35th Annual Yellowknife Geoscience Forum Abstracts of Talks and Posters

November 20-22, 2007

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Recommended Citation: Cairns, S. and Falck, H. (compilers), 2007, 35th Annual Yellowknife Geoscience Forum Abstracts; Northwest Territories Geoscience Office, Yellowknife, NT. YKGSF Abstracts Volume 2007.

TUESDAY, NOVEMBER 20 (MORNING)

Theatre 1 – Northern Geoscience/Mineral Exploration

Chairpersons: Steve Goff, Edith Martel

08:20 **Welcome**

08:40 **J. Ketchum and S. Cairns** - The Northwest Territories Geoscience Office – current and future directions and evolving partnerships

09:00 **S.P. Goff** - A Mineral Exploration overview of the Northwest Territories

09:20 **L. Ham** - A Mineral Exploration overview of Nunavut

09:40 **D. White, D. Bryan, L. Hulbert and G. Vivian** - The Muskox Intrusion; Silvermet Inc. adds a Chapter to the Exploration History

10:00 **Coffee**

10:20 **D. Morgan** - Update on GNME's Ni-PGE Exploration on Victoria Island, NWT

10:40 **A. Taylor** - Prairie Creek Mine Update

11:00 **W.A. Schleiss, D. Swisher and R. Burns** - Update On the Pine Point Project

11:20 **V. Pratico** - Tyhee Development Corp's Yellowknife Gold Project

11:40 **Coffee**

12:00 **R.M. Ginn** - Viking Gold Exploration Inc. Activities in the Morris Lake Area, NT

12:20 **R. Sherlock, D. Lindsay, J. Wakeford and D. Smith** - Miramar Hope Bay Ltd., Progress Report 2007: Development of Hope Bay Project, NU

12:40 **S. Burgess** - 2007 Hackett River Project Update: At the Threshold of Development

Theatre 2 – Energy in Canada's North

Chairpersons: Yvon Lemieux, Willem Zantvoort

08:40 **D. Thomson, C. Schröder-Adams and T. Hadlari** - An introduction to Cretaceous clastic marine deposits in the Peel Plateau Region, NWT: Biostratigraphy and Sedimentology

09:00 **T. Hadlari, D. Thomson and C. Schröder-Adams** - Sedimentology of the Albian Martin House Formation, Peel Region, NT

09:20 **T.L. Allen and T.A. Fraser** - Hydrocarbon potential of Upper Paleozoic strata, eastern Richardson Mountains, northern Mackenzie Mountains and Peel Plateau, Yukon

09:40 **S. Tylosky, T. Hadlari, O. Catuneanu and W.G. Zantvoort** - Turbidite facies of the Upper Devonian Imperial Formation, Northwest Territories

10:00 **Coffee**

10:20 **L.P. Gal** – Devonian Arnica Formation as reservoir in a petroleum systems context; Peel Plateau and Plain, NWT and Yukon

10:40 **R.B. MacNaughton and K.M. Fallas** - On the Plateau Fault as a Conceptual Hydrocarbon Play

11:00 **Y. Lemieux and B.C. MacLean** - Preliminary structural interpretation of seismic data in the southern Peel Plateau and Plain: linking the northern Mackenzie and Franklin mountains

11:20 **I. Zapfe-Smith, L. Klatzel-Mudry and K. Hansen** – Integration of Multiple Technologies in Northern Frontier Exploration

11:40 **Coffee**

12:00 **D.J. Scott** - Overview of the Earth Sciences Sector's Gas Hydrates Program: Facilitating the development of a secure, alternative supply of clean natural gas

12:20 **S.E. Grasby, B. Beauchamp and C. Harrison** - Methane seeps in the Sverdrup Basin: Evidence for historic gas generation and migration

12:40 **S. Zhang** - New discoveries of Ordovician Oil Shale on Southampton Island, Nunavut

Theatre 3 – Environmental Sciences

Chairpersons: David Livingstone, Hugh Wilson

08:40 **R. Reid** - DIAND Water Monitoring in the NWT and Nunavut

09:00 **G. Groskopf** - Metal Mining Effluent Regulations: an update

09:20 **L. Wan -** Assessment of Water Management at Mining Sites in Nunavut

09:40 **D. Faria** - Hydrological Monitoring at Colomac Mine Site for Remediation Planning

10:00 **Coffee**

10:20 **P. Vescei** - The Fish Fauna of Great Bear Lake: Expedition on a Freshwater Inland Sea

10:40 **W.S. MacNeill** - Walleye Movements and Life History in Two Interconnected lakes in the NWT - NICO Project, Fortune Minerals Ltd.

