triple Energy Ltd ('Triple'), which is currently suspended on the Australian Securities Exchange ('ASX') has proposed the acquisition of Neutralysis Industries Pty Ltd ('NIPL'), a private gas exploration company registered in Australia. Shareholder approval is required for this transaction. As part of the transaction, HyTerra will re-list.

NIPL has a 10.03% beneficial interest in a joint venture agreement with Natural Hydrogen energy LLC ('NH2E'), a private company registered in the United States of America and domiciled in Denver, Colorado.

The NIPL – NH2E joint venture has agreed a joint development and earn-in agreement ('JDA') for the exploration and exploitation of natural hydrogen gas on certain leases located in the states of Nebraska and South Carolina in the United States of America. Pursuant to the JDA, NIPL may acquire up to a 30% beneficial interest in the joint venture by funding US\$5,000,000 on an agreed Phase 1 work program, and a further 21% beneficial interest by funding a further US\$15,000,000 of work program.

The JDA includes twenty-one leases acquired by NH2E in Nebraska and South Carolina over features in the landscape which are postulated to be surface expressions of natural hydrogen seepage from the subsurface and, specifically, basement rocks where it is believed that natural hydrogen gas is generated. The JDA also contemplates the acquisition of additional leases as part of the NIPL funded work program.

NH2E drilled the Hoarty NE-3 well in 2018-2019 within a lease cluster over one such feature in Nebraska to test for the presence of natural hydrogen gas in the subsurface. The well penetrated approximately 1,000 m of sedimentary section and was drilled to a total depth of 11,287 ft (3,440 m) in basement rocks. Natural hydrogen gas was detected at potentially significant concentrations whilst drilling. Two zones of elevated hydrogen gas concentration associated with matrix and fracture porosity have been identified on wireline logs within the basement section.

Following a period where the well was shut-in, swabbing operations were undertaken and the swabbed gas was flared. However, gas samples failed to confirm the presence of substantial concentrations of natural hydrogen. Pursuant to the JDA, the joint venture plan to undertake a comprehensive testing program of the well to confirm (or otherwise) the presence of commercial quantities of hydrogen.

RISC has reviewed the available data and analyses and has undertaken a hydrogen gas in-place evaluation of the JDA leases. RISC has been unable to estimate prospective resources due to the relative immaturity of the natural hydrogen gas play and uncertainties associated with exploitation and anticipated rates of recovery.

RISC has also reviewed the legacy assets of HyTerra, comprising the Aolong joint venture with Heilongjiang LongMay Coal Mining Group ('LongMay'). HyTerra acquired its interest in Aolong with the acquisition of CFT Heilongjiang ('CFT') in 2012. Three wells were drilled by the Aolong joint venture for the exploration of coal bed methane ('CBM') over the period 2013 – 2015 in certain coal mining licenses in the Jixi - Hegang Coal Basin of the Heilongjiang Province, Peoples Republic of China. The wells failed to delineate a potentially commercial CBM resource and no exploration activities have been undertaken since this time.

In addition, HyTerra announced in 2018 that it had negotiated a memorandum of understanding ('MOU') to acquire Guanzhou Bofu Investment Co. Ltd. a company which has the right to derive income from the Xin 214 Project consisting of certain oil licenses in Songyuan City, Jilin Province in the, People's Republic of China. RISC has been advised that due-diligence was not completed on this proposed acquisition and that the acquisition terms were not agreed by the interested parties.

RISC has determined that the fair market valuation of HyTerra's net interest in the Aolong joint venture to be between AU\$-0.5 million and AU\$0 million with a best estimate of AU\$0 million (Table 1-1). RISC has been advised that HyTerra has entered into a contract for the sale of its interests in Aolong, the terms of which are undisclosed. Should the sale complete the valuation (liability) will consequently be affected. However, it is assumed that there is some risk on the transaction not being completed and the valuation (liability) will still rest with HyTerra.

RISC has determined that the fair market valuation of NIPL's net beneficial interest in the NH2E JDA to be between AU\$-7.0 million and AU\$38.9 million with a best estimate of AU\$4.9 million (Table 1-2).

RISC has ascribed no value to the Guanzhou Bofu Investment Co. Ltd. acquisition MOU.

**Table 1-1: Valuation of HyTerra assets (net HyTerra)**

	Valuation (AU\$ million)		
	Low	Best	High
<b>Net HyTerra</b>	-0.5	0	0

**Table 1-2: Valuation of NIPL assets (net NIPL)**

	Valuation (AU\$ million)		
	Low	Best	High
<b>Net NIPL</b>	-7.0	4.9	38.9



## 2. Terms of reference and basis of assessment

### 2.1. Terms of reference

This Independent Technical Specialist Report ('ITSR') was prepared in response to an instruction letter from Stantons Corporate Finance Pty Ltd ('Stantons') received by RISC dated 8 March 2022. Stantons was engaged by HyTerra to prepare an Independent Expert Report ('IER') for inclusion in a Notice of Meeting regarding the proposed acquisition of NIPL by HyTerra.

RISC was requested to prepare a fair market valuation of:

- HyTerra's interest in the Aolong Project Joint Venture in Heilongjiang Province, Peoples Republic of China ('PRC');
- HyTerra's Memorandum of Understanding ('MOU') to indirectly or directly acquire Guanzhou Bofu Investment Co. Ltd.; and
- NIPL's interest in a joint development and earn-in agreement with Natural Hydrogen Energy LLC ('NH2E') for certain leases in Nebraska and South Carolina, USA, including consideration of any rights, earn in requirements, royalties, and free carried interests on the project.

As per the instruction from Stantons, our ITSR is compliant with the Australian Securities and Investments Commission ('ASIC') Regulatory Guides 111 and 112 and includes consent for the report to be included in a Notice of Meeting and for RISC to be named as technical specialist/expert in accordance with ASX listing rule 5.41.

### 2.2. Basis of assessment

The data and information used in the preparation of this report were provided by HyTerra and supplemented with public domain information.

Information and data provided by HyTerra:

- Joint development and earn-in agreement executed by NH2E and NIPL, inclusive of details on proposed forward work program;
- Information and technical data regarding the Hoarty NE-3 well drilled by NH2E in Nebraska;
- Petrophysical evaluation of the Hoarty NE-3 well commissioned by HyTerra;
- Lease information including certified documentation; and
- A concise summary of Aolong Joint Venture prepared by HyTerra.

RISC has relied upon the information provided and has undertaken the evaluation on the basis of a review and audit of existing interpretations and assessments as supplied, making adjustments that in our judgment were necessary.

RISC has reviewed the resources in accordance with the Society of Petroleum Engineers internationally recognised Petroleum Resources Management System ('PRMS')<sup>1</sup>.

The evaluation date of this report is 1 July 2022.

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<sup>1</sup> Petroleum Resources Management System, prepared by the Oil and Gas Reserves Committee of the Society of Petroleum Engineers (SPE) and reviewed and jointly sponsored by the American Association of Petroleum Geologists (AAPG), World Petroleum Council (WPC), Society of Petroleum Evaluation Engineers (SPEE), Society of Exploration Geophysicists (SEG) and approved by the Board of the SPE in March 2007. The PRMS was subsequently updated in June 2018.

Details of the findings of our review and the resource estimation process are presented in this report. Unless otherwise stated, all resources presented in this report are gross (100%) quantities.

RISC has not conducted a site visit and does not consider one necessary.

## **2.3. Valuation**

The valuation is based on the principles of the VALMIN Code<sup>2</sup> and the concept of “market value” (‘Value’).

The VALMIN Code defines Value as the estimated amount of money (or the cash equivalent of some other consideration) for which the Mineral Asset should exchange on the date of valuation between a willing buyer and a willing seller in an arm’s length transaction wherein the parties each acted knowledgeably, prudently and without compulsion. For the purposes of this report, we have applied these definitions to petroleum properties.

A range of oil and gas industry accepted practices in relation to petroleum properties has been considered to determine Value, which are described below.

### **2.3.1. Sunk costs and work program**

The sunk costs and warranted costs of a future work program may also be used to estimate Value. The work program valuation relies on the assumption that, unless there is evidence to the contrary, the permit is worth what a company will spend on it. This method is relevant for permits in the early stages of exploration and for expenditure which is firmly committed as part of a venture budget or as agreed with the regulator as a condition of holding the permit.

There may need to be an adjustment for risk and the time value of money. Likewise, expenditures that are long-dated may be excluded or discounted and only meaningful exploration work program expenditures may be retained.

Should the work program improve the perception of prospectivity then an uplift of these expenditures may be warranted (multiple of exploration expenditure method).

Results as the work program progresses, will alter the perceived value. Therefore, the original work program agreed may no longer represent today’s Value.

### **2.3.2. Farm-in promotion factors**

An estimate of Value can be based on an estimation of the share of future costs likely to be borne by a reasonable farminee under prevailing market conditions. A premium or promotion factor may be paid by the farminee. The promotion factor is defined as the ratio of the proportion of the activity being paid for and the amount of equity being earned.

The nominal permit value is defined as the amount spent by the farminee divided by the interest earned. The premium value for the permit is the difference between the nominal value and the equity share of the

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<sup>2</sup> The VALMIN Code sets out requirements for the technical assessment and valuation of mineral assets and securities for independent expert reports, it provides guidance for petroleum assets and securities. The VALMIN Committee is a joint committee of The Australasian Institute of Mining and Metallurgy (AusIMM) and the Australian Institute of Geoscientists. The committee was established to develop and maintain the "Australasian Code for Public Reporting of technical assessments and valuations of mineral assets", commonly known as the VALMIN Code. The VALMIN Code was first published in 1995, with subsequent editions published in 1997, 2005 and 2015

cost of the activity divided by the equity interest being earned. This reflects the amount that a farminee is willing to pay to acquire that interest from the farmor.

The premium or promotion factor will be dependent upon the perceived prospectivity of the property, competition and general market conditions. The premium value is equivalent to the farminee paying the farmor a cash amount in return for the acquisition of the interest in the permit and is the fair market value.

Farm-in transactions may have several stages. For example, a farminee may acquire an initial interest by committing to a future cost in the first stage of the transaction but has an option to acquire an additional interest or interests in return to committing to funding a further work program or programs.

Farm-in agreements can also include re-imbursement of past costs and bonus payments once certain milestones are achieved, for example declaration of commerciality, or achieving threshold reserves volumes. Depending on their conditionality, such future payments may contribute to Value. However, they may need to be adjusted for the time value of money and probability of occurring.

### **2.3.3. Comparable transaction metrics**

An estimate of the Value of petroleum properties can be obtained using recent comparable transactions. Such transactions may provide relevant metrics such as Value per unit of reserves, contingent or prospective resources and price paid per unit area of the permit/license or % interest. The VALMIN Code advises Value must also take into account risk and premium or discount relating to market, strategic or other considerations.

### **2.3.4. Expected monetary value**

Expected monetary value ('EMV') is the risked net present value ('NPV') of a prospect or project. EMV is calculated as the success case(s) NPV times the probability of success and development less the NPV of failure cases multiplied by the probability of failure. The NPV may be estimated using discounted cash flow ('DCF') methods. The EMV method provides a representative estimate of Value in areas with a statistically significant number of mature prospects or projects within proven commercial hydrocarbon provinces where the chance of success and volumes can be assessed with a reasonable degree of predictability. EMV is appropriate to discovered hydrocarbons where development details and costs are mature. As such RISC does not consider EMV is appropriate for this situation.

The EMV valuation can also be used as a relative measure for ranking exploration prospects within a portfolio to make drilling decisions, assessing commercial potential and to demonstrate the commercial attractiveness of a permit, which may influence a buyer or seller.

