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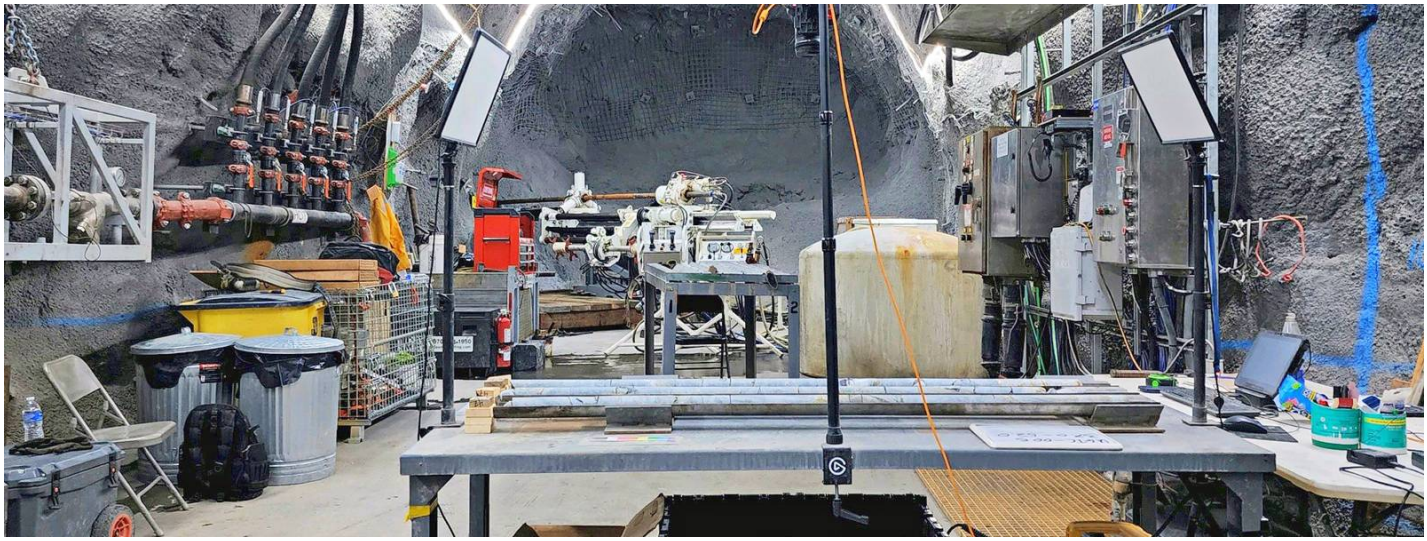

MINES · IN SITU STRESS MEASUREMENTS

Resolution Copper Mine, Arizona

DA Smith made 3D in situ stress measurements with CSIRO digital hollow inclusion cells on the TPL2 Level at Resolution Copper Mine.

CLIENTS	LOCATION	YEARS	WORK
Resolution Copper, Rio Tinto, BHP	**Superior, Arizona**	**2022–23**	**Mines, In Situ Stress Measurements**

DA Smith was commissioned by Resolution Copper to conduct three-dimensional (3D) in situ rock stress measurements on the TPL2 Level at the Resolution Copper Mine using CSIRO digital hollow inclusion (HID) cells. Multiple stress measurements were completed in a hydrothermally altered diabase rock mass via three 6-inch-diameter, sub-horizontal boreholes with the objective of characterizing the 3D pre-mining stress state in advance of block caving.

In October 2022, DA Smith overcored ground support to recover installed steel bolts for an engineering study on the long-term corrosion resistance of ground support at the mine.

Following the CSIRO HID campaign, additional coring and experimental stress measurements were conducted using the 3D IST tool developed by Sigra, Pty and operated by technicians from Agapito Associates, Inc, with drilling and testing support from DA Smith. A 300-foot-deep exploratory horizontal HQ core hole was drilled in advance of Sigra testing to confirm competency of the rock mass and locate a high-angle fault ahead of mining. Finding suitable rock mass quality deep within the orebody, IST stress measurements were completed in a parallel hole in January 2023.

The program was successfully concluded in late January 2023 with hydrofracture stress measurements conducted by Solexperts Gmbh with drilling and testing support from DA Smith.

Drilling was conducted by a dedicated DA Smith drill crew and DA Smith overcoring technicians using DA Smith's Boart-Longyear LM90 electric-hydraulic drill, HID cell overcore tooling, Reflex alignment and downhole survey equipment, and computers/software. All equipment was hoisted through the No. 10 Shaft. Special precautions were instituted while drilling to control 140F groundwater under high head, including the application of a blowout preventer (BOP) system to control high-pressure outflows. Spanning almost five months underground, the 2022-23 program demanded a rigorous focus on safety, planning, and coordination with mine personnel. The program was completed safely and on budget.

The TPL2 Level, at 6,800 feet deep, is the deepest shaft and station in America (circa 2023).

Resolution Copper is one of the largest mining projects under development in the world, projected to produce 25% of future US copper demand for more than 60 years. The mine represents a joint venture between Rio Tinto (55%) and BHP (45%), the third and second largest mining companies in the world, respectively.

The 2022-23 campaign was preceded by earlier drilling and stress measurements conducted by DA Smith* on the Neversweat Level (1,200-foot level) in 2010.

* Formerly as Agapito Associates, Inc.



