GSN 2015 Reno

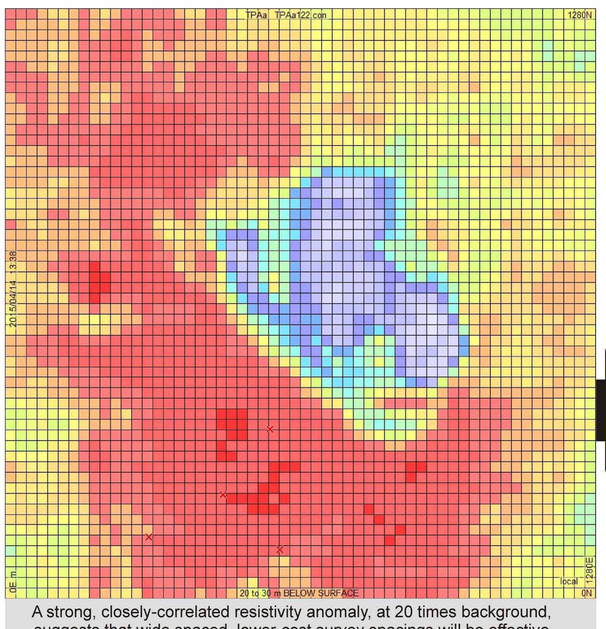
3D resistivity characterization of the Hasbrouck Peak epithermal gold system: a district shallow-exploration signature.

Greg Shore, P.Geo,
Consulting Geophysicist,
Aurora, Ontario, Canada

Josh Lymburner, M.Sc.
Crone Geophysics & Exploration Inc.
Mississauga, Ontario, Canada

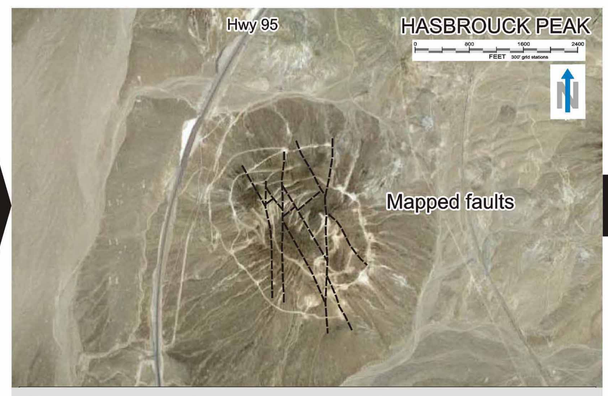
At the GSN - contact us at the
Crone Geophysics booth # 99,
cell/messages to 289 221 3604

When contemplating expanded exploration of a district, having a clear idea of what a known resource looks like within the setting at hand is a powerful advantage. Knowledge of whether or not the district host setting is inherently complicated or "busy" with potentially confusing, non-economic signatures is also valuable. At the Hasbrouck Peak deposit, amenable host geology extends in several directions for a considerable distance, including several miles northward to the similar Three Hills deposit, on the outskirts of Tonopah. An older 3D IP/resistivity survey of Hasbrouck Peak, refreshed by recent re-inversion with current UBC 3D codes, confirms a close correlation between elevated resistivity and resource, and suggests that a quiescent host geology background could allow economical wide-spacing reconnaissance 3D survey of much of the remaining unmapped district, without missing significant indications of look-alike deposits. The district may be a candidate for VLS* 3D mapping.

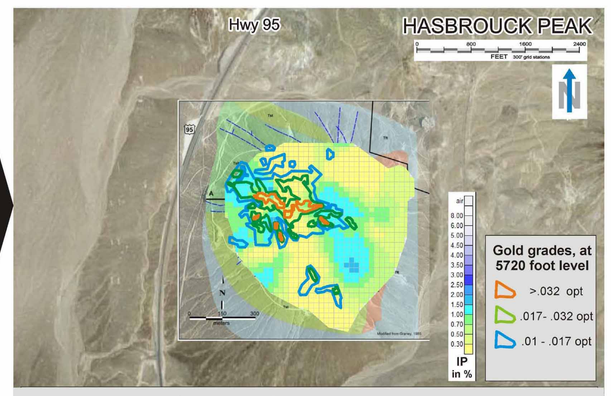


A strong, closely-correlated resistivity anomaly, at 20 times background, suggests that wide spaced, lower-cost survey spacings will be effective in undertaking wider area reconnaissance 3D resistivity mapping.