### 3. Introduction

#### 3.1. HyTerra Ltd asset overview

HyTerra (formerly known as Triple Energy Limited ('Triple')) announced on 5 October 2012 the acquisition of CFT Heilongjiang ('CFT'), a company incorporated in Hong Kong<sup>3</sup>. CFT was a shareholder of and held an 80% profit interest in Heilongjiang Aolong Energy Co. Ltd ('Aolong'), an incorporated joint venture company established with Heilongjiang LongMay Coal Mining Group ('LongMay') under the laws of the Peoples Republic of China ('PRC').

Aolong was formed by LongMay and CFT with the objective of de-gassing coals via the establishment of coal bed methane ('CBM') gas production in the vicinity of LongMay's coal mining operations in the Jixi - Hegang Coal Basin of the Heilongjiang Province (Figure 3-1).

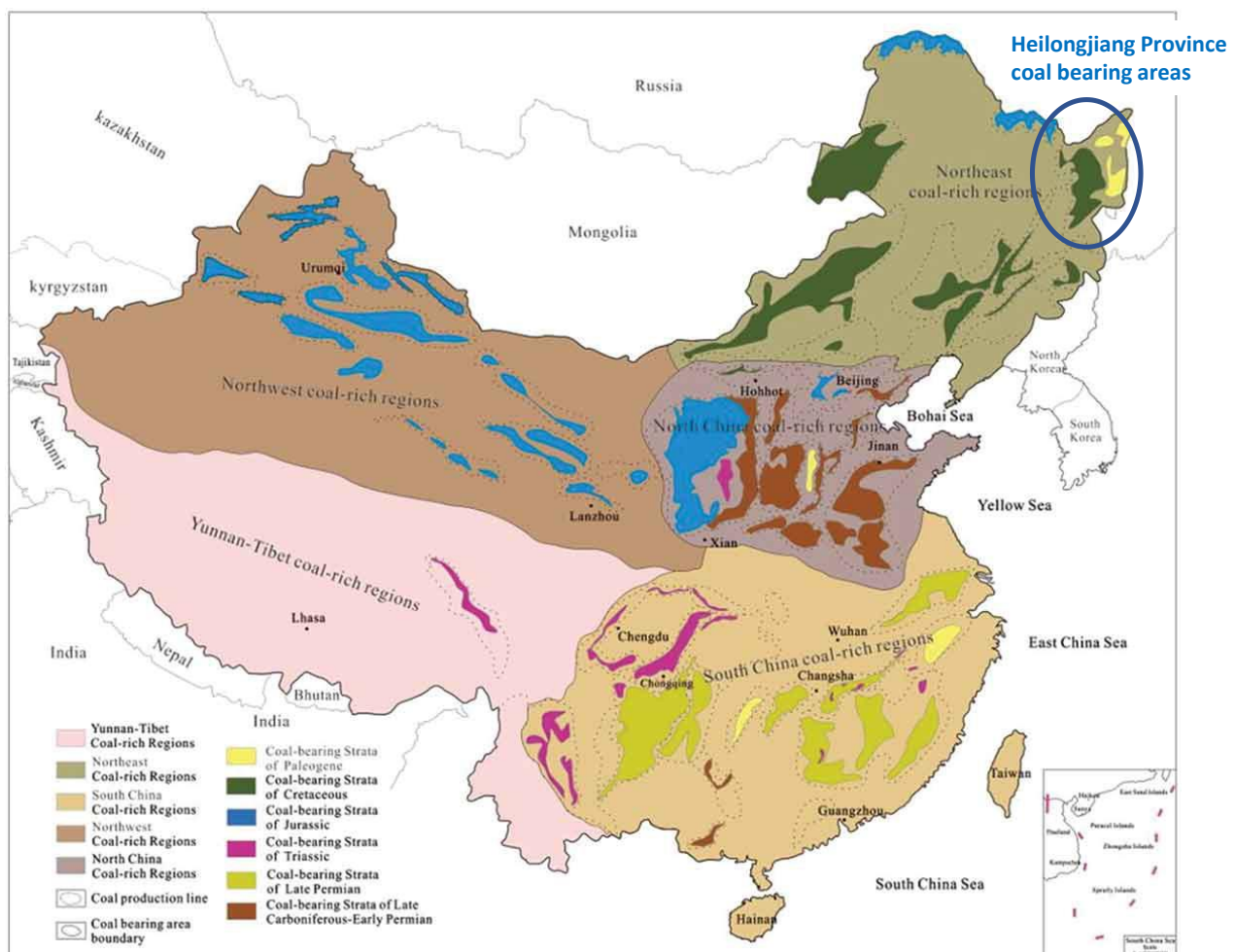


Figure 3-1: Aolong project location map<sup>4</sup>

<sup>3</sup> Triple Energy Ltd ASX release dated 5 October 2012

<sup>4</sup> Modified from Zengxue Li, Dongdong Wang, Dawei Lv, Ying Li, Haiyan Liu, Pingli Wang, Ying Liu, Jianqiang Liu & Dandan Li (2018) The geologic settings of Chinese coal deposits, International Geology Review, 60:5-6, 548-578.



The Aolong project included gas extraction rights over the Hegang mine area, Shuan Ya Shan mines, Qi Tai He mines and Ji Xi mines (Figure 3-2).



Figure 3-2: Aolong project locations<sup>5</sup>

<sup>5</sup> Source: Valuation of Triple Energy Ltd 80% Interest in the Acreage Held by the Aolong JV, by AWT (2015) included in the Notice of General Meeting, ASX release 19 March 2015.

Three CBM wells were drilled over the period 2013-2015. The wells failed to define a CBM resource and there has been no exploration activity undertaken since this time.

HyTerra announced in 2018 that it had negotiated a memorandum of understanding ('MOU') to acquire Guanzhou Bofu Investment Co. Ltd. a company which had the right to derive income from the Xin 214 Project consisting of certain oil licenses in Songyuan City, Jilin Province in the, PRC. RISC has been advised that due-diligence was not completed on this proposed acquisition and that the acquisition terms were not agreed by the parties.

### 3.2. Neutralysis Industries Pty Ltd asset overview

Neutralysis Industries Pty Ltd ('NIPL') a private company registered in Australia has a 10.03% beneficial interest in a joint development and earn-in agreement ('JDA') with Natural Hydrogen Energy LLC ('NH2E'), a company domiciled in Denver, Colorado, USA.

Originally executed in April 2021 and subsequently updated April 2022, the JDA describes the funding arrangements and work program activities to be undertaken on certain exploration leases owned by NH2E for NIPL to acquire beneficial interest in the JDA in a phased manner. NIPL has the right to earn a beneficial interest of up to 51% in the JDA. The JDA specifies that a joint venture company is to be established upon the satisfaction of certain conditions precedent to reflect the beneficial interest as earned by NIPL.

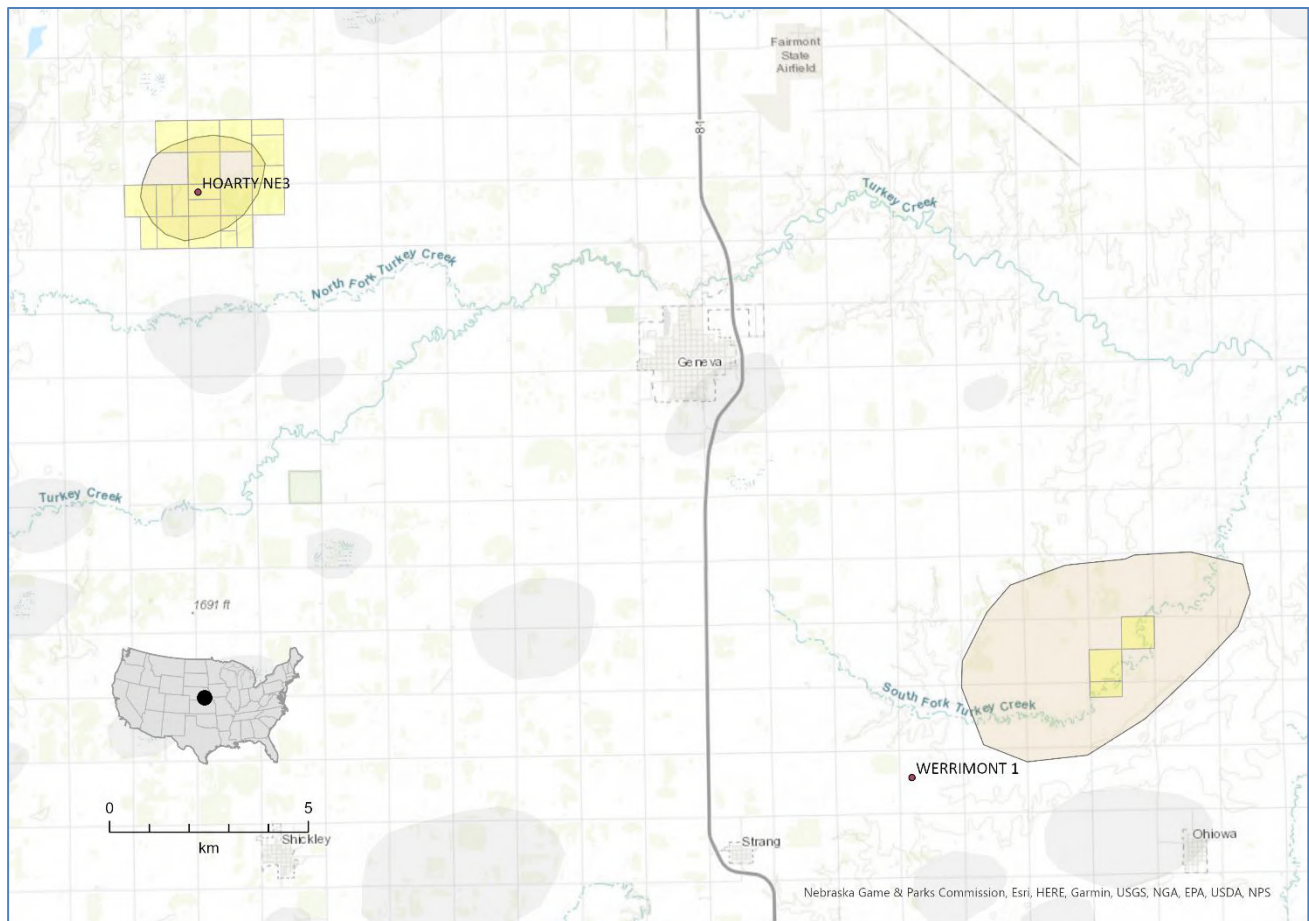
NH2E has acquired leases in Nebraska and South Carolina for the exploration of natural hydrogen (Figure 3-3, Figure 3-4 and Figure 3-5) which are assigned to the JDA.



Figure 3-3: NH2E asset location map



These leases are situated over features in the landscape, known as ‘bays’ (or ‘Carolina Bays’) and referred to as ‘fairy circles’ in Australia, which are characterised by a depressed ground level and raised outer rim. It is postulated that these features are surface expressions of hydrogen seepage from the subsurface<sup>6</sup> <sup>7</sup>. The NH2E lease areas are situated over identified bays as seen in Figure 3-4 and Figure 3-5.



