

# Old school geology vs new age technology – deciphering the Lantern code

*C Lower<sup>1</sup>, M Kapo<sup>2</sup>, T Nguyen<sup>3</sup>, H Galam<sup>5</sup>, W Edgar<sup>4</sup>, J Tracey<sup>5</sup>, O Greenberger<sup>6</sup> and J Beeson<sup>7</sup>*

1.Senior Geologist Research and Development, Kirkland Lake Gold, Hayes Creek NT 0822. Email: CLower@klgold.com.au

2.Mine Geologist, Kirkland Lake Gold, Hayes Creek NT 0822. Email: MKapo@klgold.com.au

3.Project Mine Geologist, Kirkland Lake Gold, Hayes Creek NT 0822. Email:

[thy.nguyen@klgold.com.au](mailto:thy.nguyen@klgold.com.au)

4.Project Mine Geologist, Kirkland Lake Gold, Hayes Creek NT 0822. Email:

[thy.nguyen@klgold.com.au](mailto:thy.nguyen@klgold.com.au)

5.Senior Drilling Geologist, Kirkland Lake Gold, Hayes Creek NT 0822. Email:

[HGalam@klgold.com.au](mailto:HGalam@klgold.com.au)

6.Mine Geology Superintendent, Kirkland Lake Gold, Hayes Creek NT 0822. Email:

[JTracey@klgold.com.au](mailto:JTracey@klgold.com.au)

7.Geology Manager, Kirkland Lake Gold, Hayes Creek NT 0822. Email:

[OGreenberger@klgold.com.au](mailto:OGreenberger@klgold.com.au)

8.Consultant Structural Geologist and Director, Geoscience now, Mt Pleasant WA 6153. Email:

[beeson.john@yahoo.com.au](mailto:beeson.john@yahoo.com.au)

## ABSTRACT

As a successful mid-tier miner, Kirkland Lake Gold Limited (KL) achieved record gold production of 723,701 ounces in 2018, through the operation of low cost, high grade assets such as Fosterville Gold Mine, Australia and Macassa Gold Mine, Canada. KL's future success relies on taking advantage of new opportunities, such as the recent discovery and definition of the Lantern gold mineralisation in the Northern Territory (NT), Australia, which is the focus of continued exploration and development. The Lantern discovery is proximal to the existing Cosmo Deeps Gold Mine, which enabled exploration development to commence swiftly in 2018. Given the close proximity, there was the risk of applying generalistic geological assumptions of relative continuity of mineralisation as observed at Cosmo Deeps.

Lantern is hosted in the Koolpin Formation metagreywackes, within the strongly deformed Cosmo Howley antiform of the Pine Creek Orogen. The existing Cosmo Gold Mine is located in the overturned eastern limb of the same antiform, separated from Lantern by a Zamu dolerite sill and more Koolpin formation Metagreywackes. Amphibolite grade metamorphic assemblages of chlorite–biotite–amphibole–quartz–garnet–cordierite–tourmaline–carbonate +/- pyrite–pyrrhotite–arsenopyrite form intense multiphase alteration. Like Cosmo Deeps, Lantern gold mineralisation occurs in sandier greywacke beds; but, unlike Cosmo Deeps, bonanza gold grades also occur within selected quartz carbonate and sulphide veins.

The exploration development provided the NT geology team with the time and opportunity to unravel the structural complexity of Lantern. Needing to “up its geological game”, KL employed a fusion of old school geology and innovative numeric data collection technology. Mentored by industry experts, the team transformed underground mapping using point cloud photo imagery scanning technology and combined this with more representative sampling practises. Continuous geochemical and mineralogical drill core scanning technologies were trialled, providing a numeric platform for better communication of geological information and freeing up geologists' time for interpretation in support of improving their geological understanding of Lantern.