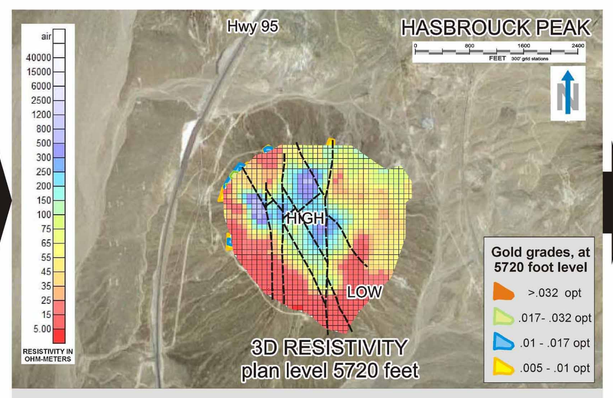
Hasbrouck Peak, viewed facing west.



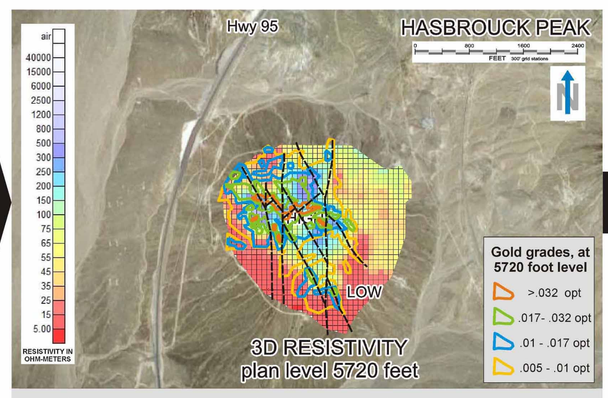
Measured and indicated resource is 811,000 ounces Au and 18,149,000 ounces Ag (West Kirkland Mining NI 43-101 Feb 21. 2014)



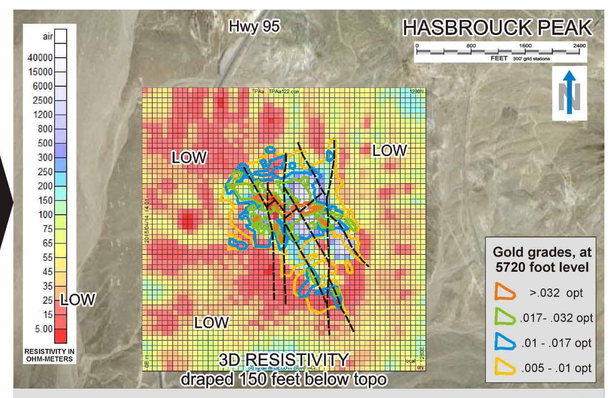
3D IP reveals no significant chargeability anomalies. Typical values are less than 1.5%, nominally "background".



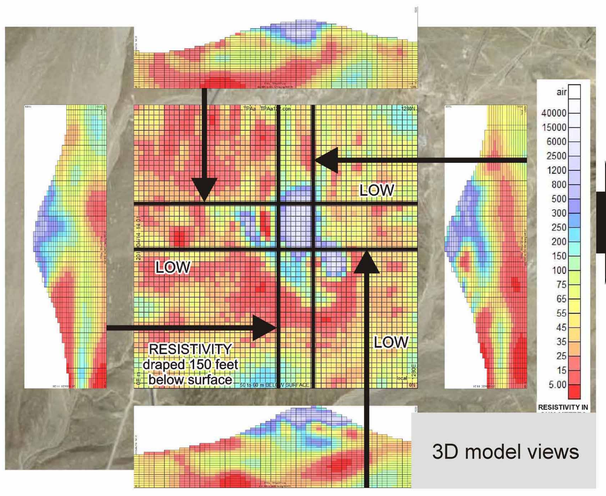
The 3D resistivity model, at the 5720 foot level.



