



The Rock Record – September, 2013

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*Please contribute to the SGS
Newsletter*

The SGS Newsletter is produced by the SGS executive. Letters, announcements, notices, comments, photos, news and information about SGS members, etc. are always welcome. Call an executive member or write to us at:

**Saskatchewan Geological
Society**

**P.O. Box 234
Regina, SK S4P 2Z6**

SGS e-mail address:

info@sgshome.ca

SGS Website:

www.sgshome.ca

All advertising inquiries should be directed to **Dan Kohlruss**

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FRIDAY: SGS Golf BBQ starts at 6pm at Wascana Place/Lady Slipper Courtyard. Food will be served around 6:30. RSVP Tom @ 306-787-8639

Saskatchewan Geological Society Talks Fall, 2013

Mr. Greg Vogelsang, President, Geoscientists Canada;

Tuesday, September 17th—details inside

An Overview of Geoscientists Canada, Current Objectives and Activities

**Dr. Stephen Turner, Society of Economic Geologists, 2013 International
Exchange Lecturer;**

Thursday, October 3rd—details inside

Discovery of the Mesel, Batu Hijau and Martabe Deposits, Indonesia: Results of Successful Greenfields Exploration

**Dr. Andy Bajc, Ontario Geological Survey, 2012 Provincial Geologists
Medal Recipient;**

Wednesday, October 16th

3-D Mapping of Quaternary Deposits for Groundwater Applications

**Dr. Jim Rice, Planetary Geologist, retired National Aeronautics and
Space Administration;**

Friday, November 1st

Luncheon talk on Mars geology (TBD); and an evening Public Lecture at the Saskatchewan Science Centre in Regina on the Mars Rover Program

**Dr. Duane Froese, University of Alberta,
Geological Association of Canada 2013-14 W.W. Hutchison Lecturer;**

Friday, November 29th,

Lost World in Ancient Ice

Dr. Don Henderson, Curator of Dinosaurs, Royal Tyrrell Museum;

Tuesday, December 3rd, Public Lecture, Saskatoon

Alberta's Last Sea Dragon – the Lethbridge/Korite Elasmosaur

Saskatchewan Geological Society Talk

Tuesday, September 17th

Mr. Greg Vogelsang--President, Geoscientists Canada

An Overview of Geoscientists Canada, Current Objectives and Activities

Ramada Hotel, 1818 Victoria Avenue, Regina--Oak Room, Main Floor

Lunch: 11:45 a.m.; Meeting and talk: 12:15-1:00 p.m.

For lunch the cost is:

Members: \$15.00

Student Members: \$5.00

Non-Members: \$20.00

For those not having lunch the talk is free

RSVP: Murray Rogers at murray.rogers@gov.sk.ca or 306-787-1932 by Friday noon, September 13th.

Abstract

Created in 1996, Geoscientists Canada formerly known as the Canadian Council of Professional Geoscientists (CCPG) is a national council whose members are the self-governing professional associations or constituent associations that regulate the profession of geoscience in each of the jurisdictions in Canada. Geoscientists Canada does not license individual geoscientists. Individuals must become licensed with the appropriate constituent association (regulator) in each of the provinces or territories in which they intend to practice.

The objectives of Geoscientists Canada are:

1. to safeguard and promote the present and future interests of the geoscience professions in Canada;
2. to establish and maintain liaison among the provincial and territorial associations and corporations of professional geoscientists in Canada and to assist them in:
 - coordinating, correlating and standardizing their activities, particularly in the areas of registration of geoscientists, mobility of registered practitioners and inter-provincial practice;
 - promoting and maintaining high standards in the geoscience professions;
 - developing effective human resources policies and promoting the professional, social and economic welfare of the members of the geoscience professions;
 - promoting a knowledge and appreciation of geoscience and of the geoscience professions, and enhancing the usefulness of the professions to the public;
 - promoting the advancement of geoscience and related education;
 - generally carrying out their various objectives and functions;
3. to act on behalf of and to present the views of its constituent associations and organizations in matters that are national or international in scope, including international registration or certification of geoscientists, and reciprocal practice;
4. to act in respect of other matters of Canada-wide or international nature concerning the geoscience professions either alone or together with other bodies;
5. to acquire, print, publish, conduct, buy, sell, distribute, circulate, manufacture and import, in physical or electronic media, journals, periodicals, reviews, pamphlets, magazines, books, advertisements, maps, charts, engravings, posters, labels, plates, cards, calendars, pictures and illustrations, whether coloured or otherwise, pertaining to the geoscience professions or the aforementioned objectives;
6. to apply for, obtain, register, purchase, lease, license or otherwise acquire, hold, use, own, introduce and sell, assign, lease, license or otherwise dispose of any copyright or copyrights in any literary or other work pertaining to the geoscience professions or to the aforementioned objectives and capable of being copyrighted;
7. to prepare, acquire or purchase and to distribute or dispose of any literary, scientific or professional work, translation or composition pertaining to the geoscience professions or the members of the Corporation;
8. to affiliate with, join or enter into arrangements or agreements to carry on any undertaking with any society, association or other body having objectives similar or comparable to those of the Corporation.