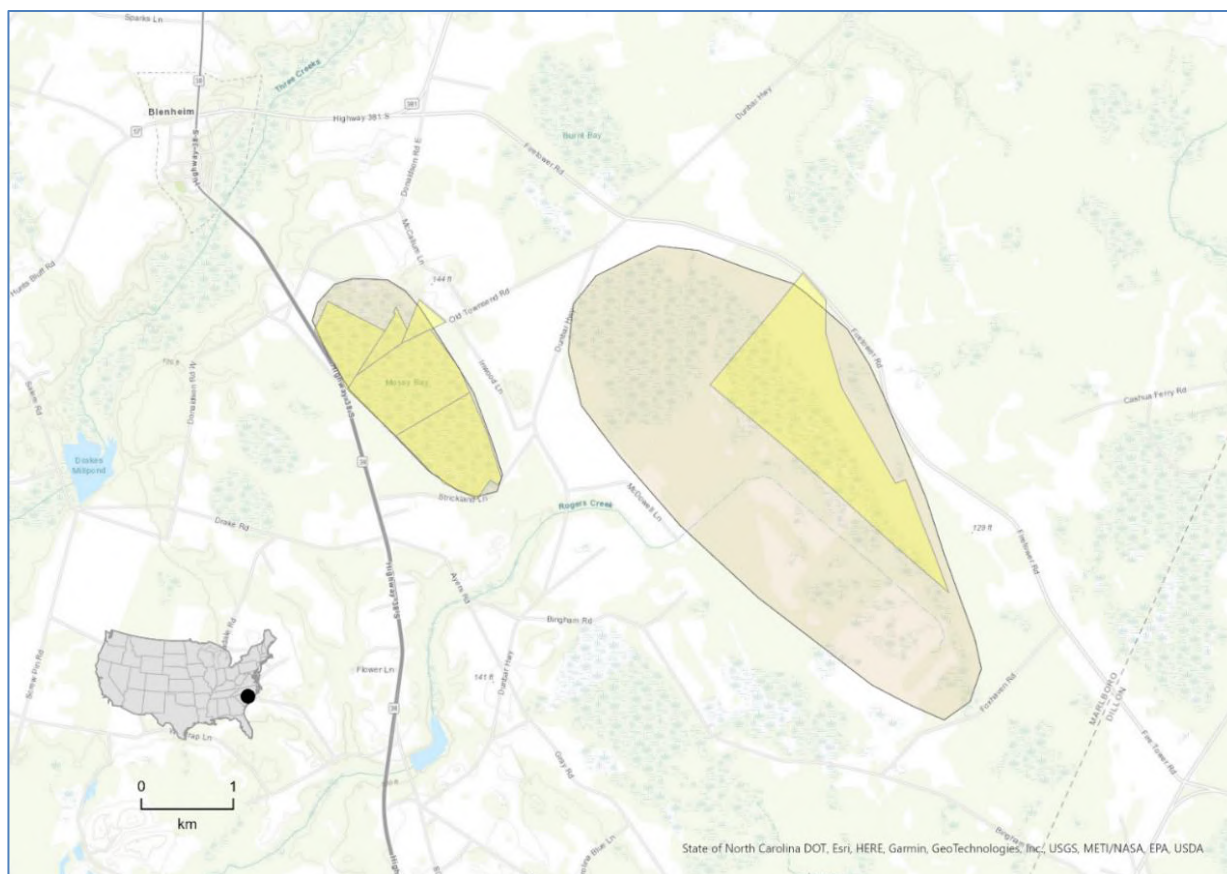
**Figure 3-4: NH2E asset location map – Nebraska northwest and Nebraska southeast**

As cited in the scientific literature, geochemical studies, soil sampling and analysis appear to support the theory of such features being the site of hydrogen seeps from the subsurface.

In total NH2E have acquired twenty-one (21) leases totalling 3,891 acres (15.7 km<sup>2</sup>) in Nebraska and South Carolina to explore for the presence of natural hydrogen gas in the subsurface. Key terms of the NH2E and JDA leases are summarised in Table 3-1.

<sup>6</sup> Zgonnik, V. (2020), The occurrence and geoscience of natural hydrogen: A comprehensive review. Earth Science Reviews, 1031(40)

<sup>7</sup> Frery, E., Langhi, L., Maison, M. and Moretti, I. (2021), Natural hydrogen seeps identified in the North Perth Basin, Western Australia. International Journal of Hydrogen Energy, August 2021.



**Figure 3-5: NH2E asset location map – South Carolina west and South Carolina east**

**Table 3-1: Summary of key terms, NH2E leases**

<b>Initial term</b>	Up to 6-years in Nebraska, 10-years in South Carolina
<b>Commencement date</b>	Various
<b>Signature bonus</b>	Nil
<b>Training, Administration &amp; Local Development fees</b>	Nil
<b>Bonus Fees</b>	US\$48,000 <sup>8</sup>
<b>Royalty</b>	Nebraska - 12.5% overriding royalty South Carolina – 16.7% overriding royalty
<b>Taxes</b>	United States of America
<b>Minimum work program commitments</b>	Nil <sup>9</sup>

<sup>8</sup> Bonus fees are one off payments upon leasing the mineral rights. South Carolina leases do not attract bonus fees.

<sup>9</sup> Leases do not have an associated work program. JDA specifies work program commitment.

NH2E drilled the Hoarty NE-3 well in the Nebraska northwest T7N-R4W cluster of leases (Figure 3-4). Drilled over the period November 2018 to February 2019, the well was drilled to a total depth of 11,287 ft (3,440 m) in Pre-Cambrian basement metasediments.

The well intersected several zones in the basement metasediments where elevated hydrogen gas was detected. Conventional wireline logging was conducted, a slotted liner installed in the borehole and the well was suspended for a future testing campaign.

Swabbing operations were conducted in June 2021 and gas was recovered and flared at rates up to 43,400 cf/day. The flare was observed to burn with a transparent flame suggesting high concentrations of hydrogen, however gas samples failed to confirm high levels of hydrogen and are considered unrepresentative by NH2E.

## 4. HyTerra Ltd assets

### 4.1. Aolong Joint Venture

The Aolong joint venture was established by LongMay and CFT in 2011 to treat, extract, produce and utilise CBM in the coal mining co-operation areas of LongMay. Aolong had an exclusive option to access an area of up to 2,700 km<sup>2</sup> for CBM exploitation.

Aolong is an incorporated joint venture under the terms of a Sino-Foreign Contractual Joint Ventures Contract ('CJV Contract') laws of the Peoples Republic of China. Under the terms of the agreement, CFT (subsequently acquired by HyTerra (Triple)) was entitled to 80% profit share of any established CBM production.

RISC has not been provided the CJV Contract nor a summary of the terms and provisions of the agreement.

RISC notes that HyTerra nor the Aolong joint venture held or were directly awarded any licenses or tenements directly. RISC understands that joint venture activities were to be undertaken within coal mining licenses held by LongMay, with the co-operation of LongMay.

#### 4.1.1. Work program

The initial work program and business plan included the drilling and testing of 2 -3 wells in the Hegang mining cooperation area.

In total, three wells were drilled over the period 2013 – 2015:

- Xian Xian-1 drilled and tested in 2013,
- Niaoshan-1 was drilled in 2015, and
- Yixin-1 which was drilled immediately following Niaoshan-1.

No firm CBM related work program commitment was in place for the Aolong joint venture project areas and that CBM activities within the cooperation areas were discretionary activities. RISC also understands that no substantive activities have been undertaken since this period of time.

#### 4.1.2. Geological setting

The Jixi - Hegang Basin is a Mesozoic fault bounded coal bearing basin. The western boundary of the basin is formed by the Qinhei Mountains and the south-eastern boundary is defined by the major Yilan – YiTong fault. The Hegang coal fields trend in a north – south direction in a monoclinical structure that dips to the east.

The coal bearing strata are within the Early Cretaceous aged Jixi Group, consisting of intercalating marine and non-marine deposits.<sup>5</sup>

#### 4.1.3. Well results and data

RISC anticipates that in the Aolong joint venture cooperation areas, consisting of coal fields and mining operations, there would exist a significant coal seam database consisting of depth structure, coal seam thickness, coal density and potentially gas content. No such database has been made available to RISC to review.

The Xian Xian-1 well intersected 63.4 m of gross coal seams with a reported 37 m of 'gassy' coal seams. Two DST's were conducted and the results are unknown.

The Niashan-1 well failed reportedly due to fault seal issues. The Yixin-1 well result was inconclusive and a proposed fracture stimulation and testing program for the well was not conducted due to the potential risk of communication with a nearby water bore being used for irrigation purposes.

RISC is unaware of any pre-existing permeability, gas content, gas saturation or gas composition data, or any such data obtained from the drilling campaign.

#### **4.1.4. Overlapping tenure**

RISC notes that the exploration, appraisal and exploitation of CBM within the Aolong joint venture cooperation areas was to be undertaken in close proximity to established and ongoing surface coal mining operations. RISC understands that the CBM activities were also to be undertaken and governed by the coal mining licenses where no CBM exploration, appraisal and exploitation licenses or tenure were to be granted.

In such a situation, it would be expected that an access and coordination agreement between the coal mining and CBM entities would be agreed that would govern each parties rights to land access and undertaking activities.

RISC is not aware of any such formal coordination agreement between the parties undertaking coal mining and CBM activities.

#### **4.1.5. Resources**

A gas in-place assessment was undertaken by AWT in 2010, updated in 2012, and included in a HyTerra (Triple) notice of meeting on 19 November 2012<sup>10</sup>. RISC is not aware of any prospective resource assessments being undertaken, nor publicly released. However, a valuation of the project was undertaken by AWT was included in supporting documentation of a HyTerra (Triple) notice of meeting in March 2015<sup>11</sup>.

RISC has not undertaken an independent gas in-place assessment or resource assessment of the Aolong joint venture project.

#### **4.1.6. Subsequent events**

##### **4.1.6.1. CBM exploration activities**

Following the poor results of the wells drilled and the inability to undertake stimulation activities in Yixin-1, no further substantive CBM activities have been undertaken within the Aolong joint venture areas.

RISC has not been made aware of the current status of the joint venture.

##### **4.1.6.2. Sino-Foreign Contractual Joint Venture contract laws**

Aolong is an incorporated joint venture under the terms of Sino-Foreign Contractual Joint Ventures Contract ('CJV Contract') laws of the Peoples Republic of China prior to 1 January 2020. RISC has been advised that the Sino-Foreign Contractual Joint Ventures law was repealed on 1 January 2020, preventing the establishment of new incorporated joint ventures.

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<sup>10</sup> Triple Energy Ltd ASX release dated 19 November 2012

<sup>11</sup> Triple Energy Ltd ASX release dated 19 March 2015.

Sino-Foreign joint ventures established under the pre-existing Sino-Foreign Contractual Joint Ventures laws were extended a transition period of 5-years to amend their articles of incorporation to ensure compliance with the new foreign investment laws.

RISC is not aware if this has been undertaken by the Aolong Joint Venture nor of any real or perceived impact or risk to the rights of the Aolong Joint Venture and its parties.

#### **4.1.6.3. *Sale of Aolong joint venture interest***

RISC has been advised by HyTerra that it has entered into a contract for the disposal or sale of its interest in the Aolong joint venture. RISC is not aware of the terms of such a sale nor the timing of completion of the transaction.

## **4.2. Guangzhou Bofu Investment Co. Ltd acquisition**

HyTerra (Triple) announced on 11 September 2018 that it had signed a non-binding Memorandum of Understanding ('MoU') in relation to the potential acquisition of Guangzhou Bofu Investment Co. Ltd ('GBIC') which intended to acquire an 80% interest in Songyuan Petroleum Development Co. Ltd. ('SPDC')<sup>12</sup>. SPDC had the right to derive income from the development of four oil blocks in Songyuan City, Jilin Province in the PRC<sup>13</sup>.

RISC has been advised that due diligence was not completed and that terms for an acquisition were not agreed. RISC is not aware whether GBIC acquired any interest in SPDC or whether the MoU has been terminated or is still in-force, but we assume it has lapsed.

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<sup>12</sup> Triple Energy Ltd ASX release dated 11 September 2018.