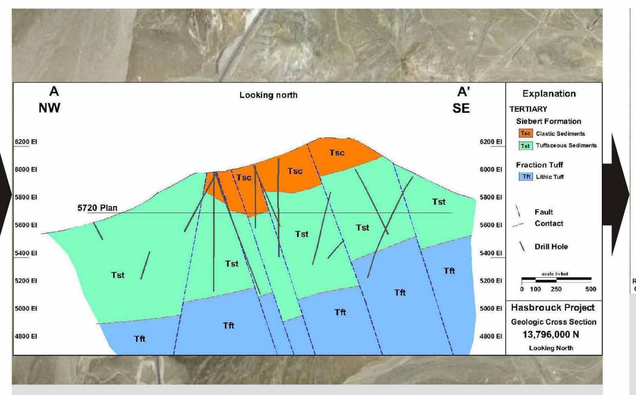
Close lateral correlation between elevated resistivity and the gold-silver resource.



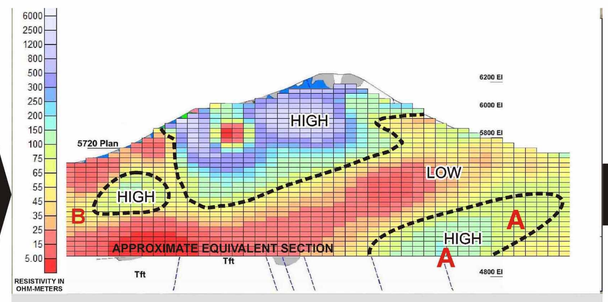
An absence of adjacent shallow anomalies across the 4200' by 4200' survey area helps keep drill targeting simple.



3D model views

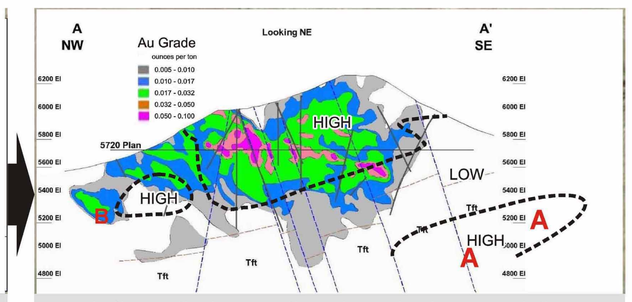


Relatively simple, layered volcanics.



Areas of elevated resistivity are outlined on this true vertical section through the 3D model. The section extends 1500 feet below the peak.

A deeper resistive pattern (*5 times background*) at "A" warrants follow-up. fs3D* data compliance supports consideration of subtly resolved patterns as verifiably data-backed expressions, not just sparse-data processing artefacts.



In the vertical sense, there is again close correlation with known ore mineralization. New anomaly at A?

A review of historic drilling reveals no testing in the area of the deeper 5x background pattern **A**, at lower right, which is now recognized as a site requiring investigation. The lesser-ratio (3x) anomaly at **B** confirms that significant grades can be associated with intermediate (modest) levels of anomalous resistivity, making **A** more interesting.

Rule of thumb: In well-behaved volcanic host regimes, unexplained (but data-verifiable) anomaly patterns *of any relative intensity* may warrant investigation; absolute values are historically non-diagnostic.

* VLS (Very Large Scale) 3D resistivity mapping involves acquisition of Full Spectrum 3D (fs3D) resistivity data to depths of 5 to 10 times the locally-anticipated depth of mineralization of interest. VLS mapping may reveal underlying large scale patterns suggestive of source feeder structures, either vertically below, offset, or in combinations. For more on both fs3D data and VLS-inferred feeders, see the poster "Very large scale true 3D resistivity mapping technology provides....", in this poster venue, at GSN Reno 2015.

