Contingent Resource Certified For Voyager Field

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Highlights

- 2C net unrisked contingent helium resource of 643 MMscf for Voyager (100% BNL).
- High side (3C) net unrisked estimate of 1,228 MMscf.
- First declaration of contingent resource at Voyager is in addition to existing prospective resources at Galactica/Pe Enterprise, Argo, Galileo.
- Voyager Field first planned development with a total of 15 wells to be permitted.
- Plan of development and FEED for an initial processing facility at the Voyager Field scheduled for completion in C
- Targeted commissioning of Stage 1 helium production facility at Voyager during H2 2023.

PERTH, Sept. 27, 2022 - Blue Star Helium Ltd. (ASX:BNL, OTCQB:BSNLF) (Blue Star or the Company) announces a contingent resource declaration at its Voyager Field (100% BNL), following the BBB#1 helium discovery and independe evaluation by Sproule. No previous resource estimate existed for the Voyager prospect.

Commenting on the first declaration of contingent resources across its Las Animas tenure, Blue Star Managing Directo Trent Spry said:

"The independent Contingent Resource certification by Sproule is a key step in the process to allow us to make a final decision for the development of the Voyager Helium Field and move the project into commercial production.

"The contingencies required for upgrading of the current contingent resources at Voyager to reserves are currently bein addressed as part of the plan of development preparation and offtake agreement discussions.

"Blue Star was a first mover in Las Animas County, self-generating a portfolio of prospective resources over a vast play exploration program undertaken this year has resulted in a number of discoveries already, with Voyager being the first moved into contingent resource status. Through the current plan of development process, the Voyager Field is now exp progressively move to reserves, production and commercialisation.

"We plan to move our other discoveries such as Galactica/Pegasus, as well as potential future discoveries in the area, Lyons helium play level through the same process. At the same time, we are also looking to unlock the deeper play pot area.

"Blue Star is looking forward to becoming a new helium producer right in the middle of the largest helium market in the US."

A summary of Sproule's Resource estimations for the Voyager Field can be found in the table below.

Table 1: Voyager Field Resource Estimates:[1]

Voyager Field			
	1C	2C	3C
Net Recoverable Helium (MMscf)	299	643	1,228

Notes to table above:

1. The resource estimates have been prepared using the probabilistic method[2] and are presented on an unrisked b
2. The resource estimates are presented on a net entitlements basis and represent Blue Star group's net economic the contingent recoverable helium volumes after deductions for the volume weighted royalty burden.[3]

The 2C contingent resources of 643 MMscf at Voyager are in addition to the Company's previously announced prospective resources across its Las Animas tenure (see BNL announcement 10 June 2021; there was no previous resource estimate for Voyager).

The Voyager Field's Resources have been independently evaluated and certified by Sproule in accordance with the definitions of Reserves, Contingent Resources and Prospective Resources and guidelines set out in the Society of Petroleum Engineers Petroleum Resources Management System (SPE-PRMS, 2018).[4] The Voyager Resources Report is reported as at an evaluation date of 1 August 2022.[5]

Since the report was commissioned, Blue Star has continued to acquire leases across Voyager and expects to further consolidate the leasing in the area, which is expected to result in increased net resources as Blue Star progresses the Field from contingent resources to reserves.

This ASX Announcement has been authorised for release by the Board of Blue Star Helium Ltd..

Basis of Preparation Summary[6]

Geology

Sproule conducted an independent assessment of the geological prospectivity of the Voyager Field by creating a database of well information using data provided by the Company and the publicly available data available from IHS MARKIT. Subsurface maps were created for the Top of Dakota, near top Permian, top Lykins, the top of the Lyons, basement, and a gross and net Lyons reservoir map. Additionally, lineament maps for the basement, Dakota, and the topological surface were constructed. Various cross-sections were created to tie into the existing Model Dome Helium Field and the historical wells. Various historical and published well information and the Company's analysis of the historical wells were reviewed and incorporated into the Sproule interpretation.

The Voyager Field closure was updated with the additional information from the BBB#1 well which was drilled on the Voyager structural high. Maximum, Most Likely, and Minimum closure areas representing the P10\P50\P90 closure areas were used for the volumetric calculations. The reservoir definition is generally excellent given the detailed petrophysical analysis on nine key wells. There is uncertainty on the true total and net thickness of the Lyons reservoir due to the majority of the wells not penetrating the full extent of the Lyons reservoir and an overall lack of wireline logs thus the map used is an interpretation based on the well data at hand and a geological interpretation of the Lyons deposition. Both a Gross Interval and a Net Reservoir Map for the Lyons Formation were interpreted based on the known well control and checked against the Company's petrophysics estimates of both Gross is mapped and a Net Reservoir is calculated. Overall, there is adequate net reservoir thickness for commercial production of helium if there is adequate trap size.

