

SEG WHISTLER 2013: GEOSCIENCE FOR DISCOVERY  
**Intrusive-related Gold Deposits – Fairbanks, Alaska**  
Pre-Conference

**LEADERS:**

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**WHERE:** The tour will start and finish in Fairbanks, Alaska, with day trips to Fort Knox, Pogo and Livengood.

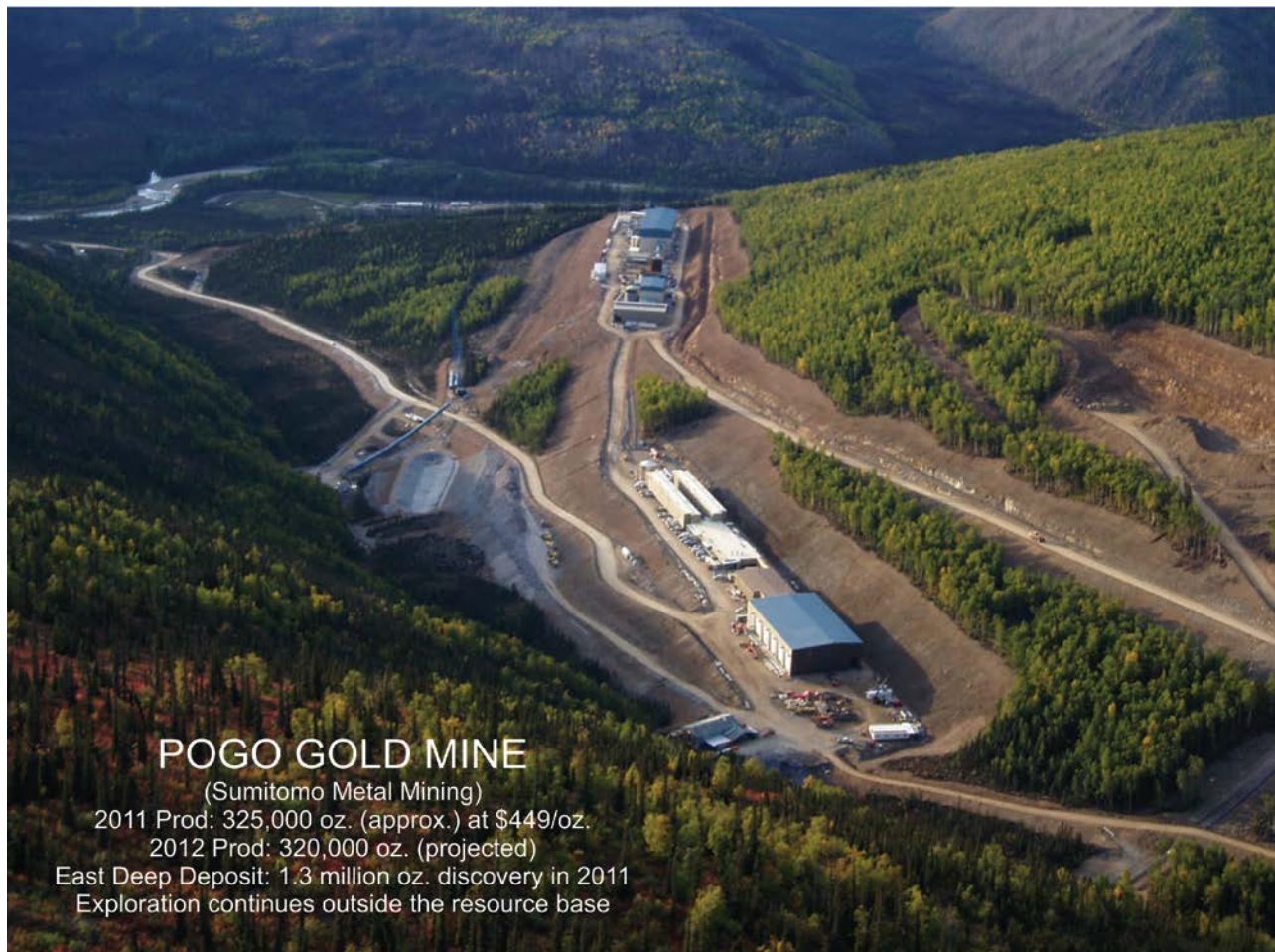
**WHEN:** September 20 through 24 (field trips on September 21, 22 and 23)

**COST:** Covers local transportation and accommodation (double occupancy).  
Participants must cover their food costs and arrange their own transportation to and from Fairbanks.