<sup>13</sup> Collectively referred to as the Xin 214 Project.



## 5. Neutralysis Industries Pty Ltd assets

Neutralysis Industries Pty Ltd Limited ('NIPL') and Natural Hydrogen Energy LLC ('NH2E') formed a joint venture and executed a joint development and earn-in agreement ('JDA') on 8 April 2021, and subsequently amended 1 April 2022. Pursuant to the JDA, NIPL could earn a beneficial interest in the JDA in return for fully funding a work program associated with the leases as specified in the JDA (refer Table 5-1). To date NIPL has earned a 10.03% beneficial interest.

The JDA and the funding arrangement also contemplate the acquisition of additional leases for the purposes of hydrogen exploration and exploitation.

NIPL has the right to earn a beneficial interest of up to 51% in the JDA. The JDA specifies that a joint venture company is to be established upon satisfaction of conditions precedent to reflect the beneficial interest earned by NIPL.

In total NH2E have acquired twenty-one (21) leases totalling 3,891 acres (15.7 km<sup>2</sup>) in Nebraska and South Carolina to explore for the presence of natural hydrogen gas in the subsurface. The leases are grouped as Nebraska northwest, Nebraska southeast, South Carolina west and South Carolina east (Table 5-1). Refer also Figure 3-4 and Figure 3-5.

### 5.1. Tenure

RISC has been provided documentation regarding title over select mineral rights leases held by NH2E and a copy of the notarized certification of due diligence and lease examination by Katherine Morganstern of Top Notch Land Services Inc. of Kimball, Nebraska regarding the terms, obligations and standing of the mineral leases of NH2E. RISC is reasonably satisfied that NH2E is the beneficial owner of the mineral leases as included in the JDA and shown in Table 5-1.

### 5.2. Work program, commitments, and sunk costs

The JDA specifies a work program to be conducted by the parties and funded by NIPL, this is summarised in Table 5-2. A provision of Phase 1 in the JDA work program is for an interim payments of US\$1,511,242 to earn an initial beneficial interest of 9.06% in the JDA.

RISC has been advised that a further US\$159,800 of work program has been fully funded by NIPL since the execution of the JDA and that the parties have agreed that the beneficial interest now stands at 10.03%. RISC has been provided evidence of this mutual agreement and is satisfied that NIPL has earned this additional equity.

The planned work program expenditure of the JDA consists of:

- An initial Phase 1 program of US\$5 million which NIPL is fully funding in order to earn a 30% beneficial interest in the JDA.
- A Phase 2 program of US\$15 million, for which NIPL can earn a further 21% if it fully funds the second phase.

The total work program is US\$20 million which, if fully funded by NIPL will gain NIPL a 51% beneficial interest in the JDA (or joint venture company). NH2E will remain operator of the joint venture unless jointly agreed that operatorship can transfer to NIPL.

Table 5-1: NH2E lease summary

Legal Description	Total Leased Acres	Effective Date	Expiration Date	Primary Term Years
<b>Nebraska northwest</b>				
T7N-R4W Sec 23: NE4	160	10/03/2022	10/03/2025	3
T7N-R4W Sec 23: N2NW	80	8/03/2016	8/03/2022	6
T7N-R4W Sec 23: E2SE, SWSE	120	7/05/2018	7/05/2023	5
T7N-R4W Sec 23: S2NW	80	10/08/2018	10/08/2023	5
T7N-R4W Sec 23: NWSE	40	10/08/2018	10/08/2023	5
T7N-R4W Sec 14: SW4	160	10/08/2018	10/08/2023	5
T7N-R4W Sec 22: NW4, E2SW4, SE4	400	18/09/2018	18/09/2023	5
T7N-R4W Sec 13: S2SW4	80	18/09/2018	18/09/2023	5
T7N-R4W Sec 14: NW	160	18/09/2018	18/09/2023	5
T7N-R4W Sec 14: NE4	160	18/09/2018	18/09/2023	5
T7N-R4W Sec 13: S2NW4, N2SW4	80	18/09/2018	18/09/2023	5
T7N-R4W Sec 24: NW4	160	18/09/2018	18/09/2023	5
T7N-R4W Sec 22: E2NE	80	7/11/2018	7/11/2023	5
T7N-R4W Sec 22: W2NE4	80	7/11/2018	7/11/2023	5
T7N-R4W Sec 23: SW4	160	8/11/2018	8/11/2023	5
T7N-R4W Sec 15: NE4	160	8/11/2018	8/11/2023	5
T7N-R4W Sec 13: S2NW4, N2SW4	80	12/11/2018	12/11/2023	5
T7N-R4W Sec 13: N2NW	80	15/11/2018	15/11/2023	5
<b>Nebraska southeast</b>				
T6N-R1W Sec 30: NE & SW Sec 31: N2NW	400	15/08/2018	15/08/2023	5
<b>South Carolina east</b>				
TMS #6-001-01-008 Tract 3 on plat entitled "Survey of Property for Myrtle Beach Farms" in Cabinet A, Plat Slide 167, Page 2	654.24	1/04/2014	1/04/2024	10
<b>South Carolina west</b>				
Property Tax ID # 059-00-02-020; 059-00-02-021; 059-00-02-022; 059-00-02-026; 059-00-02-028.	517	1/04/2014	1/04/2024	10
Notes to the table:				
<ol style="list-style-type: none"> <li>1. T7N-R4W Sec 23: NE4 was recently renewed with an effective date of 10 March 2022.</li> <li>2. T7N-R4W Sec 23: N2NW containing the Hoarty NE-3 well has been suspended under shut-in royalty terms.</li> </ol>				

**Table 5-2: JDA work program summary**

Description	Estimated Cost (US\$)
<b>Phase 1</b>	
Testing the Initial Well for production. Extended testing if required.	\$300,000 (up to \$200,000 for extended testing)
Pilot gas separation unit	\$2,100,000
Acquiring additional mineral rights leases	\$250,000
Studies, operating costs including contingency	\$950,000
2D seismic acquisition and exploratory drilling	\$1,200,000
<b>Total Phase 1</b>	<b>\$5,000,000</b>
<b>Phase 2</b>	
Acquiring additional mineral rights leases	\$2,200,000
Studies, operating costs including contingency	\$1,800,000
2D seismic acquisition and exploratory drilling	\$9,000,000
Gas treatment plant	\$2,000,000
<b>Total Phase 2</b>	<b>\$15,000,000</b>

The aim of Phase 1 of the work program is to undertake a comprehensive test the Hoarty NE-3 well and establish pilot hydrogen gas production. RISC has not been provided details of the proposed test program.

RISC has not been provided any specific details regarding the remainder of the work program to be undertaken and cannot comment on the reasonableness of the activities.

### 5.3. Geological setting

The Nebraska northwest and southeast regions are located within the Salina Basin, a mid-continent basin in eastern Nebraska and Kansas. Sediments of Cambrian to Quaternary age are reported, however sediments of Ordovician to Pennsylvanian (Upper Carboniferous) age including Mississippian age (Lower Carboniferous) dominate. The Salina Basin overlies basement terranes of metasediments and crystalline rocks of Pre-Cambrian age<sup>14</sup>.

The South Carolina west and east regions are associated with bays which are extensively mapped on the Atlantic coastal plain from Florida to Jersey.<sup>15</sup> The JDA leases are located on the Atlantic coastal plain with a thin Cretaceous to Pliocene sedimentary section comprising the western edge of the Blake – Bahamas Basin.

<sup>14</sup> Prenskey, S. (1985) Federal Lands Assessment Project: Salina Basin Province (Phase 1), USGS open file report 87-450F

<sup>15</sup> South Carolina Geological Survey. <https://www.dnr.sc.gov/geology/carolina-bays.html>

Underlying the sediment cover of the South Carolina regions lies the Appalachian Piedmont terrain comprising complex Neoproterozoic to early Paleozoic aged rocks.<sup>16</sup>

The nature and origin of natural hydrogen gas is vigorously debated in scientific literature. The NH2E hydrogen exploration play is based on the theory that hydrogen gas is generated and sourced from within the Earth's crust, is present in matrix and fracture porosity of predominantly basement rocks, and seepage to the surface is evidenced by features at surface.

Natural hydrogen gas is reported in Kansas to the south of the Nebraska leases in several wells drilled into basement.<sup>17</sup>

## **5.4. Data**

No depth to basement, soil geochemistry analysis or other geological descriptions have been made available to RISC to review for the Nebraska or South Carolina leases. RISC is not aware of any seismic data or any other data such as geochemical studies or soil sampling pertinent to the evaluation of the Nebraska and South Carolina leases or the exploration of natural hydrogen.

The primary data available is that associated with the Hoarty NE-3 well drilled by NH2E in 2018/19 in the Nebraska northwest lease region.

### **5.4.1. Hoarty NE-3 well**

NH2E drilled the Hoarty NE-3 well in the Nebraska northwest T7N-R4W cluster of leases (Figure 3-4) to test for the presence of natural hydrogen gas in basement rocks. Drilled over the period November 2018 to February 2019, the well was drilled to a total depth of 11,287 ft (3,440 m) in basement metasediments. This is the deepest well in Nebraska.

The well intersected approximately 3,478 ft (1,060 m) of sediments of up to Mississippian age (Lower Carboniferous) before drilling a further 7,800 ft (2,377 m) in basement rocks. A mudlog, daily drilling reports, a geochemical gas analysis report, wireline logs and petrophysical analyses are available for the well.

#### **5.4.1.1. Hydrogen analysis**

As detailed in the geochemical gas analysis report, specialised hydrogen gas detection equipment was used alongside traditional mudlogging gas detection equipment whilst drilling the well. In addition, manual sampling of gas from the mud flow line was also undertaken.

Hydrogen concentrations in the well are shown in Figure 5-1. The concentration difference between the two measurements is speculated by NH2E to represent atmospheric contamination. Hydrogen gas was detected via manual sampling in excess of 30% concentration below 10,000 ft (3,050 m).

Swabbing operations were conducted in June 2021 to reduce the hydraulic head in the well. Gas that had been swabbed into the wellbore and recovered to surface was flared. The flare burnt with a transparent flame, interpreted to verify that hydrogen gas was predominant in the gas stream. However, RISC is not

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<sup>16</sup> Hibbard, J., Stoddard, E., Secor, D. and Dennis, A. (2002). The Carolina Zone: overview of Neoproterozoic to Early Paleozoic per-Gondwanan terranes along the eastern flank of the southern Appalachians. *Earth Science Reviews*, 57, pp299-339.

<sup>17</sup> Guelard, J., Beaumont, V., Rouchon, V., Guyot, F., Pillot, D., Jezequel, D., Ader, M., Newell K. D. and Deville, E. (2017) Natural H<sub>2</sub> in Kansas: Deep or shallow origin?. *Geochemistry, Geophysics, Geosystems* (18), pp1841-1865.

aware of any gas sampling or analysis to verify a substantial hydrogen concentration. Flared gas was depressurised from the wellhead annulus and does not constitute a formal flow test.