Based on the regional mapping and the well control a structure map of the top Lyons was interpreted and a Maximum Closure, based on the water contact in the BBB#1 well was determined with a Minimum Closure at the most reasonable highest closing contour.

Petrophysics

Sproule conducted petrophysical analysis for the BBB#1 well. The objective of the analysis was to estimate the effective porosity, water saturation and net reservoir and pay thicknesses for the Lyons Formation to assist in determining the reservoir parameter ranges to be used in the probabilistic volumetric estimation.

These results were compared with the parameters supplied by the Company petrophysical analysis. The gas pore volume difference between the two analyses is within 4% and hence it was concluded that the petrophysics workflow used by the Company is reasonable.

For the probabilistic resource volume calculations, Sproule assumed the following distributions in the Monte Carlo calculations:

Porosity

A mean porosity of 0.18 was assumed over the project area. A normal distribution was used with a standard deviation of 0.023. The distribution was truncated at a minimum porosity of 0.14 and a maximum porosity of 0.25. This resulted in porosities of 0.155, 0.18 and 0.21 at the P90, P50 and P10 intervals respectively.

Water Saturation

Sproule used gas saturation as the input distribution where the gas saturation is defined as one minus the fractional water saturation. The gas saturation distribution was defined as normal with a mean value of 0.53 and a standard deviation of 0.125. The distribution was truncated with a minimum value of 0.50 and a maximum value of 0.80. This yielded gas saturations of 0.52, 0.59 and 0.71 at the P90, P50 and P10 intervals respectively. The maximum value of gas saturation was extended beyond the petrophysical analysis to account for the possibility that the log calculated water saturation was negatively impact by fluid invasion and to allow for gas saturations that have been observed in other high permeability sandstones.

Net-to Gross Ratio

A normal distribution was used with a mean net-to-gross ratio of 0.72 and a standard deviation of 0.094. The distribution was truncated at a minimum of 0.50 and a maximum of 0.95. The resulting P10, P50 and P90 values were 0.60, 0.72 and 0.84 respectively.

Initial Reservoir Pressure

The area surrounding the Voyager project is known to be underpressured, though data are sparse. A combination of pressure gradients and potentiometric surface elevations was used to estimate a range of initial reservoir pressures. The reservoir pressure not only impacts the volume of gas initially in place but has a direct bearing on the estimated gas recovery factor.

No bottomhole pressures were measured in the BBB #1 water well, but the client reported a water level at 748 feet during logging. This corresponds to a pressure of 116 psia at the interpreted gas-water contact depth of 1,023 feet. The corresponding pressure gradient is 0.113 psi/ft and the potentiometric surface elevation is 4,671 feet.

The Voyager project was mapped to have a subsea elevation of 4,470 feet at the top of the Lyons with a measured depth of 910 feet. Using the available pressure gradients and potentiometric surface elevations, the estimated range of initial reservoir pressures for the Voyager project varied from 169 psia to 23 psia. The remaining pressures after excluding the minimum and maximum values averaged 84 psia with a standard deviation of 27 psi. This mean and standard deviation were used with a normal distribution in the Monte Carlo calculations to estimate initial reservoir pressure. The distribution was truncated at a minimum of 30 psia and a maximum of 170 psia. This resulted in pressures of 52, 85 and 119 psia at the P90, P50 and P10 intervals respectively.

Initial Gas Formation Volume Factor and Helium Content

Testing during drilling of the BBB#1 water well yielded gas with a composition of 78.7 percent nitrogen, 12.5 percent carbon dioxide, and 8.8 percent helium (0.964 specific gravity). Gas deviation factors as a function of pressure were calculated by standard correlations at a temperature of 73OF. The correlations were tested against experimental measurements for other gases with high nitrogen and helium contents and were found to give acceptable results.

For the resource volume calculations, Sproule used the Monte Carlo estimate of reservoir pressure to obtain the corresponding z factor. The gas formation volume factor was then calculated using the standard formula.

The Monte Carlo calculations used a uniform distribution for the helium content with a minimum of 8 percent, a maximum of 9 percent.

Gas Recovery Factor

No extended flow tests were conducted during the completion of the BBB #1 water well. However, the 1963 report on the Model Dome field contained data on flow rates, reservoir thickness and reservoir pressure for the development wells, which allowed estimates of effective gas permeability. These calculated permeabilities ranged from just over 500 mD to more than 1,000 mD. These values compared well to permeabilities from recent gas flow tests conducted by The Company on water wells drilled in T29S-R54W and T34S-R54W (Galactica/Pegasus Area), which yielded effective permeabilities of 90 mD to just over 750 mD. The available data supports the conclusion that the Lyons formation is of good to excellent reservoir quality.