11:00 **H. Machtans** - Use of Ninespine Stickleback for Ecotoxicology Studies in Yellowknife

11:20 **P. Vescei** - Baker Creek Survey: Spring Spawning Fishes in a Remodeled Stream Channel

11:40 **Coffee**

12:00 **K. Hamre** - NWT Protected Areas Strategy and non-renewable Resource Assessments

12:20 **R. Gau and S. Carriere** - Rare and Lesser-known Species of the NWT - Update on Surveys and Proposed Best Practices for Assessments

12:40 **R. Mulders** - Estimating Wolverine Abundance on the Barrens using DNA Mark-Recapture Methods

TUESDAY, NOVEMBER 20 (AFTERNOON)

Theatre 1 – Northern Geoscience/Mineral Exploration

Chairpersons: Steve Goff, Edith Martel

14:50 **V.A Jackson** - The South Wopmay Bedrock Mapping Project: A summary of field and integrated laboratory studies

15:10 **L. Corriveau and H. Mumin** - Geoscience and Exploration Tools for Multiple Discoveries within the Extraordinary Range of IOCG (U) Polymetallic Mineral Deposits

15:30 **R.E. Goad, K.L. Neale, M.T. Samuels, J.P. Mucklow and R.P. Schryer** - Development of the NICO Cobalt-Gold-Bismuth Project Northwest Territories, Canada

15:50 **E.C. Walker and L. Rajnovich** - Cooper Minerals Exploration for IOCG-type Deposits within the Terra Property, Great Bear Magmatic Zone, NWT

16:10 **L. Ootes, S. Goff, L. Corriveau, J. Harris and V. Jackson** - Uranium Metallogeny in the Great Bear Magmatic Zone (Wopmay Orogen) and Adjacent Terranes

Theatre 2 – Energy in Canada's North

Chairpersons: Yvon Lemieux, Willem Zantvoort

14:50 **R. Bennett, S. Blasco, V. Kostylev, K. MacKillop, J. Beaudoin and P. Travaglini** - Beaufort Sea Offshore Geohazard Research

15:10 **D. Huntley, A. Duk-Rodkin, I.R. Smith, L. Macdonald and L. Koszarycz -** Terrain Geodatabase and Landslide Hazards: Southern Mackenzie Valley Region, Northwest Territories

15:30 **A. Duk-Rodkin and D. Huntley** - Surficial geology research program in the southern Mackenzie valley, Chapter III: geology highlights

15:50 **I.R. Smith** - Application and benefits of a seismic shothole litholog database and GIS for the Northwest Territories and northern Yukon

16:10 **B. Wang, B. Paudel, H. Li and K. Lesage** - Recent geotechnical studies of landslides in the Mackenzie valley

Theatre 3 – Environmental Sciences

Chairpersons: David Livingstone, Hugh Wilson

14:50 **B. Arquilla** - Monitoring the Effects of Mines on Songbirds

15:10 **D. Whalen** - Frequency and Distribution of Shallow Hazards that Effect the Beaufort Sea Potential Pipeline Area

15:30 **J. Kanigan** - Permafrost Response to Climate Warming South of Treeline, Mackenzie Delta, NWT

15:50 **R. Jenkins** - Environmental Studies Research Funds Online Sumps Database Project

16:10 **S. Kokelj** - Massive environmental change in the outer Mackenzie Delta: A template for detecting ecosystem change

TUESDAY, NOVEMBER 20 (EVENING)

Charles Camsell Talk

Tuesday November 20, 2007; 7 pm

Prince of Wales Northern Heritage Centre

Sponsored by NAPEGG, open to the public (free)

Dr. Tim Patterson, Carleton University

Cosmoclimatology: A possible paradigm shift in our understanding of the drivers of climate change

WEDNESDAY, NOVEMBER 21 (MORNING)

Theatre 1 – Northern Geoscience/Mineral Exploration

Chairpersons: Steve Goff, Edith Martel

08:40 **E. Martel, C. Roots, S. Gordey, L. Ootes, B. Fischer, C. Leslie, J. Macdonald and M. Mercier** - Sekwi Mountain Project year 2: Overview of bedrock mapping and collaborative studies in central Mackenzie Mountains, NWT

