

Carlin-type gold deposits are world-class gold producers and their characteristics are well known. However, a coherent genetic model explaining why so many of these world-class gold producing mines are located in central Nevada has been lacking. Increased interest in gold, renewed interest in Nevada and at a time when we now have an improved understanding of what controls the location of these world-class gold deposits suggests that an important new wave of discoveries may be imminent. Furthermore, NGE has been developing better ways to find them and is in a unique position to present an innovative exploration methodology to a market craving the next new big idea.

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Nevada is centered in the geologically unique Basin and Range physiographic province where N-S elongate mountain ranges alternate with valleys or basins. Nevada and in particular, north-central Nevada, has the highest concentration of multi-million ounce gold deposits (gold dots, size proportional to total ounces) of any place on the planet. Furthermore, 50% of that area remains essentially unexplored because it is covered by post-mineral rocks and/or sand & gravel – basically the flat areas between the mountain ranges.



However, the <u>discovery</u> of new ounces in both Nevada and the world has fallen every year for the past decade in spite of recent increases in exploration expenditures. Conventional exploration concepts and methodologies applied over the past 50 years are meeting with diminished success as exploration matures in districts with exposed bedrock – the low hanging fruit is gone, but can be reset with the development and application of new exploration concepts and methodologies.



After the first few Carlin-type gold deposits were discovered it was observed that for no apparent reason they seemed to line up on what became known as "Trends". The Big Idea that Trends somehow controlled the distribution of large gold deposits has dominated the ability to fund exploration for more than 50 years. With new discoveries, the original Trends have become broader and new ones have been proposed, so the "guide" is nearly useless as a discriminator for increased gold exploration potential.

Geologists have learned much more about why Carlin-type gold deposits occur where they do than that they seem to line up on Trends. The main characteristics of Carlin-type gold deposits have been well documented, but there has not been a unified genetic model explaining why Nevada, and, in particular, the North-Central Nevada part of Nevada, should be so uniquely endowed. In a recent paper John L. Muntean, et. al., *2011, Magmatic-hydrothermal origins of Nevada's Carlin-type gold deposits*, provides that coherent genetic framework in some detail (see Corporate Presentations Area of www.NevadaExploration.com for a copy of the paper).

Most importantly, this new information leads to better strategies to focus often scarce exploration resources by those willing to understand and use these new observations.



The story that the investor needs to understand is not really than complicated and does not require a lot of geologic jargon to explain. The same geologic processes that can be seen operating today operated 385 Million Years Ago (Ma) when an ocean once covered what is now Nevada.

The sea life that forms coral reefs requires sunlight, so only lives at the bottom of shallow seas (light blue areas). With time, all coral reefs die and turn to limestone (light blue areas). Sand, silt and clay carried by rivers from land to the east are mixed with limestone and are also deposited at the bottom of deeper seas (dark blue areas), where sunlight does not reach and limestone does not form. Over time, both rock types accumulated to great thicknesses like the layers of a cake.



Today, in north-central Nevada the light blue dashed line demarks the western limit of the formation of a large expanse of limestone. Thick layers of sand, silt and clay are located to the west of the light blue dashed line.



Over time complex, powerful plate tectonic processes push from the west to the east against what will become the Western US.



In north-central Nevada, this pushing resulted in the eastward movement of the deep-sea sand, silt and clay rock layers that acted together like a large 'plate' that broke along the western edge of limestone deposition (light blue line). The Western Upper Plate of sand, silt and clay rock layers was pushed 90 miles, up and over the Eastern Lower Plate limestone rocks (dark blue dashed line).

Over time the Plate Tectonic compressional forces relaxed and turned to extensional forces. Compression alternated with extension essentially shuffling the various rock layers like a deck of cards. The Upper Plate rocks acted much like a carpet being pushed along a hardwood floor, slipping and folding to create a variety of structural traps for later rising hot fluids.

The Upper Plate sand, silt and clay rocks are generally impermeable to ascending hot fluids. The Lower Plate limestone rocks are more easily dissolved by hot ascending fluids. The Upper Plate rocks act like a lid on a pressure cooker in the overlap area (yellow highlighted area) and help to build large concentrations of gold in both Upper Plate the more reactive Lower Plate rocks. Where either the Upper or Lower Plate rocks are absent the resulting gold deposits are smaller and lower grade (smaller gold dots). Therefore, the area between the two colored dashed lines (yellow highlighted area) where the Upper Plate and Lower Plate rocks overlap is 'very good for gold' and offers a significantly increased reward for focused exploration.

One of the reasons that Nevada is unique in the world for having so many large gold deposits is that this overlap area is geologically unique.



However, without rising hot fluids containing gold and other elements, there would only be an empty "pressure cooker".

Basically, a shallow subduction slab existed for 100 million years underneath Nevada but sank about 40 million years ago when Pacific Plate Tectonics changed abruptly. Over a 15 million year period the leading edge of this slab abruptly fell into the mantle, retreating 300 km southwestwards.

Rocks at the bottom of the ocean contain more water than other rocks. When the ocean bottom is pushed beneath rocks on land they heat up as they are pushed deeper beneath the surface. The water contained in the ocean floor rocks lowers the melting point of the descending slab and when the slab is pushed deep enough it selectively melts and molten bodies of *igneous* rock containing gold and other elements rise to the surface to form volcanoes (*Magmatic Activity*).

