



**YOU ARE INVITED TO**  
**THE COEUR D'ALENE & COLUMBIA SECTION'S ANNUAL**  
**JOINT DINNER MEETING & SILENT AUCTION**  
*(to benefit local students and members)*

**Thursday, March 23, 2017**

**GUEST SPEAKER:** Natalie Caciagli, Ph.D., P.Geo., Senior Resource Geochemist, Kinross Gold Corp.

Natalie will be presenting Kinross "Best Practice" G4 models; example for machine learning for integration of geochemical and logging data in support of resource estimation. The G4 concept is a resource modeling "Best Practice" methodology based on a secure & valid database that supports the 4 principle geologic models used to spatially characterize a potential ore body. The KG4 models are: Geologic Models (G1), Geochemical Models (G2), Geometallurgical Models (G3) and Geotechnical Models (G4). (Speaker bio and presentation abstract attached)

**LOCATION:** Best Western Coeur d'Alene Inn  
506 W. Appleway Ave.  
Coeur D'Alene, ID

**TIME:** 6:00 – 9:00PM

**COST:** \$30.00

**MENU CHOICE:** *Bourbon Street Steak, Chicken Asiago or a vegetarian option*

**RSVP & MENU CHOICES NEEDED BY MARCH 17, 2017 TO**

**Kennet Bertelsen, [kbertelsen@m-m.net](mailto:kbertelsen@m-m.net), (509) 315-5303**

**Please let us know if you can help out with any of the following fund-raising opportunities:**

**Auction Items:** *Any item you would like to contribute. Company item or purchased item.*  
*Contact: Jann Higdem, [jhigdem57@gmail.com](mailto:jhigdem57@gmail.com), (208) 682-3527*  
*BJ Kronschnabel, [Bernard.kronschnabel@valmont.com](mailto:Bernard.kronschnabel@valmont.com), (402) 613-8793*

**Meeting Sponsors:** *You will be prominently displayed at the event.*  
*Contact Jim Thomas, [jngthomas@gmail.com](mailto:jngthomas@gmail.com)*  
*(Please note: sponsorships do not cover dinner costs.)*

## **Natalie Caciagli, Ph.D., P.Geo., Senior Resource Geochemist, Kinross Gold Corporation**

*Natalie Caciagli (Ph.D.) is a Senior Geochemist at Kinross Gold where she works on a wide range of international projects in Exploration, Mine Planning, Resource Estimation, Geometallurgy and Production. She combines compositional data analysis and data science techniques and she has applied Artificial Intelligence (AI) and machine learning tools to mining projects, integrating data in geochemistry, lithology, alteration mineralogy, and metallurgy. Natalie has an MSc in Geology from the University of California, Los Angeles and a PhD in Geology from the University of Toronto in Canada. She has presented at numerous workshops and academic conferences, as well as authoring a number of research papers. Her experience in mining analytics spans North America, South America and, West Africa.*

### **Kinross “Best Practice” G4 models: Example of Machine Learning for Integration of Geochemical and Logging Data in Support of Resource Estimation Kinross Gold Corporation, Toronto, Canada,**

*The G4 concept is a resource modeling “Best Practice” methodology based on a secure & valid database that supports the 4 principle geologic models used to spatially characterize a potential ore body. The KG4 models are: Geologic Models (G1), Geochemical Models (G2), Geometallurgical Models (G3) and Geotechnical Models (G4).*

*In the case study presented here, the previous geological model for an orogenic gold deposit based on field logging, did not adequately constrain and inform the gold estimation domains. As a result, early resource estimates used basic grade shells to limit estimation with no support from geology or geochemistry.*

*Principal component analysis of the pXRF data and k-means cluster analysis was used to create a data driven, statistically robust geochemical model. This geochemical model was correlated and integrated with the geological model using Random Forest predictive modelling. As a result three new lithological/alteration domains were identified within the granodiorite host which showed good correlation with gold mineralisation and provided support for resource modelling.*

*These new estimation domains demonstrate stationarity or approximately homogeneous distributions of mineralization. This increases our confidence in the grade estimation domains, de-risking both the resource estimate and subsequent mine planning.*