09:00 **S. Gordey, C. Roots, E. Martel, K. Fallas, B. Fischer, C. Leslie, J. Macdonald, R. MacNaughton and M. Mercier** - Bedrock transect across the Mackenzie Mountains at 64.5°N: A new look at crumpled old platform strata

09:20 **C.D. Leslie, H.A. Sandeman and J.K. Mortensen** - Diatremes and related volcanic rocks of the Lower Paleozoic Misty Creek Embayment, Mackenzie Mountains, NT

09:40 **E.C. Turner and D.G.F. Long** - Displacement History of Syndepositional Faults in the Mackenzie Mountains Supergroup

10:00 **Coffee**

10:20 **H. Falck, S. Day and J. Lariviere** - Stream Sediment Sampling in the Mackenzie Mountains: A Status Report

10:40 **R. Cameron and L. Stokes** - Sediment-Hosted Copper Mineralization, Keele River, Mackenzie Mountains, NWT

11:00 **J.J. Ryan, L. Nadeau, M.D. Young, V. Bennett, T. Tremblay, J. Brown, D.T. James, R.G. Berman and W.J. Davis -** 2007 mapping in the Boothia mainland area (NTS 57C and 57D), Kitikmeot region, Nunavut

11:20 **R. Rainbird, W. Davis, P. Ramaekers, L. Heaman, A. Armitage and W. Bleeker** - U-Pb zircon geochronology and provenance of the Hornby Bay and Dismal Lakes groups Hornby Bay Basin, Northwest Territories and Nunavut

11:40 **Coffee**

12:00 **J. Chakungal, M. Sanborn-Barrie and D. James** - Southampton Island: an updated geosciences database

12:20 **M. Ross, D.J. Utting, D.A. Hodgson and D.T. James** - Ice flow and dispersal patterns on Southampton Island, Nunavut: A preliminary assessment

12:40 **E.C. Turner** - Tectonostratigraphic Dynamics of the Society Cliffs Dolostone, Mesoproterozoic Borden Basin, NU

Theatre 2 – Environmental Sciences

Chairperson: David Livingstone

08:40 **M. Palmer -** Snow conditions in the Mackenzie Delta area, 2004 – 2007

09:00 **R. Barry -** Recommended mitigation measures for marine seismic programs in Nunavut

09:20 **Y.T.J. Kwong, K. Pelletier, K. Costello, V. Sterenberg and C. Jefferson** - Environmental Ore Deposit Models for the Canadian North - Progress Report

09:40 **A. Ehrlich -** The Use of Thresholds in Environmental Impact Assessment: Where to draw the line

10:00 **Coffee**

Theatre 2 – Geoscience Outreach

Chairpersons: Diane Baldwin, Donna Schreiner

10:20 **S. Daniel and K. Bruce** - Experiential Science 10-20-30: The Final Frontier

10:40 **B. Friesent-Pankratz and G. Lafferty** - Aquatic Science Education in the NWT: Challenges and Opportunities

11:00 **D. Dowe** - Introduction to Mine Training: Program Description

11:20 **K. Bruce** - Tuning-in and Turning on to a Career in Mining

11:40 **Coffee**

12:00 **J. Tees** - Diavik Diamond Mines' Aboriginal Leadership Development Program

12:20 **R. Montpellier and M. Sturk** - Mining Industry Attraction, Retention and Recruitment Strategy (MARS): Collaborative Action to Ensure the Vitality of Canadian Mining

12:40 **cont. (double length talk)**

WEDNESDAY, NOVEMBER 21 (AFTERNOON)

Capitol Theatre Lobby - Posters Session (15:10 to 16:30) (See below for Poster Listing)

Chairpersons: Hendrik Falck, Thomas Hadlari

THURSDAY, NOVEMBER 22 (MORNING)

Theatre 1 – Kimberlites and Diamonds of Canada's North

Chairperson: Hamish Sandeman

08:40 **Stornoway Diamond Corporation -** The Renard Kimberlites, Otish Mountains Quebec: A development track project

09:00 **D. Ritcey, F. Moul, D. Clarke and M. Kirkley** - Diamond Exploration on Brodeur Project, Northwest Baffin Island