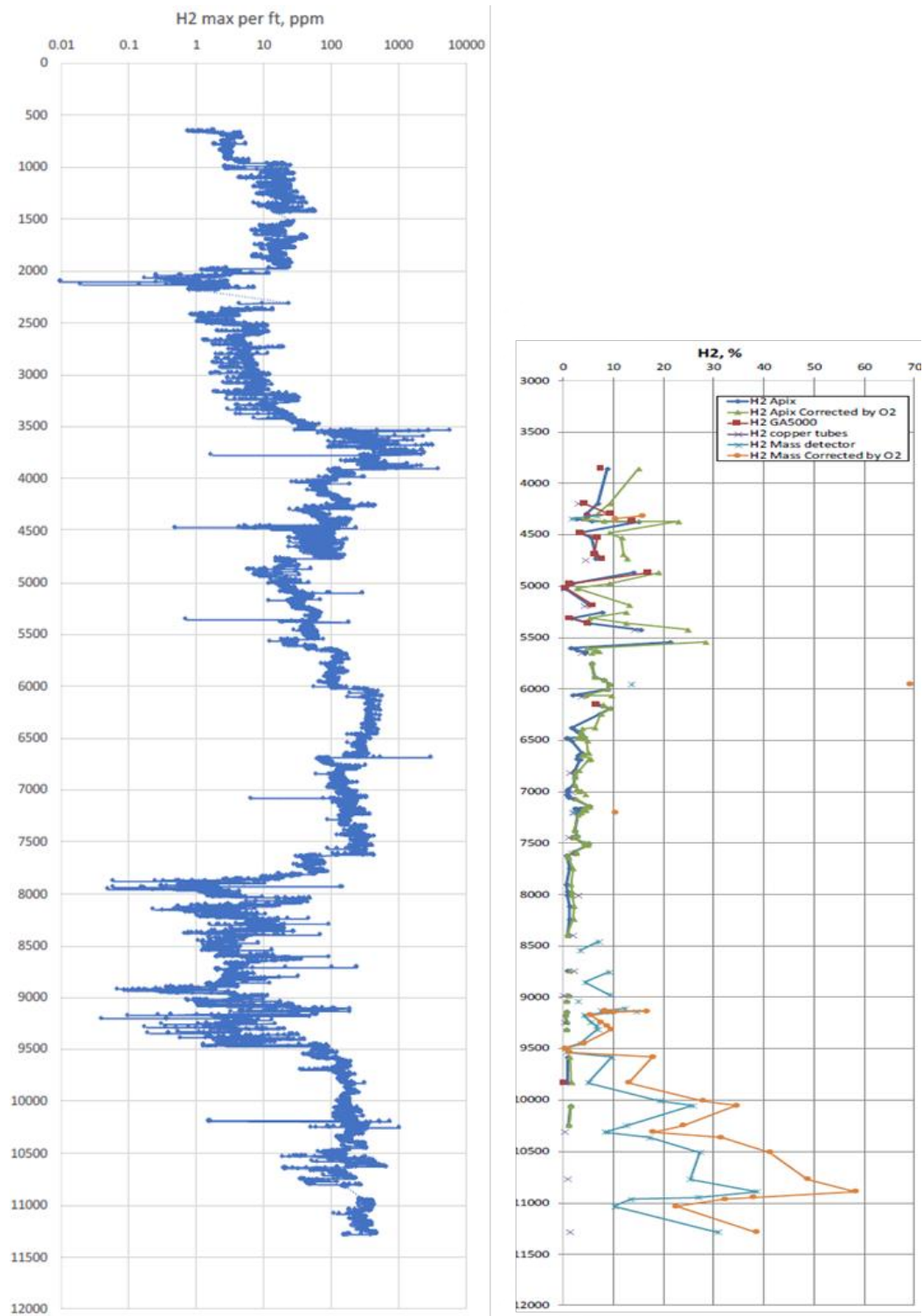


Figure 5-1: Hoarty NE-3 hydrogen gas profiles from gas detection equipment in the mud agitators (at left), and manual gas sampling of bubbles in the mud (at right)

During the swabbing operations, isotube gas samples were taken from the wellhead and casing annulus and analysed (Table 5-3). Hydrogen concentrations in these samples are low and markedly different to the hydrogen concentrations measured whilst drilling. NH2E postulate this is due to microbiological conversion of hydrogen in the borehole and atmospheric contamination since the well was suspended.

It is RISC's opinion that the manual hydrogen sampling undertaken whilst drilling is a more representative measurement of natural hydrogen gas in the well. However, RISC cannot verify the measurement and analysis and therefore considerable uncertainty in the hydrogen gas concentration in the well remains.

**Table 5-3: Hoarty NE-3 isotube analyses, collected prior to swabbing operations**

Sample #	796998	796999	797000	797001	797002	797003
Component	Chemical mol. %					
Carbon Monoxide	-	-	-	-	-	-
Helium	1.02	0.879	1.58	7.59	7.31	-
Hydrogen	0.178	0.304	0.0503		0.0183	0.17
Argon	0.388	0.464	0.167	0.34	0.408	1.24
Oxygen	2.61	2.22	1.39	0.11	1.44	0.036
Nitrogen	90.66	91.2	23.89	62.2	63.52	98.55
Carbon Dioxide	0.024	0.012	-	0.007	-	-
Methane	5.11	4.91	72.91	29.71	27.26	0.0029
Ethane	0.0048	0.0045	0.008	0.0396	0.0345	0.0003
Ethylene	0.0002	0.0002	0.0002	0.0002	0.0002	0.0004
Propane	0.0007	0.0008	0.0015	0.0048	0.0043	0.0001
Propylene	0.0002	0.0003	0.003	0.0012	0.0011	0.0003
Iso-butane			0.0001	0.0001		-
N-butane	0.0001	0.0002	0.0004	0.0007	0.0001	-
Iso-pentane	0.0004	-	-	-	-	-
N-pentane	-	-	0.0001	-	-	-
Hexanes	0.0005	0.0006	0.0012	0.0002	0.0001	0.0003
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

RISC notes the presence of helium gas in the isotube samples (Table 5-3). NH2E and NIPL have not presented any evaluation plan to investigate further.

Notwithstanding the uncertainties regarding the hydrogen concentrations, in RISC's opinion helium at these concentrations could potentially be commercially attractive and further evaluation is warranted.



#### **5.4.1.2.     *Petrophysical analysis***

Petrophysical analysis of the well was undertaken by NH2E and has been provided to RISC. An independent petrophysical evaluation was also undertaken by Upstream Digital Solutions on the basement section for HyTerra. This analysis is more comprehensive and identified two zones of interest with elevated hydrogen gas associated with matrix and fracture porosity (Figure 5-2). The petrophysical analysis sums and averages, including calculated minima and maxima is shown in Table 5-4.

RISC has relied upon this analysis for parametrisation of volumetric inputs for estimation of gas in-place (refer Section 6).

This analysis has identified two zones of elevated hydrogen gas associated with matrix and fracture porosity, Zone 1 and Zone 4. Matrix porosity is low but significant fracture porosity has been estimated.

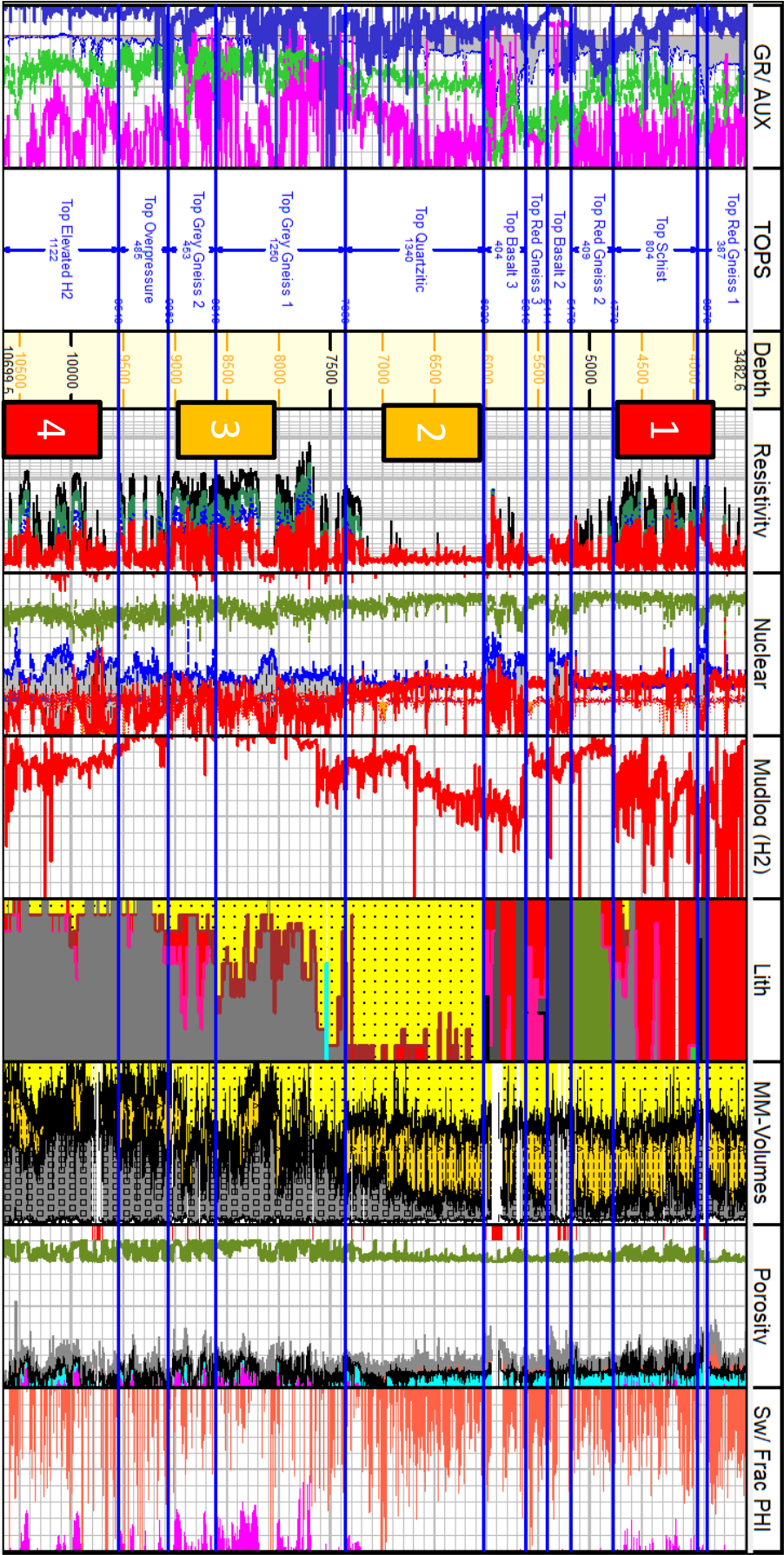


Figure 5-2: Hoarty NE-3 basement petrophysical analysis (HyTerra)

Table 5-4: Hoarty NE-3 petrophysical analysis sums and averages (HyTerra)