Saskatchewan Geological Society Talk

Thursday, October 3rd

**Dr. Stephen Turner, Newmont Australia
Society of Exploration Geologists, 2013 International
Exchange Lecturer**

**Discovery of the Mesel, Batu Hijau and Martabe Deposits, Indonesia: Results of
Successful Greenfields Exploration**

Ramada Hotel, 1818 Victoria Avenue, Regina--Oak Room, Main Floor

**Lunch: 11:45 a.m.
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RSVP: Murray Rogers at murray.rogers@gov.sk.ca or 306-787-1932 by Tuesday noon, October 1st.

If you want lunch please RSVP or you may go hungry.

Abstract

In the early 1980s Newmont commenced a generative exploration program in Indonesia. The main objective was an outcropping epithermal gold deposit; however the methodology used was broad enough to locate any style of outcropping mineralization. The results of that exploration program were the discovery of the Mesel gold deposit in North Sulawesi, and the Batu Hijau and Elang copper-gold deposits on Sumbawa Island. Mesel is a sediment-hosted replacement-style gold deposit with analogies to Carlin-style mineralization in Nevada. Batu Hijau and Elang are classic porphyry copper-gold deposits. All were new greenfields discoveries. Mesel is located ~4 km from eluvial gold workings that were exploited by the Dutch between 1900 and 1921. Outcrops at Mesel had been sampled by the Dutch but were not developed, probably due to the refractory nature of the gold. Normandy discovered the Martabe deposit in northern Sumatra in 1997 using BLEG (bulk leach extractable gold) stream sampling, as had been previously used successfully by Newmont.

By the time the 4th generation Contract of Work (COW) documents were ready to be granted in 1986 Newmont had identified three substantial blocks of favourable terrane; the eastern end of the North Arm of Sulawesi, Lombok and Sumbawa islands in the eastern Banda Arc, and Bengkulu Province in southwest Sumatra. A comprehensive multi-method, multi-element, drainage sampling program was implemented to ensure that a single visit would be sufficient for most sites sampled. All the initial surveys were completed by foot traverse. At each site a 2 kg BLEG, -80 mesh stream sediment, panned concentrate, and rock float / outcrop samples were taken although this was later modified. This multiple approach was important in the interpretation of many of the anomalies, particularly where the major expense was simply getting to a remote sample site.

In Bengkulu it was recognized at an early stage that the abundant gold anomalies generated by the drainage survey were not being reflected by zones of significant alteration and mineralization in the local geology. The common coarse pannable gold and spiky anomalies indicated reworked placer gold, and auriferous conglomerates were subsequently recognized on ridge tops. With this understanding it was easy to rapidly assess the remaining anomalies, and then terminate the COW when no primary sources for the gold were found.

Work on the North Sulawesi COW commenced with both a regional drainage survey, and detailed mapping and sampling within an extensive area of alteration and surface eluvial gold shows around the old Dutch workings at Hais. Two transitional styles of gold mineralization are now recognized in the district; open-space quartz and calcite veining with coarse gold associated with paleokarst breccias in a massive platformal limestone, and a replacement-style alteration and mineralization associated with micron-size gold. The first style generates strong stream sediment anomalies and extensive surface eluvial gold deposits which were exploited by the Dutch and more recently by thousands of local miners. However, the primary paleokarst gold mineralization was small and erratic, as demonstrated by the disappointing results from the first three drill campaigns in the district.

In contrast the Mesel deposit had a very weak stream sediment anomaly (2 ppb Au in BLEG, no detectable -80 mesh gold, and no pannable gold), and restricted outcrop. The fourth drill program targeted the Hein's Find outcrop at Mesel with significant gold results; however, the size of the deposit was not appreciated until later drilling. Mesel (with the Nibong and Leon's deposits) had a +2 million ounce gold resource which was mostly refractory. These deposits are now mined.

The first stage regional drainage survey in Nusa Tenggara Barat (NTB: Lombok western and Sumbawa islands) generated 36 anomalous clusters of drainages. The top-ranked drainage was a strong and coherent anomaly which was followed up to an impressive zone of quartz – limonite stockwork at the Dodo-Elang prospect. The initial drill program tested an epithermal overprint at Bukit Ladam on the margins of what subsequently proved to be a very large porphyry Cu-Au deposit at Elang.