09:20 **B. Kienlen** - Pelly Bay Diamond District: Update on Discovery

09:40 **J. Armstrong** - An Exploration Update for the Aviat and Qilalugaq Diamond Projects, Melville Peninsula, Nunavut

10:00 **Coffee**

10:20 **P.K. Holmes, J. Pell, H. Grenon, M.V. Sell and L. Tam** - An Exploration Update for the Nanuq Diamond Project Kivalliq, Nunavut

10:40 **P. Strand, A. Banas and J. Burgess** - Contrasting Kimberlite Types and Dispersion Trains at the Churchill Diamond Project, Kivalliq region, Nunavut

11:00 **R.C. Brett and J.K. Russell** - Origin of Olivine in Kimberlite: Phenocryst or Imposter?

11:20 **U. Näher and K.R. Kivi** - The DogMag, a low cost alternative to airborne magnetic surveys in diamond exploration

11:40 **Coffee**

12:00 **K.R. Kivi and U. Näher** - New Nadina Explorations Ltd drills and discovers more kimberlite at Lac De Gras

12:20 **S. Campbell** - Snap Lake Diamond Project Extraction Planning

12:40 **J. Pell, W. Mathison, E.V. Friedland and J. Crawford** - DO-27 and Beyond – An update on Peregrine Diamonds Programs in the Slave Province

Theatre 2 – Adaptive Environmental Remediation

Part 1: Current Remediation Practices

Chairperson - Bill Coedy

08:40 **G. Lafferty** – Colomac Remediation Plan Development – Involving Traditional Knowledge Approach of the Tlicho Elders

09:00 **B. Coedy** – Aeration of A Pit-lake to Remove Thiocyanate and Ammonia at Colomac, NT

09:20 **A. Richardson** - Petroleum Hydrocarbon Remediation – Colomac Experience

09:40 **J. Cassie** – Adaptive "Natural" Remediation Of A Fine-Grained Borrow Pit in the North – The Final Chapter

10:00 **Coffee**

10:20 **M. Rykaart** – Performance of Tailings Covers in Northern Climates

10:40 **E. Madsen** – Northern Ice Road Challenges and Future Options

Part 2: Closure and Rehabilitation Design – Considerations for the Permafrost Regions Subjected to Climate Warming

Chairpersons: Octavio Melo, Igor Holubec

11:00 **Introduction**

11:20 **B. Kochtubajda** - Climate Change and the Arctic

11:40 **Coffee**

12:00 **S. Smith –** Permafrost Thermal Response to Changing Air Temperatures

12:20 **L. MacPhie –** Practice and Performance of Reclaimed Mine Sites in Temperate Climates

12:40 **I. Holubec –** Required Design for Climate Warming in Permafrost

Theatre 3 – Consultation in the North

Chairpersons: Carolyn Relf, Denise Lockett

8:40 **K. Bergner** - Resource Development and Consultation

9:00 **M. Hardin** - The Duty to Consult and Its Relationship to Project Approval Processes: Is a Clearer Picture Emerging?

9:20 **J. Jackson** - INAC-NWT Region's Interim Approach to S.35 Crown Consultation

9:40 **B. McCallum** - Community Involvement in the Kiggavik Project

10:00 Coffee

10:20 **S. Autut** - Consultation and Public Participation in Nunavut

10:40 **G. Mackenzie-Scott, M. Tapsell and M. Haefele** - The Importance of Early Engagement

11:00 **W. Anderson** - MVLWB's Public Involvement Guidelines

11:20 **A. Applejohn** - Consultation requirements for Science Licenses

11:40 Coffee

12:00 **S. Ellis** - Consulting with the Akaitcho Dene First Nations

12:20 **D. Bubar** - Mineral Exploration on First Nations' Traditional Lands: Threat or Opportunity?

12:40 **G. Gibson** - Impact and Benefit Agreements in Canada's Diamond Mines: Expectations of Reciprocity

THURSDAY, NOVEMBER 22 (AFTERNOON)

Theatre 1 – Kimberlites and Diamonds of Canada's North

Chairperson: Hamish Sandeman

14:50 **A.V. Wolmarans, I.M. Mason, J. Harvey and K. Smith** - Using BHR for predictive resource evaluation models

15:10 **B. Coutts, J. Heimbach and D. Dyck** - Panda, from Pyrope to Production (Now you've found a kimberlite, the work is just starting)

Theatre 2 – Adaptive Environmental Remediation

Chairpersons: Bill Coedy, Octavio Melo, Igor Holubec

14:50 to 16:10 Panel Discussion

A seven panel member discussion with participation from the audience on topics related to closure/reclamation in permafrost regions subjected to climate warming.