The north facing resistivity section is approximately aligned with the slightly northeasterly facing mineralization section.

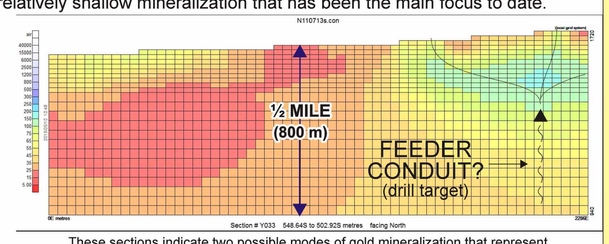
All plan and section images of geology, structure and mineralization are from the published materials of West Kirkland Mining Inc., by permission.

The single high-ratio, unequivocally distinct resistivity anomaly within Hasbrouck Peak's demonstrably quiet background mode confirms an opportunity for extended survey coverage at wider, more economical survey grid spacings. For example, a stepout fs3D* resistivity survey at almost double the grid station spacing (500' by 600' vs 300' by 300') was undertaken between Hasbrouck Peak and Klondyke Peak to the southeast.

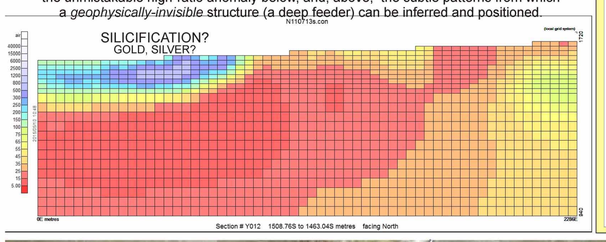
Banking on the fact that the Hasbrouck anomaly can easily be seen from decimated data at station spacings of 600 and even 900 feet, this new survey covered 2.8 times the area of the original Hasbrouck 3D survey, at a data acquisition cost that was less than that of the original, smaller survey.

The new survey mapped elevated resistivities of dimensions and depth below surface that are similar to those at Hasbrouck, but in flat land. In a further demonstration of the insights available from VLS* mapping, a second anomalous area exhibits a pattern suggesting deep feeder structure and fluid upflow, - a deep drill target which, when verified through examination of the entire 3D model, will represent potential for the intersection of bonanza grade, feeder-hosted gold mineralization.

Prospective volcanic host conditions extend in an area 6 to 8 miles wide from Three Hills near Tonopah, south toward Goldfield. The geology and terrain are amenable to the lower costs of wider spacing fs3D mapping, and work to date shows signs that VLS (overview-scale) deep imaging may deliver targeting of deep feeder structure, in addition to mapping the relatively shallow mineralization that has been the main focus to date.



These sections indicate two possible modes of gold mineralization that represent the geophysical extremes included within a fs3D data based inversion model, - the unmistakable high-ratio anomaly below, and, above, the subtle patterns from which a *geophysically-invisible* structure (a deep feeder) can be inferred and positioned.



VLS 3D resistivity mapping could cover the entire area from Tonopah to Goldfield, to deliver a multi-targeting fs3D assessment of this volcanic regime from the near-surface to depths of over a mile below surface.

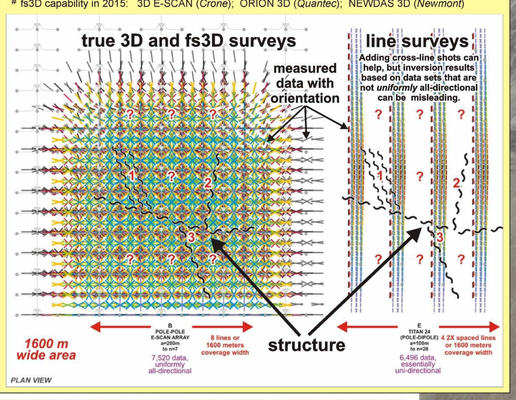
The area hosts two economic gold-silver epithermal ore systems, at Hasbrouck Peak and at Three Hills While the detection and 3D imaging of look-alike systems would be the nominally primary survey objective, it is unknown what other types of economic mineralization might be imaged either directly, or, as in the case of deep hot-spring feeder systems, indirectly.