**MINIMUM PARTICIPANTS:** 13

**MAXIMUM PARTICIPANTS:** 18

**GEAR:** Comfortable hiking boots and outdoor clothing is recommended, including rain gear. Freezing temperatures can be expected in Fairbanks at that time of year.



## SUMMARY:

The intrusive-related gold (IRG) deposit field trip is designed to introduce attendees to a relatively new and distinctive group of gold deposit types whose chemistry suggests a genetic link with plutonic rocks, in this case, mid-Cretaceous (90-105 Ma) intrusives. A synthesis of this information suggests a mineral deposit model in which metal and high CO<sub>2</sub> bearing fluids fractionate from ilmenite series, I-type intrusions during the late phases of differentiation (porphyritic granites). Depending on the rate of ascent of these hydrothermal fluids, the level of the crust they reach before depositing their metallic budget, and their associated intrusive rocks, two distinctly different metallogenic systems can form, in some cases in the same mineral prospect. In deeper, higher pressure settings gold mineralization can form at higher temperatures (400°-600°C) and low sulfur fugacities. Such systems are characterized by elevated Au ± Bi ± Te ± W ± As mineralization. Sulfur-depleted metallic minerals such as native bismuth, native arsenic, maldonite and loellingite often form in such environments. These higher temperature systems display isotopic, trace element and fluid inclusion evidence suggesting almost exclusively magmatic fluid involvement and are thought to form in more proximal intrusive settings. In higher level, lower pressure settings, mineralization forms at lower temperatures (250°-400°C) and higher sulfur fugacities and is characterized by elevated Au ± Ag ± As ± Cu ± Sb ± Hg ± Pb ± Zn. These lower temperature systems display isotopic, trace element and fluid inclusion evidence suggesting variable meteoric water mixing and are thought to form in more distal intrusive settings.



One of the deposits (Pogo) exhibits properties of both intrusion-related and orogenic gold deposits. We will let the field trip participant decide what deposit type this important lode belongs to.

The intrusive-related gold field trip will visit both intrusive-hosted and metamorphic rock-hosted gold deposits and occurrences in both distal and proximal settings. The deposits and occurrences that will be visited include:

1. Stockwork-shear style mineralization hosted in porphyritic intermediate to felsic intrusives. Mineralization contains Au with anomalous Bi, Te, W and trace Mo. Examples include Fort Knox, Alaska's largest lode gold producer (+8 Moz reserve; production through 2012—5.6 Moz)). There is a strong genetic relationship between host intrusion and gold mineralization.
2. Porphyritic stockwork with intrusion/schist shear hosted Au-As-Sb (Ryan Lode, 2.4 Moz) with a strong genetic relationship between host intrusion and gold mineralization.
3. Gneiss or high-grade schist-hosted quartz veins proximal to causative intrusives. Metals associated include Au, Bi, and As. The Pogo deposit (6.9 Moz reserve; production through 2012, about 2.2 Moz) ) is the best example of such mineralization. Mineralization is genetically related to plutonic activity but is not hosted in intrusive rocks.
4. Au ± base metal, ± Ag ± W ± Bi intrusion hosted mineralization with a possible genetic relationship between precious metal mineralization and intrusion. Examples include Dolphin deposit in the Fairbanks District (6 Moz).
5. Structurally controlled mineralization hosted by schist-only high angle shear zones and veins. Associated metals include Au, As, Sb, Ag, Pb and W in low sulfide quartz-carbonate veins. Alteration adjacent to veins is pervasive quartz-sericite-sulfide alteration that can extend for up to one mile from the source structure. Deposits were mined heavily prior to World War II and are noteworthy because of their exceptional grades (+1 to +5,000 opt Au). Examples from the Fairbanks District include Cleary Hill (280,000 oz. production), Christina, and Hi Yu (110,000 oz. production) veins.
6. Low angle, disseminated, carbonate and/or calcareous rock hosted Au-As-Sb mineralization associated with brittle thrust or detachment zones distal to generative intrusives. Favorable host rocks may provide chemical and/or physical controls for mineralization. The True North (1.3 Moz) and Livengood (+20 Moz) deposits are examples of this type of mineralization.