Theatre 3 – Northern Geoscience/Mineral Exploration

Chairpersons: Steve Goff, Edith Martel

14:50 **A. Udell** - NT GoMap – Online Access to NWT Geoscience Data and Publications

15:10 **P. Beales, J. Robinson and D. Kleissen** - A Multidisciplinary Geodatabase Aids in the Merging of Historical Data providing a Basis for Spatial Project Development in Exploration and Mineral Development

15:30 **J. Harris, C. Chung, J. Kerswill, P. Keating, E. Hillary, E. Grunsky and L. Chorlton** - Mineral Resource Assessment – A GSC Perspective

15:50 **A.J. Mills and S.J.A. Day** - Non-renewable Resource Assessment of the Edehzhie Candidate Area: results and interpretation

16:10 Closing Remarks & NAPEGG Education Foundation Student Presentation Awards

POSTER LISTING

Bleeker and LeCheminant The "Dessert Lake" Red-Bed Basin: a newly recognized Proterozoic basin (outlier) overlying the southern extension of the Slave and Bear provinces

Byron et al. Giant Quartz Veins within the Great Bear Magmatic Zone: an example from NICO, Northwest Territories

Corriveau et al. Alteration vectoring to IOCG(U) deposits: the project

Czarnecki Peel River Watershed Sampling Program: Water and Suspended Sediment

Fischer and Turner Stratigraphy and Mineralization at the AB-C Carbonate-Hosted Zinc(-Lead) Showing, Mackenzie Mountains: Preliminary Observations

Fraser and Allen Hydrocarbon potential of Upper Paleozoic and Cretaceous strata, eastern Richardson Mountains and Peel Plateau, Yukon

Gordey et al. Bedrock transect across the Mackenzie Mountains at 64.5°N: A new look at crumpled old platform

Grant et al. Silver enrichment in the 2.68Ga Hackett River volcanogenic massive sulphide (VMS) deposits, Hackett River Greenstone Belt, Nunavut

Griller et al. Environmental Science and Traditional Inuit Knowledge Collaboration: Developing the Groundwork for Community Involvement in Environmental Consulting

Harris et al. Remote Predictive Mapping (RPM): Experiences from Baffin Island, Nunavut

Hunt et al. A Study on Diamonds and their Mineral Inclusions from the Renard Kimberlites, Quebec

Huntley et al. Reconnaissance Drift Sample Survey and Glacial History of the Trout Lake 95A NTS Map Sheet, NWT

Janson et al. Cyclic growth conditions for Diavik diamonds? Insights from carbon isotopes

Johnson et al. Peridotite Xenoliths from the Monument Property, Slave Craton, NWT, Canada

Long and Gordey Cretaceous coal in the Sekwi Range, Mackenzie Mountains, NWT (105P/12).

MacDonald and Lin The Plateau Thrust: A detailed investigation and characterization of the deformation in its footwall, NTS sheet 106A, Mackenzie Mountains, NWT, Canada.

Malyshev et al. U-Pb isotopic system of zircons of the lower Riphean sandstones from the east Anabar shield: provenance and local sedimentary basins reconstruction

Malysheva The Novaya Zemlya archipelago and the oil bearing potential of Middle-Upper Paleozoic carbonate and terrigenous-carbonate strata of Barents - North Kara region, Russia

McKnight and T'Seleie Draft Sahtu Land Use Plan: Ongoing Progress

Mercier et al. Geology and Mineralogy of the Mountain River Beryl (Emerald) Showing, Mackenzie Mountains, Northern Canadian Cordillera, NWT, Canada

Mulders and Boulanger Estimating wolverine abundance on the barrens using DNA Mark-Recapture methods

Ootes et al. The Giant Crest Iron Deposit – Yukon and Northwest Territories

Pyle et al. Regional Geoscience Studies and Petroleum Potential, Peel Plateau and Plain, NWT and Yukon

POSTER LISTING (CONT.)