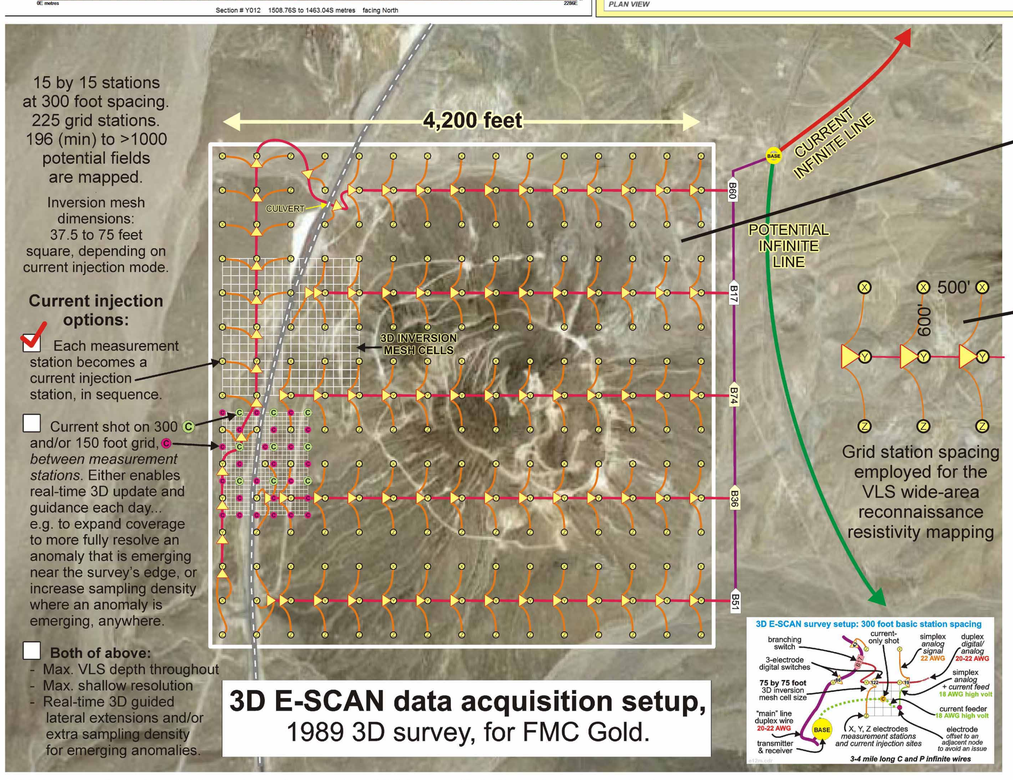
While any survey array could cover the area, the resistive nature of the primary target, and the expected subtly resistive nature of the deep feeder structure patterns (as seen at right) both require fs3D-qualified# data sets both to ensure the recognition of these resistive-end patterns, and to ensure the absence of artefact patterns that may result from inversion of sparse or directionally-biased survey data sets.

