

# ASX / MEDIA ANNOUNCEMENT



21 October 2019

## High Specification Caesium-Rubidium Formate Produced

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- **Caesium-rubidium formate brine produced from Pilot Plant Campaign 1 with specific gravity of 2.3**
- **Key specification criteria meet requirements for oil industry application; qualification process has commenced**
- **Further samples of rubidium-rich compounds are being produced for third-party assessment**
- **Caesium and rubidium compounds represent potential additional Phase 1 Plant by-products, manufactured under a stand-alone provisional patent application**

Lepidico Ltd (ASX:LPD) (“Lepidico” or “Company”) is pleased to advise that a high specification sample of caesium-rubidium formate brine with a specific gravity (SG) of 2.3 has been produced from Pilot Plant potassium circuit liquor<sup>#</sup>. The process technology for producing the heavy formate brine is owned by Lepidico and subject to a stand-alone international patent application filed in February 2017.

Caesium and rubidium naturally occur in lepidolite, which, when processed using Lepidico’s L-Max<sup>®</sup> technology, report through to one of two non-lithium streams; a brine liquor or an alum-residue. Approximately 100 litres of rubidium-caesium brine was collected during Pilot Plant Campaign 1. This is the first time an adequate quantity of such liquor has been available for product research and development purposes. This brine was concentrated using a Lepidico proprietary process technology to produce intermediate crystallisation products and a brine containing rubidium and caesium sulphates, which was subsequently converted to a formate. The specification of this caesium-rubidium formate appears to meet key criteria for oil and gas industry application (Table1). Chlorine and sulphate assays for product manufactured using deionised water are pending. A qualification process for this material has commenced.

Lepidico Managing Director, Joe Walsh said, “Production of a caesium-rubidium formate with an SG greater than 2.2, good clarity and low levels of deleterious elements is a major advance in the initiative to commercialise this material as a valuable by-product from the planned Phase 1 Plant. Work is ongoing to produce other caesium and rubidium compounds that have potential application in the oil and gas industry, as well as in the manufacture of perovskite-containing solar cells.”

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**Table 1:** Heavy formate specification from Pilot Plant versus an industry benchmark

Criteria	Lepidico Pilot Plant	Industry Benchmark Specification*
Caesium + rubidium (g/l)	647 + 403	-
Chlorides (ppm)	TBA	<1,000
SO <sub>4</sub> (ppm)	TBA	<150
Total non-Cs+Rb monovalent cations (ppm)	<7,500	<25,000
Divalent cations (ppm)	<70	<100
Specific gravity	2.3	>2.2
Turbidity/clarity (NTU)	<10	<10
pH	10.2	9-11

\*Further detail not disclosable for commercial reasons

A revised Mineral Resource (JORC Code (2012)) estimate for the Karibib Lithium Project in Namibia is on schedule for completion in November 2019, following the recent completion of an infill drill programme intended to upgrade the Resource to predominantly Measured and Indicated categories. The new estimate is planned to include grades for both caesium and rubidium, allowing production estimates for these metals to be published for the first time from the ongoing Phase 1 Plant Project Feasibility Study.

### Background\*

Caesium formate is a slightly alkaline salt of caesium hydroxide and formic acid (HCOO-Cs<sup>+</sup>), which is extremely soluble in water and has a density of 2.4 g/cm<sup>3</sup> (82% weight). It has applications in the oil and gas industry as a completion fluid<sup>^</sup>. Caesium formate is a high value compound that can be mixed with less expensive potassium formate to make clear brine mixtures with a density range from 1.8 to 2.4 g/cm<sup>3</sup>. Caesium compounds have a variety of applications albeit in relatively small quantities. Consumption, import, export and price data for caesium and rubidium compounds are not available as they are not traded in commercial quantities.

In May 2018, the U.S. Department of the Interior published a list of 35 critical minerals (83 FR 23295) which included caesium, rubidium and lithium minerals. The list was developed to serve as an initial focus for "A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals". Lepidolite<sup>#</sup> is the only known mineral that contains all three of these metals in potentially economic concentrations.

\*Source: U.S. Geological Survey

<sup>^</sup>A completion fluid is a solids-free liquid used to "complete" an oil or gas well. This fluid is placed in the well to facilitate final operations prior to initiation of production. The fluid is meant to control a well should downhole hardware fail, without damaging the producing formation or completion components. Completion fluids are typically high density brines (chlorides, bromides and formates), but in theory could be any fluid of proper density and flow characteristics. The fluid should be chemically compatible with the reservoir formation and fluids, and is typically filtered to a high degree to avoid introducing solids to the near-wellbore area. Seldom is a regular drilling fluid suitable for completion operations due to its solids content, pH and ionic composition.

<sup>#</sup>The Pilot Plant Campaign 1 feed was sourced from Alvarrões, Portugal. Note: lepidolites have similar major metal components (Li, K, Rb, Cs) albeit in varying concentrations between deposits.

## Further Information

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### About Lepidico Ltd

Lepidico Ltd is an ASX-listed Company focused on exploration, development and production of lithium chemicals. Lepidico owns the technology to a metallurgical process that has successfully produced lithium carbonate from non-conventional sources, specifically lithium-rich mica minerals including lepidolite and zinnwaldite. The L-Max<sup>®</sup> Process has the potential to complement the lithium market by adding low-cost lithium carbonate supply from alternative sources. More recently Lepidico has added LOH-Max<sup>™</sup> to its technology base, which produces lithium hydroxide from lithium sulphate without by-product sodium sulphate. The Company is currently conducting a Feasibility Study for a 5,000 tonne per annum (LCE) capacity Phase 1 lithium chemical plant, targeting commercial production for 2021. Work is currently being undertaken to incorporate LOH-Max<sup>™</sup> into the Phase 1 Plant Project engineering. Feed to the Phase 1 Plant is planned to be sourced from the Karibib Lithium Project in Namibia, 80% owned by Lepidico where a Mineral Resource of 8.8 Mt grading 0.56% Li<sub>2</sub>O and 59ppm Ta<sub>2</sub>O<sub>5</sub> is estimated (ASX announcement of 16 July 2019) and/or the Alvarrões Lepidolite Mine in Portugal under an ore access agreement with owner-operator Grupo Mota (ASX announcement of 7 December 2017).

### Forward-looking Statements

All statements other than statements of historical fact included in this release including, without limitation, statements regarding future plans and objectives of Lepidico, are forward-looking statements. Forward-looking statements can be identified by words such as "anticipate", "believe", "could", "estimate", "expect", "future", "intend", "may", "opportunity", "plan", "potential", "project", "seek", "will" and other similar words that involve risks and uncertainties. These statements are based on an assessment of present economic and operating conditions, and on a number of assumptions regarding future events and actions that are expected to take place. Such forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties, assumptions and other important factors, many of which are beyond the control of the Company, its directors and management of Lepidico that could cause Lepidico's actual results to differ materially from the results expressed or anticipated in these statements.

The Company cannot and does not give any assurance that the results, performance or achievements expressed or implied by the forward-looking statements contained in this release will actually occur and investors are cautioned not to place any reliance on these forward-looking statements. Lepidico does not undertake to update or revise forward-looking statements, or to publish prospective financial information in the future, regardless of whether new information, future events or any other factors affect the information contained in this release, except where required by applicable law and stock exchange listing requirements.