Rayner et al. New U-Pb geochronological constraints on the timing of deformation and the nature of basement of SW Baffin Island, Nunavut

Sanborn-Barrie et al. The geology of Southampton Island, Nunavut, within a NE Laurentia context

Sandeman et al. Whither the Kimberlite Indicator and Diamond Database (KIDD) and Kimberlite Indicator Mineral Chemistry Database (KIMc): integration into GoMap for on-line queries

Schreiner et al. Community Mapping Project 2007: Lutsel K'e, NWT

Turner Lithostratigraphy of the early Neoproterozoic Gypsum formation (Little Dal Group; Mackenzie Mountains Supergroup), NWT

Whalen et al. Frequency and distribution of shallow hazards that affect the Beaufort Sea potential pipeline area

Zantvoort et al. Reservoir and Source Rock Potential of late Devonian Imperial Formation, southern Peel Plateau and Plain, NWT

ABSTRACTS

HYDROCARBON POTENTIAL OF UPPER PALEOZOIC STRATA, EASTERN RICHARDSON MOUNTAINS, NORTHERN MACKENZIE MOUNTAINS AND PEEL PLATEAU, YUKON

Allen, T.L. and Fraser, T.A. - Yukon Geological Survey, Whitehorse, Yukon

This study examines the sedimentology, stratigraphy and hydrocarbon potential of Upper Paleozoic strata in the Yukon Peel region and adjacent Richardson and Mackenzie mountains. The study is part of the interdisciplinary "Regional Geoscience Studies and Petroleum Potential, Peel Plateau and Plain" project (details at http://www.nwtgeoscience.ca/petroleum/PeelPlateau.html). The project is a multi-agency research endeavour focused on improving the knowledge of regional geology, including stratigraphy and correlation, depositional and tectonic history of the basin and petroleum geology and potential of the Peel region.

Upper Paleozoic strata in the east Richardson Mountains, northern Mackenzie Mountains and Peel Plateau of the Yukon consists of basinal sediments overlain by a siliciclastic sedimentary wedge derived from the Late Devonian Ellesmerian Orogeny. Unconformably overlying Paleozoic strata in the Peel Plateau are Cretaceous sediments deposited in the foreland basin of the Cretaceous Cordilleran Orogeny.

Units investigated for hydrocarbon potential as part of this study include the Canol (Upper Devonian), Imperial (Upper Devonian) and Tuttle (Upper Devonian-Lower Carboniferous) formations as well as an 'unnamed shale' unit (Upper Devonian-Lower Carboniferous), and the 'Mo' map unit (?Upper Devonian - Lower Carboniferous). Source rock and reservoir rock potential has been examined, where appropriate, in the above mentioned units. Preliminary conclusions suggest that Tuttle Formation sandstone has poor to very good reservoir rock potential, with porosity and permeability in outcrop samples measuring as high as 26 % and 127 mD respectively. Potential source rocks were identified from the Canol, Imperial, and Tuttle formations, and the 'unnamed shale' unit.

AN EXPLORATION UPDATE FOR THE AVIAT AND QILALUGAQ DIAMOND PROJECTS, MELVILLE PENINSULA, NUNAVUT.

Armstrong, J.P. - Stornoway Diamond Corporation, Vancouver, British Columbia

Stornoway Diamond Corporation continued to explore and make additional discoveries on the 4 million acre Aviat Project located on the northern Melville Peninsula. The Aviat Project is a joint venture between Stornoway (70%), BHP Billiton (20%) and Hunter Exploration Group. During the 2007 field season the company completed spring and summer drill programs designed test unexplained indicator mineral trains and extend the series of stacked, flat lying kimberlite sheets previously identified during the 2006 program. The 2007 program was successful in furthering the understanding of the attitude and strike extent of the Eastern Sheet Complex. In addition the AV9 kimberlite body was discovered representing the third pipe-like body identified within Aviat's Tremblay Corridor.

The AV9 kimberlite lies four kilometres east-southeast of the diamondiferous AV1 kimberlite pipe. AV9 is situated along the same regional structural feature that hosts the AV1 kimberlite, and which is believed to have influenced emplacement of the other Aviat kimberlite pipes and sheets. Approximately 262 metres of kimberlite core from the AV9 body have been recovered from four drill holes. Preliminary field logging describes AV9 as a transitional kimberlite pipe, containing both macrocrystic hypabyssal and transitional hypabyssal breccia phases.