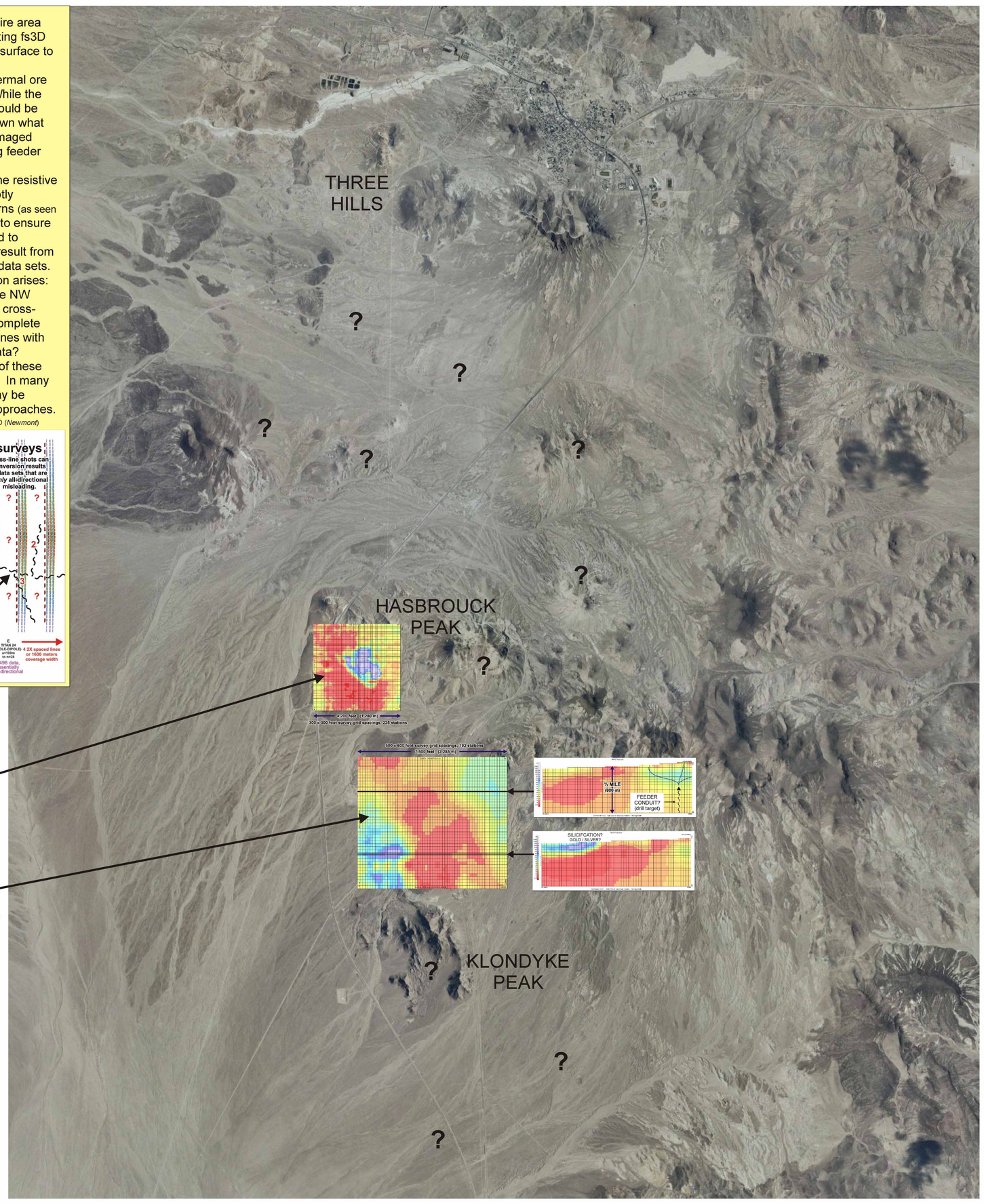
For surveys based on parallel lines, the question arises: Which orientation do we use, - perpendicular to the NW master system, and therefore unresponsive to the cross-breaking oriented structure, or vice versa? Two complete surveys, one in each orientation? Close-spaced lines with cross-line shots to collect some 2nd-orientation data?

One should always compare the current costs of these almost-3D methods vs the fs3D-qualified surveys. In many cases today, verifiably fs3D mapping data sets may be obtained at the same cost as the line-based 3D approaches.

fs3D capability in 2015: 3D E-SCAN (*Crone*); ORION 3D (*Quantec*); NEWDAS 3D (*Newmont*)







* VLS (Very Large Scale) 3D resistivity mapping involves acquisition of Full Spectrum 3D (fs3D) resistivity data to depths of 5 to 10 times the locally-anticipated depth of mineralization of interest. VLS mapping may reveal underlying large scale patterns suggestive of source feeder structures, either vertically below, offset, or in combinations. For more on both fs3D data and VLS-inferred feeders, see the poster "Very large scale true 3D resistivity mapping technology provides....", in this poster venue, at GSN Reno 2015.