## **DETAILED ITINERARY**

The tour will start and finish in Fairbanks, Alaska with day trips according to the following schedule:

**Sept 21:** Tour of Kinross Gold's Fort Knox open pit gold mine and other Fairbanks District prospects as time permits (Golden Summit, Ryan Lode). Entire day will be spent



within 25 miles of Fairbanks. Dinner to be arranged at Fairbanks restaurant. Overnight in Fairbanks.

**Sept. 22:** Tour of Sumitomo Metal Mining's Pogo underground gold mine. Tour will involve a 125 mile drive to and from the mine. Dinner to be arranged at Fairbanks restaurant. Overnight in Fairbanks.

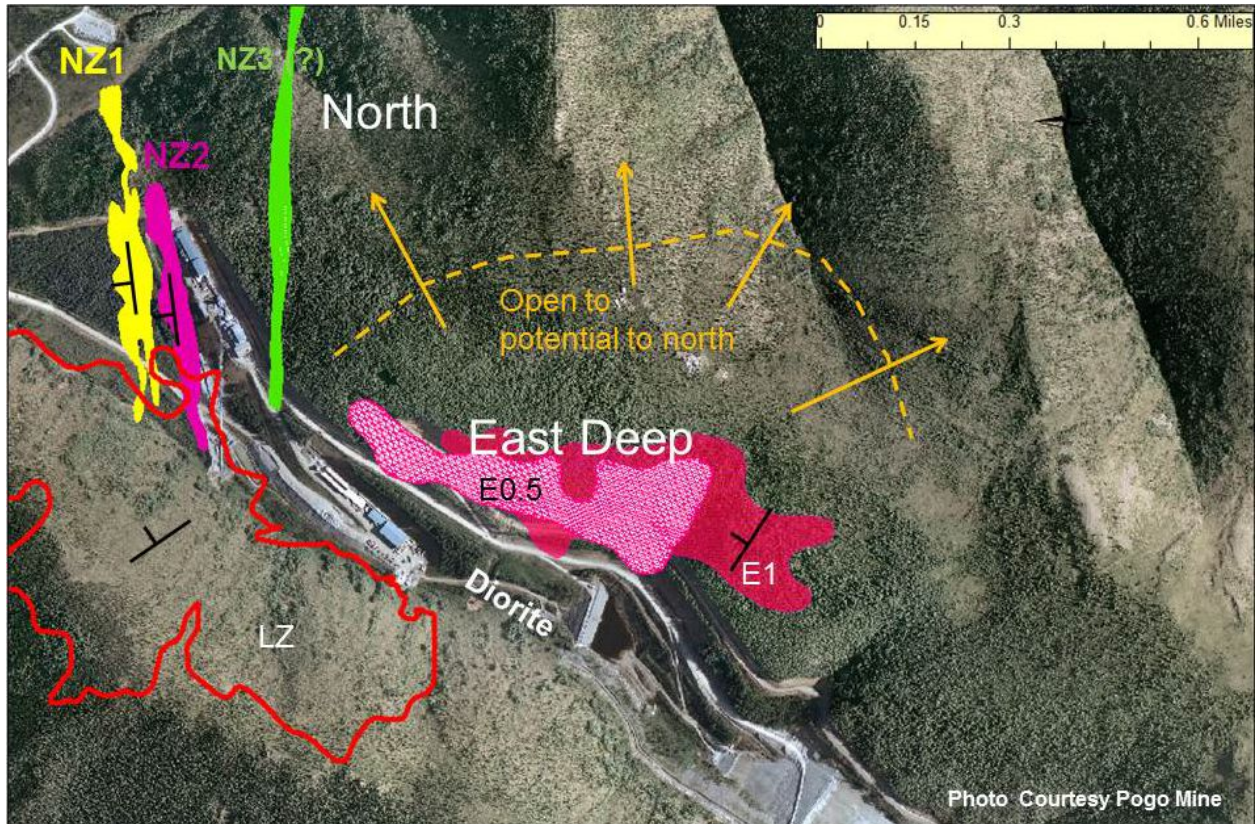
**Sept. 23:** Tour of International Tower Hill Gold Mines' Livengood deposit. Tour will involve a 75 mile drive to and from the deposit. Dinner to be arranged at Fairbanks restaurant. Overnight in Fairbanks or catch late night flight to Seattle.