With comparatively fast, shallow subduction the area of first melting was located far inland (beneath NE Nevada). The rate of subduction abruptly slowed and allowed the slab to sink at a faster rate resulting in slab steepening and magmatic activity to be seen as sweeping from NE to SW Nevada. Where the rising magmas were emplaced beneath Upper Plate rocks in proximity to Lower Plate rocks - the perfect environment for deposition of large Carlin-type gold deposits was created.

Hot, ascending gold-bearing fluids (*hydrothermal fluids*) emanating from cooling bodies of molten rock tended to concentrate along steep, long-lived fault zones. Fault zones that formed early were subjected to repeated periods of alternating compression and extension and were reactivated several times to guide ore-bearing fluids into the perfect environment for deposition of large Carlin-type gold deposits. Fluids that ponded beneath Upper Plate rocks within Lower Plate rocks of porous iron-rich limestones soaked up gold and other elements like a sponge.

Most importantly, there are very good reasons to believe that there should me many more large Carlin-type gold deposits hidden in this region than those already discovered.



The heat, gold, other elements and some of the hot water required to form a Carlintype gold deposit came from molten rock chambers that were generated as a result of volcanic and deeper intrusive activity that swept from the NE corner to the SW corner of Nevada from 40Ma to 25Ma.



In summary, the very best area to look in Nevada and likely the world for multimillion ounce Carlin-Type gold deposits is located under the yellow highlighted area – BUT the area is still very large (25,000 mi²) and requires a clear exploration strategy to focus exploration resources.

However, some other events also make Nevada unique. After undergoing the last period of major compression, Nevada was then subjected to major extension, which resulted in the formation of the modern day Basin & Range Topography – a complicating event to some, but an opportunity to others.



Carlin-type gold ore bodies (red) formed within the rocks of the Earth's crust through the geologic processes previously described from 40 to 25 million years ago (Ma).

Starting around 15 Ma, the bedrock, AND the gold ore bodies contained therein, were separated into large blocks by major post-mineral fault zones as Nevada underwent extension and was essentially pulled apart.

Some blocks were dropped down to form BASINS relative to some that were thrown up to form mountain RANGES.

The mountain RANGES were eroded, filling and covering the valley BASINS with boulders, gravel, sand, and clay.

In some Basins the gravel is too deep for a gold deposit to be economic.

In other Basins the overlying gravel is shallow enough to permit the gold deposit to be mined economically – But first, it must be <u>discovered</u> through the overlying cover. To some, this presents an unacceptable increased risk to discovery that drives many away. To NGE, this creates an increased reward, if the problem of 'seeing' through the cover can be solved.



Understanding the role of gravity geophysics and groundwater chemistry are the two keys to realizing the opportunity.

Key 1) Gravity allows covered bedrock to be identified through gravel cover.

Key 2) As groundwater interacts with rocks, it picks up a distinct and recognizable hydrochemical 'scent' of the rocks it contacts.

As a result, the groundwater surrounding a gold deposit contains higherthan-normal (anomalous) concentrations of gold and other elements.

Once identified, an anomalous hydrochemical scent can be tracked back to its bedrock source in a manner similar to gold panning where gold in stream sediment was followed upstream to its bedrock source during the last great gold rush of the mid-1800's.



In summary,

- 1) Favorable host rocks were deposited several hundred million years ago when a marine sea covered Nevada.
- 2) Compressional forces created by Plate Tectonic processes squeezed the host rocks together pushing Upper Plate sand, silt and clay up and over Lower Plate Limestone. The rock layers were shuffled like a deck of cards as well as folded and wrinkled much like a carpet moving over a hardwood floor and major fault zones were created and pre-existing ones reactivated.
- From 40 to 25 Million years ago molten rock moved upward along deep fault zones and rising hot fluids formed Carlin-Type gold deposits in various structural traps.
- 4) Extension then pulled Nevada apart creating Mountain Ranges where erosion exposed "windows" through the Upper Plate rocks into the Lower Plate rocks where conventional exploration methodologies have made significant discoveries. Adjacent down-dropped blocks formed Basins where bedrock was covered by sand & gravel eroded from the Mountain Ranges concealing gold deposits that require new exploration methodologies to see through the cover.

Key 1) Gravity geophysics identifies areas of shallow bedrock beneath cover and Key 2) Groundwater chemistry identifies which of those areas are associated with higher-than normal concentrations of gold and Carlin-type trace elements.



Gravity geophysics focuses exploration resources onto concealed and poorly explored bedrock areas with the shallowest gravel cover.



Groundwater chemistry collected by NGE (pink dots = legacy data, i.e.- no gold +/various trace elements; red dots = NGE groundwater samples, i.e.- high-resolution gold plus trace elements) further focuses exploration resources onto those areas with BOTH the highest gold in groundwater chemistry AND those areas large enough to conceal a significant new gold deposit.

NGE currently controls the mineral rights on nine (9) properties (yellow highlighted ellipses) and has completed enough groundwater sampling to identify a number of other prospects that are being held in 'inventory' without holding cost.

Note:

Those properties located outside of the overlap area could potentially contain multimillion ounce gold deposits, that are created by somewhat different processes than those just discussed. These deposits can also be detected by unusual groundwater chemistry and will be the subject of another presentation.



Many TALK about how the industry needs new exploration ideas, but few are willing to actually DO something about it. The principals of NGE have already made successful careers out of being on the leading edge of the first wave of Carlin-type gold exploration in Nevada and have been hard at work to be well positioned to produce the results that others will be following for the next wave of discoveries.