To evaluate the effect of initial reservoir pressure on gas recovery factor, a series of single well numerical reservoir simulation runs were conducted. One set of runs used a permeability of 100 mD and the second set used a permeability of 500 mD. All runs assumed a formation thickness of 104 feet, a porosity of 18 percent and a water saturation of 47 percent. Simulation runs for both permeability estimates were made using reservoir pressures of 170, 100, 65 and 30 psia.

The resulting average was used to estimate gas recovery factor. A uniform distribution was used with a minimum recovery factor of 40 percent and a maximum recovery factor of 80 percent. Recovery factor was positively correlated with reservoir pressure with a correlation coefficient of 0.75.

Resource Estimates for the Voyager Field

Sproule has estimated, by the methodology specified below, helium volumetrics for the Voyager Field of Las Animas County, Colorado.

The estimates were generated by probabilistic calculations using Monte Carlo software. In addition to the distributions previously discussed for the petrophysical and reservoir engineering parameters, the following assumptions were made for the Fields gross rock volume (area*thickness).

A lognormal distribution was used where the Most Likely gross rock volume from the geologic analysis was specified to be the P50 of the distribution. The Minimum volume was specified to be at the P90 confidence level, and the Maximum volume was specified to be at the P10 confidence interval. The distributions were truncated at one-third of the geologic Minimum volume and at 1.5 times the geologic Maximum net bulk volume. In the actual Monte Carlo fit, the P90 of the rock volume distribution was 1.02 time the geologically mapped minimum volume and the P10 of the Monte Carlo distribution was 1.10 times the geologically mapped maximum volume.

For each Monte Carlo iteration, the gross gas in place was calculated by the standard volumetric formula. The gross helium in place was determined by multiplying the gas in place by the assumed helium content. The recoverable helium was then calculated by multiplying the gross helium in place by the gas recovery factor.

The Company provided information on each of their leases consisting of the gross acres, net acres leased by The Company and the royalty burden. The Company has 100% working interest, before royalties and taxes, on all of the leases evaluated for this report.

To estimate the net resource volumes attributable to the Company, Sproule determined the gross rock volume under each lease that fell within the Minimum, Most Likely, and Maximum contour lines from the geologic analysis. These volumes were then multiplied by fraction of the acres leased by the Company and the interest net of royalty. The individual lease volumes were then summed and compared to the total gross rock volume within each contour interval to determine a volume weighted fraction of the volume leased and the corresponding royalty burden

Competent Persons Statement

The estimate of contingent resources contained in this report was prepared by or under the supervision of Jeffrey B Aldrich and Stanley Kleinsteiber each of whom is a Qualified Petroleum Reserves and Resources Evaluator as defined by ASX listing rules.[7]

The information in this report relating to contingent resources is based on, and fairly represents, information and supporting documentation prepared by or under the supervision of Jeffrey B Aldrich (member of the American Association of Petroleum Geologists and the Society of Petroleum Engineers[8]) and Stanley Kleinsteiber (member of the Society of Petroleum Engineers[9]), each of whom is an employee of Sproule.[10][11]

Each of Messrs Aldrich and Kleinsteiber consents to the inclusion of the information in this report in the form and context in which it appears.[12]

Mineral Leases[13]

In Las Animas County, Colorado, the mineral estate (including helium) may be owned by private citizens or corporations, the State of Colorado or the United States of America. A mineral owner may permit a third party to develop and produce the mineral estate (including helium) by entering into a mineral lease between itself as lessor and the third party as lessee. (For a detailed description of the system of mineral ownership, development and production in the United States see appendix 3 of the Company's announcement of 19 September 2019.)

The Company's rights to develop, produce and sell any helium that may be derived from the its Prospects has been granted by private mineral owners, the State of Colorado and the United States of America pursuant to mineral leases issued by each of those mineral owners.

The leases issued by the United States of America via the Bureau of Land Management (BLM Leases) are in their standard form (Form 3100-11, October 2008) and provide for an initial term of 10 years and an annual rental payment of US$1.50/acre payable annually in advance for the first five years and then US$2/acre. If the Company successfully produces helium or other products from the lease area, a 12.5% royalty will be payable to the US Federal Government and the lease term will be extended indefinitely until production ceases. The leases do not include any minimum work commitments. The Company is the only working interest owner in each of these leases.

The leases issued by the State of Colorado (State Leases) are in their standard form (revised DOL 20190301) for an initial term of five years, with the right to request an extension of one year and an annual rental payment of US$2.50/acre payable in advance. If the Company successfully produces helium or other products from the lease area, a 20% royalty will be payable to the State of Colorado and the lease term will be extended indefinitely until production ceases. The leases do not include any minimum work commitments. The Company is the only working interest owner in each of these leases.