A compendium of publications will be supplied in digital form, covering each of the three main deposits visited as well as general background information on IRGs in Alaska and elsewhere. A portion of the digital compendium will be supplied in a hard-copy hand-out form to facilitate use during the field trips.



Fort Knox mill.





Pogo surface plan.

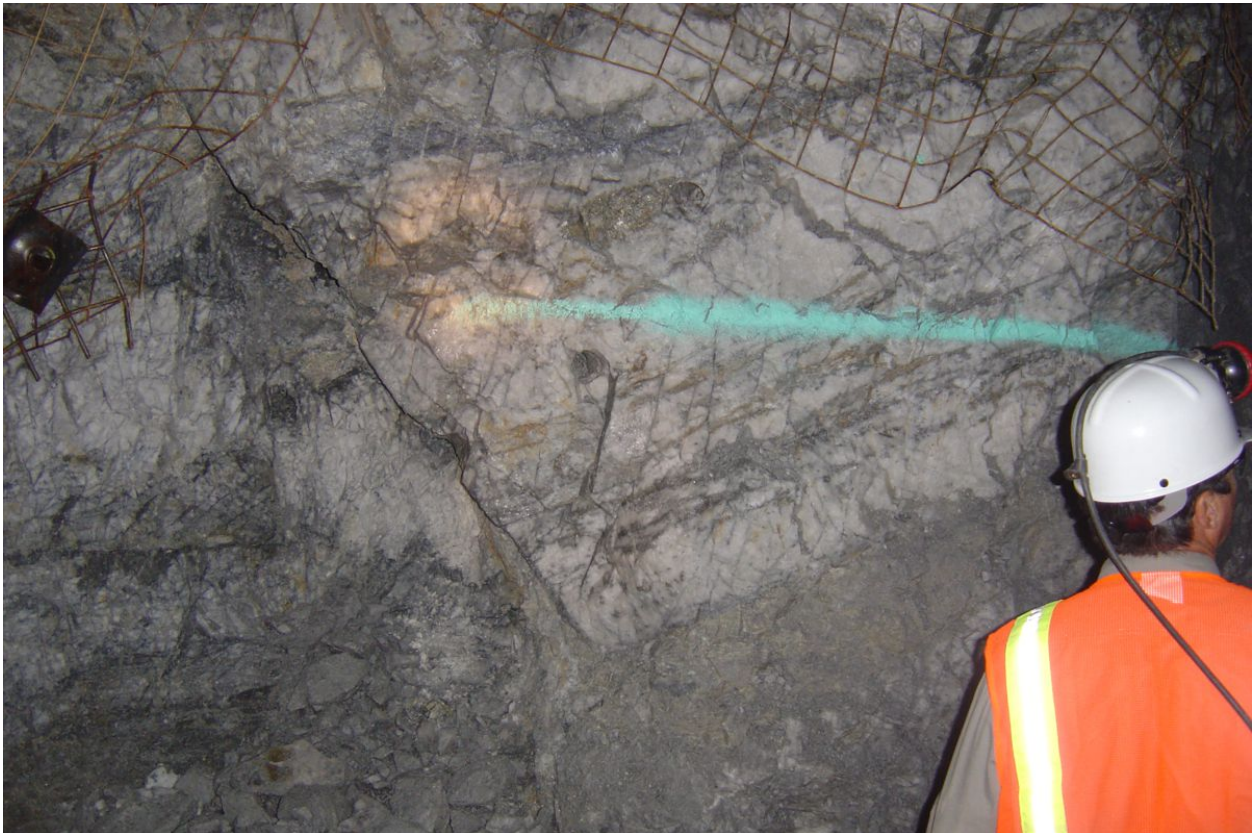


Livengood property drill program.





Livengood property – Money Knob.



Pogo gold quartz vein.