Interval	Top (ft)	Base (ft)	Net (ft)	Matrix porosity						Fracture porosity						Cutoff PHIT >= 0.01 & Swt <= 0.7			
				Ave	Std	P90	P50	P10	Ave	Std	Min	Max	Sw	Sw	Sw	Sw	Sw	Sw	Sw
				(%)	Dev.	(%)	(%)	(%)	(%)	Dev.	(%)	(%)	(%)	Std	P90	P50	P10	(%)	(%)
TOP RED GNEISS 1	3482.7	3870	301	4.60%	1.43%	3.14%	4.13%	6.69%	0.00%	0.02%	0.00%	0.29%	42.70%	12.50%	62.13%	44.98%	30.32%		
TOP BASALT 1	3870	3966	10	6.20%	0.73%	5.17%	6.22%	7.09%	0.00%	0.03%	0.00%	0.15%	55.40%	9.88%	66.90%	57.12%	40.10%		
<b>TOP SCHIST (zone 1)</b>	<b>3966</b>	<b>4770</b>	<b>408</b>	<b>3.80%</b>	<b>0.77%</b>	<b>2.94%</b>	<b>3.67%</b>	<b>4.85%</b>	<b>0.10%</b>	<b>0.27%</b>	<b>0.00%</b>	<b>1.92%</b>	<b>51.70%</b>	<b>13.55%</b>	<b>67.20%</b>	<b>55.36%</b>	<b>35.66%</b>		
TOP RED GNEISS 2	4770	5179	189	3.30%	0.54%	2.80%	3.17%	4.08%	0.00%	0.01%	0.00%	0.23%	56.20%	10.42%	67.89%	59.31%	43.76%		
TOP BASALT 2	5179	5414	108	4.30%	1.16%	2.86%	4.35%	5.72%	0.00%	0.01%	0.00%	0.13%	40.10%	18.54%	64.22%	43.75%	9.60%		
TOP RED GNEISS 3	5414	5616	149	3.30%	0.52%	2.64%	3.25%	3.97%	0.00%	0.00%	0.00%	0.00%	47.30%	16.00%	65.25%	50.95%	25.11%		
TOP BASALT 3	5616	6020	164	4.00%	1.04%	2.67%	4.06%	5.28%	0.00%	0.01%	0.00%	0.12%	44.20%	15.47%	62.23%	46.33%	24.57%		
TOP QUARTZITIC	6020	7360	769	3.00%	0.66%	2.18%	3.00%	3.85%	0.00%	0.05%	0.00%	0.76%	45.90%	18.88%	65.95%	50.20%	15.14%		
TOP GREY GNEISS 1	7360	8610	301	2.90%	1.09%	1.69%	2.80%	4.42%	0.30%	0.63%	0.00%	3.33%	43.40%	21.54%	66.48%	46.19%	1.38%		
TOP GREY GNEISS 2	8610	9063	110	4.30%	1.67%	1.82%	4.69%	6.36%	0.70%	0.70%	0.00%	2.39%	54.60%	16.65%	67.62%	54.81%	33.03%		
TOP OVERPRESSURE	9063	9548	153	2.60%	1.07%	1.28%	2.42%	3.97%	0.10%	0.27%	0.00%	1.52%	38.40%	24.91%	64.31%	38.00%	0.42%		
<b>TOP ELEVATED H2 (Zone 4)</b>	<b>9548</b>	<b>10670</b>	<b>406</b>	<b>3.10%</b>	<b>1.37%</b>	<b>1.56%</b>	<b>2.49%</b>	<b>4.82%</b>	<b>0.10%</b>	<b>0.36%</b>	<b>0.00%</b>	<b>2.48%</b>	<b>40.00%</b>	<b>22.76%</b>	<b>64.66%</b>	<b>41.46%</b>	<b>0.66%</b>		

## 6. Resources

RISC has not been provided any resource assessment to audit in the preparation of this ITSR for the Aolong joint venture project nor for the leases included in the NH2E -NIPL JDA.

In the absence of any technical data RISC has not undertaken an independent resource assessment of the Aolong joint venture project. However, for the NH2E -NIPL JDA assets RISC has conducted an independent gas in-place assessment based on the data provided.

However, these estimates cannot be disclosed according to ASX listing rules.

### 6.1. In-place resource estimate method

RISC has estimated the gas in-place for the Nebraska northwest region using prospective areas as defined below and parameters evaluated by RISC which are based on the Hoarty NE-3 petrophysical analysis in addition to our evaluation of hydrogen gas content.

RISC have assessed the in-place gas resource as a continuous resource play and that the prospective interval is gas saturated over the prospective areas with hydrogen gas being a proportion of that gas.

In the absence of subsurface information for the Nebraska southeast, South Carolina west and east regions, RISC has calculated a resource density range from the Nebraska northwest region gas in-place estimate to apply to these other JDA regions to estimate the gas in-place.

In RISC's opinion this approach is reasonable but cautions that significant uncertainty exists in these prospective regions.

#### 6.1.1. Prospective areas

RISC independently verified the lease areas as provided by NIPL and the calculated the net area of the leases within the mapped bays (prospective area). These areas are presented in Table 6-1. RISC notes that these areas include lease T7N-R4W Sec 23: NE4 which has been renewed and lease T7N-R4W Sec 23: N2NW containing the Hoarty NE-3 well location which has been suspended as permitted by the lease agreement with shut-in royalties.

Table 6-1: JDA lease area tabulation and prospective areas

Region	Permitted area		Permitted area within bay (prospective area)	
	Area (km <sup>2</sup> )	Area (acres)	Area (km <sup>2</sup> )	Area (acres)
Nebraska Northwest	9.40	2,320.0	4.74	1,171.3
Nebraska Southeast	1.60	400.0	1.65	407.7
South Carolina West	2.29	565.9	2.23	551.0
South Carolina East	2.82	696.8	2.76	682.0

The permitted lease area in some instances extends outside of the bay and the leased area within the bay is defined as the prospective area and is that used in the gas in-place resource estimation.

### 6.1.2. Gas composition

Although some gas samples were captured during the Hoarty NE-3 drilling program the samples are considered to be contaminated, and the compositional analytical results are ambiguous.

During well swabbing operations gas evacuated from the annulus of the well burned with a clear flame in direct sunlight which is indicative of a hydrogen flame. Isotube gas samples collected prior to swabbing were contaminated by air and possibly altered due to microbial activity within the well, corrections for contamination have been used where possible.

Manual sampling of gas bubbles evolving from the mud in the mud returns line whilst drilling has yielded the highest measured hydrogen gas concentrations (refer Figure 5-1) but these too were contaminated by air.

A wide range of gas composition has therefore been adopted by RISC to address the compositional uncertainty which is confined by the available data.

There is a substantial difference between the pressure and temperature of Zones 1 and 4. Zone 1 is estimated to be at 1,400 psia and 96 °F, Zone 4 is estimated to be 4,075 psia and 149 °F. This combined with the variation in hydrogen estimates (P50 estimate of 8% for Zone 1 and 12% for Zone 4) results in Zone 4 being estimated as compositionally superior with respect to hydrogen.

The estimated gas compositions are shown in Table 6-2.

**Table 6-2: Gas composition volumetric input parameters (RISC)**

Zone		Hydrogen (H <sub>2</sub> )	Methane (CH <sub>4</sub> )	Nitrogen (N <sub>2</sub> )
<b>Zone 1</b>	Low (%)	4.0	20.9	75.1
	Best (%)	8.0	18.9	73.1
	High (%)	12.0	15.0	73.0
<b>Zone 4</b>	Low (%)	4.0	20.9	75.1
	Best (%)	12.0	15.0	73.0
	High (%)	33.8	4.1	62.1

Notwithstanding the uncertainties regarding the analysis of hydrogen content, RISC notes that helium gas of up to 7.6% concentration was measured in the isotube samples (refer Table 5-3).



## 6.2. Reservoir development plan

RISC has not been provided a conceptual plan to develop and produce gas from the assets nor to process and extract the hydrogen from the well stream. In the absence of a development concept RISC is unable to estimate recoverable resources for the NIPL assets.

Factors to consider in the formulation of a development concept include reservoir performance, well count, artificial stimulation, well deliverability and surface processing equipment. An appraisal campaign with appropriate testing and sampling will address these issues.

RISC notes that the USA has a well-developed articulated network of natural gas pipelines infrastructure. It is reasonable to assume that any produced hydrogen gas could be evacuated via this network. Hydrogen gas can be introduced to existing natural gas infrastructure up to approximately 10% by volume.

In RISC opinion, the NIPL assets are currently immature and require further exploration and appraisal before an estimate of recovery and therefore resources can be made.

## 6.3. Discovery test

In RISC opinion, the Hoarty NE-3 well has not proven an accumulation of natural hydrogen gas according to Section 2.1.1 'Determination of Discovery Status' of the PRMS<sup>18</sup>. There remains significant uncertainty in the hydrogen gas concentrations and producibility has not yet been demonstrated.

## 6.4. Geological risk

NH2E and NIPL have not provided an estimate of geological risk for a natural hydrogen exploration play in any of the JDA lease areas.

The petroleum industry concepts of geological play risk and prospect specific risk however can be applied in this instance. For the Nebraska northwest region, as tested by the Hoarty NE-3 well, the natural hydrogen gas exploration play has been tested and appears to be present. However, the concentration of natural hydrogen gas in the subsurface has some significant uncertainty. RISC therefore assess the geological play risk at 70% for this region.

For the Nebraska southeast area an extension of this play (25 km to the southeast) is required and therefore consequently becomes riskier. For the South Carolina regions the play has not been shown to be present and is therefore considered high risk.

For a prospect specific risk of the Nebraska northwest region, as tested by the Hoarty NE-3 well, RISC estimate the chance of recovering natural hydrogen on a production test at 40%. This is based on the natural hydrogen gas as measured whilst drilling and the chance of establishing a commercially productive reservoir interval in the well. The resultant geological risk of the Nebraska northwest region is assessed at 28% (70% x 40%).

RISC cannot assign a geological risk to the Nebraska southeast or South Carolina regions.

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<sup>18</sup> Petroleum Resources Management System, prepared by the Oil and Gas Reserves Committee of the Society of Petroleum Engineers (SPE) and reviewed and jointly sponsored by the American Association of Petroleum Geologists (AAPG), World Petroleum Council (WPC), Society of Petroleum Evaluation Engineers (SPEE), Society of Exploration Geophysicists (SEG) and approved by the Board of the SPE in March 2007. The PRMS was subsequently updated in June 2018.

## 7. Valuation

RISC has considered oil and gas industry accepted practices to determine Value, including comparable transactions, farm-in promotion factors, sunk costs / work program and EMV. Please refer to Section 2.3 for a description of the valuation approaches.

Alternative valuation approaches have been investigated to support the valuation and these are presented and discussed herein.

### 7.1. HyTerra Ltd assets

RISC has assessed a fair market value of HyTerra's net interest in the Aolong joint venture to be between - AU\$0.5 million and AU\$0 million with a best estimate of AU\$0 million (Table 7-1).

**Table 7-1: Aolong joint venture valuation summary**

	Valuation (AU\$ million)		
	Low	Best	High
Aolong joint venture 100% project	0	0	0
Net HyTerra	-0.5	0	0
Valuation rationale	Potential liabilities for past drilling cost reconciliation	Prospectivity of the joint venture project area, work program and incorporated joint venture contract revision.	

Notes to the table:

1.

Net HyTerra low estimate assumes that HyTerra is liable for claim of AU\$0.5 million in past drilling costs.

2.

Best and high estimates reflect the prospectivity of the project areas, the current status of the project with no work program post-2015 and the likelihood of revised Sino-Foreign articles of incorporation being agreed between the joint venture parties.

3.

Conversion rate of AU\$1.4 to US\$1 used.

#### 7.1.1. Valuation assumptions and summary

RISC has considered the following in its estimation of Value:

- Sunk costs (capitalised exploration expenditure) as advised to RISC are AU\$8.175 million net to HyTerra.
- HyTerra has advised that the incorporated joint venture has not undertaken any work program since the completion of the drilling of Yixin-1 in 2015.
- RISC understands that there are currently no plans to undertake any future work program in the project area.
- HyTerra have advised RISC that they plan to write-down the full asset value.
- HyTerra have advised RISC that an outstanding claim of AU\$0.5 million associated with the prior drilling costs. RISC understands that this claim has been disputed, but HyTerra recognise the claim as a potential liability.

## 7.2. Neutralysis Industries Pty Ltd assets

RISC has assessed a fair market value of NIPL's net interest in the NH2E JDA to be between AU-\$7.0 million and AU\$38.9 million with a best estimate of AU\$4.9 million (Table 7-2).