Based on drill intercepts the current interpretation suggests that the AV2 Lower, AV6, AV7, AV7E and certain other intersections belong to a single, sheet-like kimberlite body (AV267). This sheet presently extends over approximately 2km strike length with a true thickness of about 3m (ranging from 2.5 to 4.0m) in most areas. The sheet appears to thicken from northeast to southwest, achieving widths of up to 7m. A 3m thick sheet-like kimberlite body was also intersected on the west side of the regional fault that hosts the AV1 and AV9 kimberlites, and which is believed to have influenced emplacement of the other Aviat kimberlite pipes and sheets. Changes in strike/dip of the blocks are currently attributed to flexures or 'roll-overs' of the kimberlite sheet following reasonably predictable zones

of pre-existing weakness within the gneissic host rocks. The other stacked kimberlites of the Eastern Sheet Complex (AV2 Upper, AV3, AV5, AV8 Upper, AV8 Middle and AV8 Lower) were not tested by the 2007 drill program.

During 2007 Stornoway continued exploration on the 1.04 million acre Qilalugaq Diamond Property, optioned from BHP Billiton, on the Rae Isthmus located near Repulse Bay on the southern Melville Peninsula. Stornoway collected a 4.2 tonne sample by hand pitting of the subcropping A28 kimberlite body in 2006. This returned a diamond content of 0.328 carats per tonne (cpt), including a 0.587 carat stone, during 2007 Stornoway excavated approximately 22.3 tonnes of kimberlite from the A28 kimberlite pipe by hand pitting. This material will be submitted for DMS processing to establish diamond content. Prospecting activities undertaken during the summer 2007 program extended the strike length of the Naujaat 1 and Naujaat 2 kimberlite dykes, originally discovered during 2006, and identified four new kimberlite dykes, Naujaat 3 through Naujaat 6, inclusive. The Naujaat 1 and 2 dykes occur in the immediate vicinity of 5 of the 10 known kimberlite pipes, extending over strike lengths of 3.2 and 1.4km, respectively. At the west end, Naujaat 2 appears to merge with Naujaat 1, and may be a splay off the host structure. The four newly discovered kimberlite bodies are also thought to be dyke-like in character and occur to the west of the Naujaat 1 and 2 dykes. Collectively, the Naujaat 1 to Naujaat 6 bodies and the 10 known kimberlite pipes, suggest the presence of a 26 km long, structurally favourable belt.

THE RENARD KIMBERLITES, OTISH MOUNTAINS QUEBEC: A DEVELOPMENT TRACK PROJECT. STORNOWAY DIAMOND CORPORATION

Armstrong, J.P. - Stornoway Diamonds Corp., Vancouver, British Columbia

Stornoway and SOQUEM INC. ("SOQUEM") have a 50:50 joint venture agreement to carry out regional reconnaissance scale exploration, property acquisition and development of diamond prospects in northern Quebec. The joint venture currently holds approximately 200,000 hectares of mineral permits in the Otish Mountains region of north-central Quebec, with the Foxtrot property being 154,000 hectares in size. The first kimberlites were discovered on the Foxtrot property in 2001, a total of 10 pipe-like bodies (Renard 1 thru Renard 10), in addition two shallow-dipping dyke systems have been discovered (Lynx and Hibou) and three other dyke-like features have been discovered within 10 kilometres of the Renard cluster.

The Renard pipes lie along a 2 kilometre long NNW trending corridor and are interpreted as transition zone kimberlites infilled with hypabyssal kimberlite, tuffisitic kimberlite breccia and transitional rock types. During 2006-07 a 10,000 tonne bulk sample was extracted from the Renard 2, 3 and 4 kimberlites. The Renard 2 and 3 bulk samples were collected by underground decline across the breadth of each pipe, the Renard 4 sample was collected from a single surface trench excavated within the "northern complex zone", a distinct unit of complex geology outcropping at the northern limit of the Renard 4 kimberlite. Processing of 6036 dry tonnes of kimberlite resulted in the recovery of 6497 carats of diamond. A total of 2448 tonnes of Renard 2 returned 1602 carats for an average sample grade of 65 cpht (range 26-144 cpht), a total of 1929 tonnes of Renard 3 returned 2681 carats for an average sample grade of 139 cpht (range 78-223 cpht) and a total of 1659 tonnes of Renard 4 returned 2213 carats for an average sample grade of 133 cpht (range 80-184 cpt).