Batu Hijau is in the headwaters of several geochemically anomalous major drainages, but the initial follow-up was side-tracked into a series of peripheral epithermal gold – base metal vein and breccia prospects. Eventual discovery of Batu Hijau was based on the persistent follow-up of rare copper-stained diorite float to a location termed 'Green Creek' on the flank of the porphyry. The copper has a rapid downstream decay pattern. Drilling of the surface rockchip and soil Cu, Au and Mo anomalies defined a classically zoned porphyry deposit with an initial resource of 819 Mt @ 0.56% Cu and 0.46 g/t Au. The Batu Hijau deposit is currently in operation and the Elang deposit is at an advanced stage of target definition with ongoing drilling and resource definition.

A single 14 ppb gold anomaly from a Normandy regional BLEG drainage survey in north Sumatra in 1995-1996 led to the discovery of the Martabe epithermal high-sulfidation gold deposit. Following the Normandy / Newmont merger in 2000 and drilling of challenging steep, jungle-covered silica ridges a +4 million ounce gold resource was defined. The deposit was subsequently sold and was put into production by G-Resources Group in 2012 with a total resource of +8 million ounces of gold and 77 million ounces of silver.

In each COW an understanding of the local geology and its effects on the drainage geochemical response were critical in the interpretation and follow-up of the drainage geochemical anomalies, either in progressing towards significant discoveries at Mesel, Batu Hijau, Elang and Martabe, or an early decision to relinquish the ground in Bengkulu.

2013 Annual Field Trip to the Black Hills Region of South Dakota and Eastern Wyoming



Thirteen SGS members, including two student members, participated in the annual field trip from August 25th to 29th. The trip to the Black Hills was expertly led by Dr. Alvis Lisenbee, a retired Professor from the South Dakota School of Mines. Day 1 (August 26) began with an examination of some Paleoproterozoic basement outcrops, representative of the rocks that core the Black Hills uplift. This was followed by a visit to the past-producing Etta lithium pegmatite mine, Mount Rushmore, a cave tour at Wind Cave National Park which

featured karst features, and ending with a visit to an active indoor mammoth excavation site at Hot Springs, S.D. Supper was provided by Respec Engineering.

Day 2 (August 27) started with an examination of the Precambrian/basal Cambrian Deadwood Fm. unconformity. This was followed through some of the day with an examination of outcrops of the entire Paleozoic section from Cambrian to Permian. Also included were stops at the world-class, past-producing, Precambrian Homestake open pit gold mine and an examination of rocks taken from the mine including from the mine ore formation. This was followed by a mine tour at the Tertiary Wharf epithermal open pit gold mine.



Day 3 (August 28) focused on the Tertiary alkaline intrusions and related mineralization of the northern Black Hills and westward into Wyoming. Outcrops were examined in the vicinity of the Bald Mountain REE deposit including K-metasomatized, fracture-filled U, Th, REE mineralization associated with recessive carbonatites. The day ended with a visit to the world famous Devils Tower which is a Tertiary phonolite intrusion with spectacular columnar jointing. On the return trip the final day a luncheon stop was made in the North Dakota badlands.

Thanks are extended to the many individuals who helped with organizing the trip or in the driving who include: Dr. Alvis Lisenbee, Chris Johnson (Respec Engineering), Gavin Jensen, Mike Thomas, Kim Kreis, and Colin Card among others.

John Lake
Field Trip Chair
(Assistance and photos from Murray Rogers)

Announcements and Events

FRIDAY: SGS Golf BBQ starts at 6pm at Wascana Place/Lady Slipper Courtyard. Food will be served around 6:30. RSVP Tom @ 306-787-8639

Saskatchewan Geological Society Banquet and Annual General Meeting—Tentative Date January 25—stay tuned!!!!

Saskatchewan Geological Open House

This event, showcasing advances in Saskatchewan geoscience, takes place at the Delta Bessborough, Saskatoon, Monday, December 2nd to Wednesday, December 4th, 2013. Registration and further details available here:

<http://openhouse.sgshome.ca/index>

Luncheon Talk Speakers

If anyone has any ideas for luncheon speakers please contact Kim Kreis (k.kreis@sasktel.net) or Murray Rogers (murray.rogers@gov.sk.ca)

Membership

SGS membership is on a calendar year basis---Please renew your membership for 2013 if you have not already done so. Mail the form (with a cheque), bring it to the next luncheon meeting, or use the on-line form on the website at www.sgshome.ca

SGS Merchandise

The SGS has a variety of reasonably-priced merchandise, mainly clothing, that is posted on the website: www.sgshome.ca for viewing. This includes seasonal items such as very nice golf shirts, t-shirts, and hats.