Table 7-2: NIPL valuation summary

	Valuation (AU\$ million)		
	Low	Best	High
<b>NH2E JDA 100% Project</b>	-11.7	16.3	76.3
<b>Net NIPL</b>	-7.0	4.9	38.9
<b>Valuation rationale</b>	Sunk costs	Farm-in promote (Joint Venture terms)	\$/acre
Notes to the table: 1. Costs are in US\$. Conversion rate of AU\$1.4 to US\$1 used. 2. Net NIPL for the low and best estimate of Value determined based on an earned 30% beneficial interest at the completion of Phase 1. For the high estimate, 51% beneficial interest at the completion of Phase 2 is applied.			

### 7.2.1. Valuation assumptions and summary

RISC has considered the following in its estimation of Value:

- Sunk costs incurred by NH2E for the drilling of the Hoarty NE-3 well amount to US\$3,362,000. These costs are past expenditures incurred by NH2E alone and NIPL is not considered to be contributing towards these costs as part of the JDA. As such, these costs are not considered by RISC in the determination of Value.
- NIPL sunk costs to date (contributions towards Phase 1 of the JDA) as advised to RISC are the amount of US\$1,671,042 comprising funding of the 2021 swabbing operations of the Hoarty NE-3 well, the purchase of gas detection equipment and general expenses.
- The JDA specified work program to be funded by NIPL for Phase 1 is US\$5 million and US\$15 million for Phase 2, to a total of US\$20 million.
- The JDA describes the establishment of a joint venture company to reflect the beneficial ownership of each party during the earn-in. The NIPL beneficial interest in the joint venture company at the end of Phase 1 will be 30%, and 51% at the end of Phase 2.
- RISC have assumed that Phase 1 of the JDA work program and its funding is a firm obligation borne by NIPL and non-negotiable.
- It is assumed by RISC in the low and best estimate of Value that NIPL elect to seek to defer or renegotiate the JDA terms at the end of Phase 1 and remain at the earned 30% beneficial interest level ('stand-still').
- Transaction metrics of 384 petroleum transactions within the GlobalData intelligence database of asset transactions in the USA since 1/1/2017 have been analysed in the determination of high case valuation.
- Natural hydrogen gas content, deliverability and recovery is largely unconstrained.
- The range in the valuation is reflective of the availability of data and that the technical data and its evaluation is in the early stages of exploration.

The valuation method and analysis are detailed in Table 7-3. The projects sunk costs and the JDA's agreed work program and expenditure (to be funded by NIPL) provide a direct method for determining Value (appraised value method or cost method, and joint venture terms or farmin method). RISC has used the obligated firm Phase 1 costs for determining the low estimate of Value, the JDA Phase 1 work program for the best estimate and for the high estimate of Value, a nominal value per acre has been adopted (comparable or benchmark method), as described below.

**The low estimate of Value** was determined based on the assumption that the Phase 1 work program, specifically the well testing, fails to demonstrate recoverable natural hydrogen gas from the Hoarty NE-3 well. In effect the obligated Phase 1 expenditures borne by NIPL effectively downgrade the prospectivity of the assets. No discount or uplift has been applied as these costs. It is assumed that the JDA is terminated or that the parties agree to 'stand-still' with NIPL retaining a 30% beneficial interest. Net NIPL Value reflects the firm obligated Phase 1 costs as funded by NIPL 100%.

**The best estimate of Value** is based on the JDA work program at the completion of Phase 1 of the NIPL earn-in. It is assumed that the Phase 1 work program has yielded inconclusive but encouraging results and intrinsic project Value has been created. The implied 'farm-in promote factor' for Phase 1 is 3.3:1 where NIPL funds 100% of the Phase 1 work program (US\$5 million) to earn a 30% beneficial interest. RISC assume that at the completion of Phase 1 NIPL would seek to defer Phase 2 activities or renegotiate the terms of the JDA. At this point in time, the new joint venture company established under the JDA would reflect the 30% beneficial interest earned by NIPL.

RISC cannot provide an estimate of the chance of these low or best estimate outcomes. Therefore, no risking, uplift or discount has been applied in the valuation.

**In the determination of a high estimate of Value**, RISC has analysed transaction metrics of 384 petroleum transactions of assets in the USA since 1/1/2017 within the GlobalData intelligence database, extracted on 8/3/2022. The transactions include all petroleum prospective and productive regions of the onshore basins of the USA. Of these transactions, 69 have \$/acre metrics which were analysed by RISC (Table 7-4).

The transactions as extracted from GlobalData contain only two transactions in Nebraska and no transactions in South Carolina. The transactions in Nebraska do not have a \$/acre metric and are of inconsequential value. RISC do not consider these as comparable transactions in this instance.

As shown in Table 7-4, there is a significant range in \$/acre metrics. This is reflective of the relative prospectivity, productivity and commercial terms of the various transactions. Within the analysis one transaction with a metric of US\$83,750/acre has skewed the analysis and has been selectively removed in some of the analysis. Transactions on shale assets, being a resource play, has been analysed as a potential proxy for a natural hydrogen gas play.

High case or P10 US\$/acre metrics for all transactions can be seen to range from US\$13,797 to US\$19,280 per acre. For the states of Kansas and Wyoming a P10 range of US\$707 to US\$27,902 per acre is evident.

For the determination of a high estimate of Value, RISC has adopted a US\$14,000/acre metric which is supported by the analysis, including the shale gas transactions alone (US\$14,285/acre).

Table 7-3: NIPL valuation analysis

Valuation Method & Analysis	Factor or Cost	
	US\$	AU\$
<b>Low Estimate – Undiscounted sunk costs</b>		
Hoarty NE-3 drilling costs net NH2E (undiscounted)	US\$3.4 million	AU\$4.8 million
Phase 1 costs to date net NIPL (undiscounted)	US\$1.7 million	AU\$2.4 million
Project gross sunk costs to date (undiscounted)	US\$5.1 million	AU\$7.2 million
Phase 1 work program net NIPL (undiscounted)	US\$5.0 million	AU\$7.0 million
<b>Valuation net NIPL</b>	<b>US-\$5.0 million</b>	<b>AU-\$7.0 million</b>
<b>Best Estimate – Phase 1 of JDA</b>		
Transaction costs/expenditure (Phase 1)	US\$5.0 million	AU\$7.0 million
Equity share of Phase 1 work program (30% equity)	US\$1.5 million	AU\$2.1 million
Farm-in promote factor (implied)	3.3 : 1	
Farm-in premium (net NIPL)	US\$3.5 million	AU\$4.9 million
Project value (gross)	US\$11.7 million	AU\$16.3 million
<b>Valuation net NIPL (30 %)</b>	<b>US\$3.5 million</b>	<b>AU\$4.9 million</b>
<b>High Estimate – \$/acre</b>		
Total leased acres included in JDA	3,891 acres	
Comparable transactions analysis \$/acre (P90)	US\$311	AU\$435
Comparable transactions analysis \$/acre (P50)	US\$2,446	AU\$3,424
Comparable transactions analysis \$/acre (P10)	US\$14,751	AU\$20,651
\$/acre selected for high case valuation	US\$14,000	AU\$19,600
Project value (gross)	US\$54.5 million	AU\$76.3 million
<b>Valuation net NIPL (51 %)</b>	<b>US\$27.8 million</b>	<b>AU\$38.9 million</b>
<p>Notes to the table:</p> <ol style="list-style-type: none"> <li>1. Costs are in US\$. Conversion rate of AU\$1.4 to US\$1 used.</li> <li>2. Low estimate assumes that well testing is inconclusive or fails to demonstrate recoverable natural hydrogen gas. Project gross costs to date includes drilling costs plus Phase 1 expenditure to date. Past costs associated with the drilling of the Hoarty NE-3 well are not considered in the valuation. Gross and net Value reflects NIPL obligated funding for Phase 1 only, excluding sunk well costs.</li> <li>3. Best estimate assumes that the JDA parties agree to pause the JDA or 'stand-still' at the completion of Phase 1 expenditure and NIPL earn-in.</li> <li>4. High estimate based on transaction analysis from 384 petroleum transactions on assets located in the USA, 69 of which have \$/acre metric as reported in GlobalData transaction database (extracted 8 March 2022). Refer to text for more information.</li> </ol>		



**Table 7-4: GlobalData \$/acre transaction metrics analysis**

Transactions (with US\$/acre metric)	US\$/acre		
	P90	P50	P10
All states, all transactions (n=69)	316	2,585	18,808
All states excluding largest transaction (n=68)	311	2,446	14,751
All states excluding 5 largest, 5 smallest transactions (n=58)	350	2,585	13,797
All states, shale transactions only (n=33)	353	3,009	19,280
All states, shale transactions only, excluding largest transaction (n=32)	344	2,797	14,285
Kansas only (n=7)	82	371	707
Wyoming (n=21)	333	2,616	27,902
Notes to the table: 1. GlobalData onshore USA petroleum transactions since 1/1/2017 as extracted on 8/3/2022			

### 7.2.2. Valuation alternatives

RISC is not aware of any natural hydrogen gas play related transactions globally that could be used in this instance as a comparable transaction, nor of any publicly listed hydrogen exploration and production companies for market capitalisation benchmarking.

Using \$/acre metrics for the basis of a valuation alternative is shown below in Table 7-5. The low case estimate of Value on this basis is not directly comparable to the valuation as presented in Table 7-2 as the \$/acre basis assumes that the acreage would have some intrinsic Value which has yet to be demonstrated.

However, for a best estimate of Value using a \$/acre metric approximates the best estimate of Value using the joint venture terms (or farmin) method used in our valuation. For comparison, the NH2E – NIPL JDA at the completion of Phase 1 would amount to US\$2,998/acre (gross) whereas RISC has determined that a best estimate metric of US\$3,000/acre is reasonable based on the analysis of the aforementioned GlobalData transactional database.

**Table 7-5: Alternative valuation using \$/acre metrics**

	Value		
	Low	Best	High
\$/acre	US\$300 (AU\$420)	US\$3,000 (AU\$4,200)	US\$14,000 (AU\$19,600)
Acres	3,891		
Gross valuation	US\$1.2 million (AU\$1.6 million)	US\$11.7 million (AU\$16.3 million)	US\$54.5 million (AU\$76.3 million)
Valuation net NIPL	US\$0.4 million (AU\$0.5 million)	US\$3.5 million (AU\$4.9 million)	US\$27.8 million (AU\$38.9 million)
Notes to the table: 1. Conversion rate of AU\$1.4 to US\$1 used. 2. Net NIPL calculation assumes 30% beneficial interest in the low and best case, and 51% in the high case.			

## 8. Declarations

### 8.1. Terms of engagement

This report, any advice, opinions or other deliverables are provided pursuant to the Engagement Contract agreed to and executed by the Client and RISC.

### 8.2. Qualifications

RISC is an independent oil and gas advisory firm. All of the RISC staff engaged in this assignment are professionally qualified engineers, geoscientists or analysts, each with many years of relevant experience and most have in excess of 20 years.

RISC was founded in 1994 to provide independent advice to companies associated with the oil and gas industry. Today the company has approximately 40 highly experienced professional staff at offices in Perth, Brisbane, Jakarta and London. We have completed over 2,000 assignments in 70+ countries for nearly 500 clients. Our services cover the entire range of the oil and gas business lifecycle and include:

- Oil and gas asset valuations, expert advice to banks for debt or equity finance;
- Exploration/portfolio management;
- Field development studies and operations planning;
- Reserves assessment and certification, peer reviews;
- Gas market advice;
- Independent Expert/Expert Witness;
- Strategy and corporate planning.

The preparation of this report has been managed by Mr Adam Craig who is an employee of RISC. Mr Craig is a highly experienced Geoscientist and Manager, with over 30 years' experience in the upstream oil & gas sector working for small and mid-size independents, as well as NOC related entities. He is a member and Certified Practising Geologist (#6446) of the AAPG. Adam is also a member of PESA (2021-22 WA Branch President) and a Fellow of the Geological Society. He holds BSc in Geology from Curtin University, Western Australia and is a qualified petroleum reserves and resources evaluator (QPRRE) as defined by ASX listing rules.

