

Helium reserves or resources – what’s the difference?

By James R. Weaver, P.E. of Aeon Petroleum Consultants

In recent years, due to recurring shortages of helium and its increased commercial value, there has been an unprecedented amount of activity related to exploration for new helium sources.

There are currently 10 -20 companies actively involved in helium exploration, including a handful that are publicly traded. Some of these companies are issuing frequent press releases, as they look to raise money to fund their

project. It is difficult for a potential investor or business partner to evaluate these opportunities without a general understanding of reserve and resource nomenclature.

When it comes to the chances of commerciality and risk of recovery, there is a lot of difference between reserves and resources. This article for *gasworld* will discuss the meanings and differences between ‘Reserves’, ‘Contingent Resources’, and ‘Prospective

Resources’ (a table later in this article lists criteria comparing the various types of resources).

Understanding the terminology

While the focus of this article is helium reserves and resources, these terms and ground rules were originally developed for oil and natural gas exploration.

The terminology used by reserve and resource estimators to classify and categorize reserves and resources is very specific. The predominate framework used to estimate oil and gas reserves and resources is the Petroleum Resources Management System (PRMS). These guidelines were developed in 2007 (and subsequently updated) to better align estimates of reserves and resources with a company’s financial statements. PRMS is the predominant system used by oil and gas companies, financial institutions, and government agencies for the reporting of oil and gas reserves and resources. Although the guidelines pertain specifically to oil and gas reserves and resources, the same guidelines can be used to estimate reserves and resources of non-hydrocarbon gases like helium. For those interested, I would recommend downloading a copy of PRMS from the Society of Petroleum Engineers.

By definition, PRMS is a ‘project-based’ reserves and resources system. A project could be the drilling of a single well, a helium exploration prospect,

or the installation of a compressor. Once a project is defined, the reserves and resources for that project can be estimated based on PRMS guidelines. Reserves and resources are defined at the point of sale under standard conditions as of a specified date.

Except for minute quantities in the air, helium exists as a component of gaseous mixtures in reservoirs in the sub-surface. This gas is brought to the surface by drilling and completing wells in these reservoirs. The removal of helium is accomplished by processing through a plant specially designed to remove and capture helium. The point of sale for helium is typically the tailgate of a processing plant at standard conditions specified in a sales contract.

Reserves

Reserves are the highest class of resources and are defined by PRMS as, “Those quantities anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions.” Reserves must satisfy four criteria:

- Discovered
- Recoverable
- Commercial (economic)
- Remaining (not already produced)

Reserves can be developed (wells drilled) or undeveloped (adjacent well locations for wells not yet drilled). Of the developed reserves, wells can be producing or non-producing (wells drilled, but not yet producing). The estimates of reserves can be categorized based on their probability of recovery. These are reported as Proved (the symbol 1P), Proved-plus-Probable (2P), and Proved-plus-Probable-plus-Possible (3P). These are reported as ‘Proved’ (the symbol 1P), ‘Proved-plus-Probable’ (2P), and ‘Proved-plus-Probable-plus-Possible’ (3P). These are sometimes

referred to as the ‘low’, ‘best’, and ‘high’ estimates.

Proved reserves are those reserves estimated to have a 90% chance of recovering the estimated quantities. Similarly, 2P reserves have a 50% chance of recovering the estimated quantities and 3P reserves have at least a 10% chance of recovering those quantities. The difference between 2P and 1P reserves are known as probable reserves (symbol P2) and the difference between 3P and 2P reserves known as possible reserves (P3). Reserve economics are usually determined based on the 2P estimate.

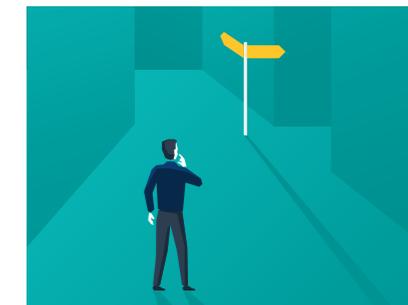
Contingent resources

The next class of resources is known as Contingent Resources. Contingent resources are defined by PRMS as, “Those quantities 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 owing to one or more contingencies.”

The criteria for contingent resources are that they are discovered and potentially recoverable. These two criteria are usually met by the penetration of a wellbore within the reservoir and production of a quantity of reservoir fluid to the surface. There is no requirement for the discovery to be economic. The contingency or contingencies preventing commerciality could be low production rate, limited reservoir, high cost of development, or low commodity prices.

As many helium projects are in remote locations, with no helium gas processing capacity in the area, they are often contingent upon the construction of a helium processing plant. These plants often cost 10x+ the cost to drill a well. In any resources report, these contingencies should be listed.

Contingent resources estimates are



also categorized by their probability of recovery of 90%, 50%, and 10% which, for contingent resources are 1C, 2C, and 3C, respectively. Most reserves and resources estimators consider contingent resources to be a ‘holding area’ and the quantities either moved into reserves at some later date or written off if the contingencies cannot be resolved.

Prospective resources

The lowest class of resources are Prospective Resources. Prospective resources are defined as, “Those quantities estimated as of a given date to be potentially recoverable from undiscovered accumulations.” These are essentially prospects with some likelihood of discovery. Again, prospective resource estimates are categorized by their probability of recovery of 90%, 50%, and 10%, which are 1U, 2U, and 3U, respectively. Since this class of resources is undiscovered, it has the lowest chance of commerciality and the highest risk of recovery. [gww](#)

Figure 1. Helium Resources Criteria

Criteria	Reserves	Contingent Resources	Prospective Resources
Discovered	Yes	Yes	No
Economic	Yes	Not Required	Not Required
Recoverable	Yes	Potentially	Potentially
Specified Report Date	Yes	Yes	Yes
Chance of Commerciality	High	Mid	Low
Risk of Recovery	Low	Mid	High
90% Probability of Recovery (Low)	1P	1C	1U
50% Probability of Recovery (Best)	2P	2C	2U
10% Probability of Recovery (High)	3P	3C	3U

ABOUT THE AUTHOR

James R. Weaver, P.E. is CEO of Aeon Petroleum Consultants, a registered petroleum engineering firm. Weaver has been in the petroleum business over 40 years and has been primarily involved in reservoir engineering and the estimation of reserves and resources. Weaver is also CEO of Blanca Peak Resources, a helium exploration firm. He can be reached at jim@aeon-petro.com