The leases issued by the private mineral owners (Private Leases) are in the form of Producers 88, Rocky Mountain 1989 (Paid-Up Rev. 1996 w ext.) for an initial term of five years with, in most cases, an option to renew for a further five years. If the Company successfully produces helium or other products from the lease area, a royalty of at least 12.5% will be payable to the lessor and the lease term will be extended indefinitely until production ceases. The leases do not include any minimum work commitments. The Company is the only working interest owner in each of these leases. A lessor may not own the entire and undivided fee simple estate in the tracts the subject of its lease. Therefore, the Company's net interest in a tract may be less than its gross interest in that tract.

The net mineral acres associated with the prospective resources at the Voyager prospect comprise 5,219.09 net acres under four BLM Leases, 1,280 net acres under two State Leases and 5,617.014 net acres under Private Leases.

The weighted royalty burden is calculated to be as follows:

	1C	2C	3C
Weighted Royalty Burden	12.88 %	12.91 %	12.92 %

Additional Listing Rule Disclosures

In respect to the Contingent Resource estimates:

- LR 5.33.2 (Basis for confirmation of hydrocarbons and discovery): The existence of potentially moveable helium a determination of a discovery in the Lyons Sandstone was via petrophysical analysis and flowing of gas to surface BBB#1 well (see announcement of 17 November 2021).[14]
- LR 5.33.3 (Analytical procedures and key contingencies): The estimates have been determined using probabilisti based on the data generated from the historical Voyager exploration and appraisal work, this includes interpretati porosity, helium saturation and net reservoir thickness from the logging program, the analysis of potential helium from the pressure data and the fluid properties derived from the gas samples and applied to the structure map wi factors calculated using analogues and industry standards. The key contingencies that prevent the Contingent Re from being classified as Reserves are (1) wireline measurement of static bottomhole reservoir pressure from with column; (2) detailed gathering system and helium processing design; and (3) helium processing purchase agreem Company currently plans to drill an additional appraisal well at Voyager[16] and is currently undertaking a plan of development and feasibility work and is engaged in offtake discussions.[17]

About Sproule

Sproule is a global energy consulting firm with a 65-year legacy of driving value for clients by helping professionals in the oil and gas sector make better business decisions. Sproule is anchored by deep geoscience and engineering expertise combined with a strong commercial understanding of energy markets and policy requirements. Sproule's integrated consulting solutions support critical oil and gas workflows that are underpinned by the following cross-functional disciplines; geology, geophysics, petrophysics, engineering, land, petroleum accounting and economics. Its teams accurately characterize subsurface opportunities and increase shareholder confidence through independent economic evaluations of resources. Advisory services include development planning, investment analysis and asset management services. In addition, Sproule offers relevant courses designed for energy professionals, enabling organizations to build scale and capacity.

About Blue Star Helium:

Blue Star Helium Ltd. (ASX:BNL OTCQB:BSNLF) is an independent helium exploration and production company, headquartered in Australia, with operations and exploration in North America. Blue Star's strategy is to find and develop new supplies of low cost, high grade helium in North America. For further information please visit the Company's website at www.bluestarhelium.com

About Helium:

Helium is a unique industrial gas that exhibits characteristics both of a bulk, commodity gas and of a high value specialty gas and is considered a "high tech" strategic element. Due to its unique chemical and physical qualities, helium is a vital element in the manufacture of MRIs and semiconductors and is critical for fibre optic cable manufacturing, hard disc manufacture and cooling, space exploration, rocketry, lifting and high-level science. There is no way of manufacturing helium artificially and most of the world's reserves have been derived as a by-product of the extraction of natural hydrocarbon gas.

About wells:

BBB#1 has been permitted by a rancher as a water well. Water wells are drilled by a contractor pursuant to a drilling contract between the contractor and the rancher. Neither the Company nor its subsidiaries are a party to this contract. The well is the property of the rancher and the Blue Star group does not have an economic interest in it. The Company will agree to fund water wells if the rancher selects a location that may be of interest to the Company, the Company has leased the underlying minerals and the rancher agrees to let the Company obtain any available data from the drilling program. Water wells are drilled for the purpose of producing water for use by the rancher. Water wells may not produce helium and may not be converted into producing helium wells.

[1] LR 5.27.1

[2] LR 5.25.6

[3] LR 5.25.5

[4] LR 5.25.2

[5] LR 5.25.1

[6] LR 5.33.3 first dot point

[7] LR 5.41

[8] LR 5.42(c)

[9] LR 5.42(c)

[10] LR 5.42(b)

[11] LR 5.42(a)

[12] LR 5.42 final paragraph

[13] LR 5.33.1

[14] LR 5.33.2

[15] LR 5.33.3 second dot point

[16] LR 5.33.3 third dot point

[17] LR 5.33.3 fourth dot point

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