### 8.3. Standard

Reserves and resources are reported in accordance with the definitions of reserves, contingent resources and prospective resources and guidelines set out in the Petroleum Resources Management System (PRMS) prepared by the Oil and Gas Reserves Committee of the Society of Petroleum Engineers (SPE) and reviewed and jointly sponsored by the American Association of Petroleum Geologists (AAPG), World Petroleum Council (WPC), Society of Petroleum Evaluation Engineers (SPEE), Society of Exploration Geophysicists (SEG), Society of Petrophysicists and Well Log Analysts (SPWLA) and European Association of Geoscientists and Engineers (EAGE), revised June 2018.

This Report has been prepared in accordance with the Australian Securities and Investment Commission (ASIC) Regulatory Guides 111 and 112.

## 8.4. Limitations

The assessment of petroleum assets is subject to uncertainty because it involves judgments on many variables that cannot be precisely assessed, including reserves/resources, future oil and gas production rates, the costs associated with producing these volumes, access to product markets, product prices and the potential impact of fiscal/regulatory changes.

The statements and opinions attributable to RISC are given in good faith and in the belief that such statements are neither false nor misleading. While every effort has been made to verify data and resolve apparent inconsistencies, neither RISC nor its servants accept any liability, except any liability which cannot be excluded by law, for its accuracy, nor do we warrant that our enquiries have revealed all of the matters, which an extensive examination may disclose. In particular, we have not independently verified property title, encumbrances or regulations that apply to these assets.

Our review was carried out only for the purpose referred to above and may not have relevance in other contexts.

## 8.5. Independence

RISC makes the following disclosures:

- RISC is independent with respect to HyTerra and confirms that there is no conflict of interest with any party involved in the assignment.
- Under the terms of engagement between RISC and HyTerra, RISC will receive a time-based fee, with no part of the fee contingent on the conclusions reached, or the content or future use of this report. Except for these fees, RISC has not received and will not receive any pecuniary or other benefit whether direct or indirect for or in connection with the preparation of this report.
- Neither RISC Directors nor any staff involved in the preparation of this report have any material interest in HyTerra or in any of the properties described herein.

## 8.6. Copyright

This document is protected by copyright laws. Any unauthorised reproduction or distribution of the document or any portion of it may entitle a claim for damages. Neither the whole nor any part of this report nor any reference to it may be included in or attached to any prospectus, document, circular, resolution, letter or statement without the prior consent of RISC.

## 8.7. Consent

RISC has consented to this report, in the form and context in which it appears, being included, in its entirety, in the Notice of Meeting. Neither the whole nor any part of this report nor any reference to it may be included or attached to any other document, circular, resolution, letter or statement without the prior consent of RISC.

## 9. List of terms

The following lists, along with a brief definition, abbreviated terms that are commonly used in the oil and gas industry and which may be used in this report.

Term	Definition
1P	Equivalent to Proved reserves or Proved in-place quantities, depending on the context.
1Q	1st Quarter
2P	The sum of Proved and Probable reserves or in-place quantities, depending on the context.
2Q	2nd Quarter
2D	Two Dimensional
3D	Three Dimensional
4D	Four Dimensional – time lapsed 3D in relation to seismic
3P	The sum of Proved, Probable and Possible Reserves or in-place quantities, depending on the context.
3Q	3rd Quarter
4Q	4th Quarter
AFE	Authority for Expenditure
Bbl	US Barrel
BBL/D	US Barrels per day
BCF	Billion (10 <sup>9</sup> ) cubic feet
BCM	Billion (10 <sup>9</sup> ) cubic metres
BFPD	Barrels of fluid per day
BOPD	Barrels of oil per day
BTU	British Thermal Units
BOEPD	US barrels of oil equivalent per day
BWPD	Barrels of water per day
°C	Degrees Celsius
Capex	Capital expenditure
CAPM	Capital asset pricing model
CGR	Condensate Gas Ratio – usually expressed as bbl/MMscf
Contingent Resources	Those quantities of petroleum estimated, as of a given date, to be potentially recoverable from known accumulations by application of development projects but which are not currently considered to be commercially recoverable due to one or more contingencies. Contingent Resources are a class of discovered recoverable resources as defined in the SPE-PRMS.
CO <sub>2</sub>	Carbon dioxide
CP	Centipoise (measure of viscosity)
CPI	Consumer Price Index
DEG	Degrees
DHI	Direct hydrocarbon indicator
Discount Rate	The interest rate used to discount future cash flows into a dollars of a reference date
DST	Drill stem test
E&P	Exploration and Production
EG	Gas expansion factor. Gas volume at standard (surface) conditions/gas volume at reservoir conditions (pressure and temperature)
EIA	US Energy Information Administration



Term	Definition
EMV	Expected Monetary Value
EOR	Enhanced Oil Recovery
ESMA	European Securities and Markets Authority
ESP	Electric submersible pump
EUR	Economic ultimate recovery
Expectation	The mean of a probability distribution
F	Degrees Fahrenheit
FDP	Field Development Plan
FEED	Front End Engineering and design
FID	Final investment decision
FM	Formation
FPSO	Floating Production Storage and offtake unit
FWL	Free Water Level
FVF	Formation volume factor
GIIP	Gas Initially In Place
GJ	Giga (10 <sup>9</sup> ) joules
GOC	Gas-oil contact
GOR	Gas oil ratio
GRV	Gross rock volume
GSA	Gas sales agreement
GTL	Gas To Liquid(s)
GWC	Gas water contact
H <sub>2</sub> S	Hydrogen sulphide
HHV	Higher heating value
ID	Internal diameter
IRR	Internal Rate of Return is the discount rate that results in the NPV being equal to zero.
JV(P)	Joint Venture (Partners)
Kh	Horizontal permeability
km <sup>2</sup>	Square kilometres
K <sub>rw</sub>	Relative permeability to water
K <sub>v</sub>	Vertical permeability
kPa	Kilo (thousand) Pascals (measurement of pressure)
Mstb/d	Thousand Stock tank barrels per day
LIBOR	London inter-bank offered rate
LNG	Liquefied Natural Gas
LTBR	Long-Term Bond Rate
m	Metres
MDT	Modular dynamic (formation) tester
mD	Millidarcies (permeability)
MJ	Mega (10 <sup>6</sup> ) Joules
MMbbl	Million US barrels
MMscf(d)	Million standard cubic feet (per day)

Term	Definition
MMstb	Million US stock tank barrels
MOD	Money of the Day (nominal dollars) as opposed to money in real terms
MOU	Memorandum of Understanding
Mscf	Thousand standard cubic feet
Mstb	Thousand US stock tank barrels
MPa	Mega (10 <sup>6</sup> ) pascal (measurement of pressure)
mss	Metres subsea
MSV	Mean Success Volume
mTVDss	Metres true vertical depth subsea
MW	Megawatt
NPV	Net Present Value (of a series of cash flows)
NTG	Net to Gross (ratio)
ODT	Oil down to
OGIP	Original Gas In Place
OOIP	Original Oil in Place
Opex	Operating expenditure
OWC	Oil-water contact
P90, P50, P10	90%, 50% & 10% probabilities respectively that the stated quantities will be equalled or exceeded. The P90, P50 and P10 quantities correspond to the Proved (1P), Proved + Probable (2P) and Proved + Probable + Possible (3P) confidence levels respectively.
PBU	Pressure build-up
PJ	Peta (10 <sup>15</sup> ) Joules
POS	Probability of Success
Possible Reserves	As defined in the SPE-PRMS, an incremental category of estimated recoverable volumes associated with a defined degree of uncertainty. Possible Reserves are those additional reserves which analysis of geoscience and engineering data suggest are less likely to be recoverable than Probable Reserves. The total quantities ultimately recovered from the project have a low probability to exceed the sum of Proved plus Probable plus Possible (3P) which is equivalent to the high estimate scenario. When probabilistic methods are used, there should be at least a 10% probability that the actual quantities recovered will equal or exceed the 3P estimate.
Probable Reserves	As defined in the SPE-PRMS, an incremental category of estimated recoverable volumes associated with a defined degree of uncertainty. Probable Reserves are those additional Reserves that are less likely to be recovered than Proved Reserves but more certain to be recovered than Possible Reserves. It is equally likely that actual remaining quantities recovered will be greater than or less than the sum of the estimated Proved plus Probable Reserves (2P). In this context, when probabilistic methods are used, there should be at least a 50% probability that the actual quantities recovered will equal or exceed the 2P estimate.
Prospective Resources	Those quantities of petroleum which are estimated, as of a given date, to be potentially recoverable from undiscovered accumulations as defined in the SPE-PRMS.
Proved Reserves	As defined in the SPE-PRMS, an incremental category of estimated recoverable volumes associated with a defined degree of uncertainty. Proved Reserves are those quantities of petroleum, which by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under defined economic conditions, operating methods, and government regulations. If deterministic methods are used, the term reasonable certainty is intended to express a high degree of confidence that the quantities will be recovered. If probabilistic methods are used, there should be at least a 90% probability that the quantities actually recovered will equal or exceed the estimate. Often referred to as 1P, also as "Proven".
PSC	Production Sharing Contract
PSDM	Pre-stack depth migration
PSTM	Pre-stack time migration

Term	Definition
psia	Pounds per square inch pressure absolute
p.u.	Porosity unit e.g. porosity of 20% +/- 2 p.u. equals a porosity range of 18% to 22%
PVT	Pressure, volume & temperature
QA/QC	Quality Assurance/ Control
rb/stb	Reservoir barrels per stock tank barrel under standard conditions
RFT	Repeat Formation Test
Real Terms (RT)	Real Terms (in the reference date dollars) as opposed to Nominal Terms of Money of the Day
Reserves	RESERVES are those quantities of petroleum anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions. Reserves must further satisfy four criteria: they must be discovered, recoverable, commercial, and remaining (as of the evaluation date) based on the development project(s) applied. Reserves are further categorised in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by development and production status.
RT	Measured from Rotary Table or Real Terms, depending on context
SC	Service Contract
scf	Standard cubic feet (measured at 60 degrees F and 14.7 psia)
Sg	Gas saturation
Sgr	Residual gas saturation
SRD	Seismic reference datum lake level
SPE	Society of Petroleum Engineers
SPE-PRMS	Petroleum Resources Management System, prepared by the Oil and Gas Reserves Committee of the Society of Petroleum Engineers (SPE) and reviewed and jointly sponsored by the American Association of Petroleum Geologists (AAPG), World Petroleum Council (WPC), Society of Petroleum Evaluation Engineers (SPEE), Society of Exploration Geophysicists (SEG), Society of Petrophysicists and Well Log Analysts (SPWLA) and European Association of Geoscientists and Engineers (EAGE), revised June 2018.
s.u.	Fluid saturation unit. e.g. saturation of 80% +/- 10 s.u. equals a saturation range of 70% to 90%
stb	Stock tank barrels
STOIIP	Stock Tank Oil Initially In Place
Sw	Water saturation
TCM	Technical committee meeting
Tcf	Trillion (10 <sup>12</sup> ) cubic feet
TJ	Tera (10 <sup>12</sup> ) Joules
TLP	Tension Leg Platform
TRSSV	Tubing retrievable subsurface safety valve
TVD	True vertical depth
US\$	United States dollar
US\$ million	Million United States dollars
WACC	Weighted average cost of capital
WHFP	Well Head Flowing Pressure
Working interest	A company's equity interest in a project before reduction for royalties or production share owed to others under the applicable fiscal terms.
WPC	World Petroleum Council
WTI	West Texas Intermediate Crude Oil