Recently three separate valuation parcels from the Renard 2, 3 and 4 kimberlite pipes were presented for valuation in Antwerp, Belgium under the supervision of WWW International Diamond Consultants Ltd. ("WWW"). In addition to performing their own valuation, WWW showed the diamond samples to three other Antwerp based experienced rough diamond valuators in order to obtain additional market based valuations. WWW have recommended a modeled "Base Case" diamond price estimate of US$109 per carat be adopted for both of the Renard 2 and Renard 3 samples, with a "High" modeled price estimate of US$122 per carat and a "Low" modeled price estimate of US$105 per carat. WWW have further recommended a modeled base case diamond price estimate of US$69 per carat be adopted for the Renard 4 sample, with a high modeled price estimate of US$73 per carat and a low modeled price estimate of US$63 per carat.

Stornoway and SOQUEM will now review the commencement of Phase 2 of the Renard Pre-Feasibility Study. Approval to proceed is expected pending execution of the appropriate management committee resolutions. The study is being authored by Agnico-Eagle Mines Limited (TSX: AEM, "Agnico-Eagle") and AMEC Americas Ltd. ("AMEC"). Phase 1 commenced in July (Stornoway press release of July 23rd, 2007) and has comprised preliminary geological, geotechnical, environmental and hydro-geological assessment. Phase 2 will comprise an independent NI

43-101 compliant resource calculation, a mining model, mine design, diamond plant design, capital and operating cost estimation, and financial modeling.

MONITORING THE EFFECTS OF MINES ON SONGBIRDS

Arquilla, B., Panayi, P. and Virgl, J. - Golder Associates Ltd.

Songbirds are often included in the wildlife monitoring at mining projects in Northern Canada. This is partly in response to public concern regarding the impacts to wildlife, but also because songbirds provide an excellent indicator of environmental effects. Songbirds are present in large numbers, and the group includes a relatively high diversity of species operating among a range of niches. Their density, diversity and habitat associations are also quickly and easily monitored through visual and aural monitoring, and the entire community can be monitored with a single survey.

Monitoring of songbirds at above-treeline mining operations began at the Ekati Diamond Mine in 1996, and is ongoing. The methods used at Ekati centre on the surveys of up to 20, 25 ha plots, each surveyed once per year. Control plots averaged 9 km from the mine footprint, while Treatment plots averaged 400 m from the mine footprint. An analysis of the data collected at Ekati from 1996 to 2003 did not indicate any adverse effects (Smith et al. 2005), but did indicate that effects may be taking place on a scale too small to be detected by the method.

As such, point-count techniques were implemented at the Jericho Mine, which use a much smaller plot (50 m radius) and a high concentration of plots predominantly within 3 km of the mine footprint. This method uses a much smaller sampling area, makes it easier to select and describe landscape type, and provides more opportunities for distributing sampling effort with distance from the mine. Results from songbird monitoring at Jericho from 2005 to 2007 will be presented. A similar technique has been employed to collect baseline data at the Doris North Project.

CONSULTATION AND PUBLIC PARTICIPATION IN NUNAVUT

Autut, S. - Nunavut Impact Review Board

Well-planned and appropriate consultation conducted by a Proponent in Nunavut can create an open, honest and transparent process that includes the public in decisions about project activities. Many project activities in Nunavut are required to undergo a Nunavut Land Claims Agreement (NLCA) Article 12, Part 4 Screening by the Nunavut Impact Review Board (NIRB) in order to determine potential ecosystemic and socioeconomic impacts of such activities. The consultation process, facilitated by a Proponent, can help all parties to understand what effects a project may have, and can help to avoid potential misunderstandings and conflict, which could potentially affect the timeframe for the development of the project.

Following a NLCA Part 4 Screening, if the NIRB recommends a Part 5 Review for a project, the NIRB has the obligation to inform the public about the project for the purpose of encouraging participation in the Review process. In this regard, the NIRB will coordinate a public participation program about the project that includes coordinating information sessions and Hearings in a manner that encourages the maximum participation of community members from potentially affected communities

A MULTIDISCIPLINARY GEODATABASE AIDS IN THE MERGING OF HISTORICAL DATA PROVIDING A BASIS FOR SPATIAL PROJECT DEVELOPMENT IN EXPLORATION AND MINERAL DEVELOPMENT

Beales, P., Robinson, J., and Kleissen, D. - Aurora Geosciences Ltd., Yellowknife, Northwest Territories

The communication of past spatial information in a readily accessible geodatabase serves great value in various project development decisions, revealing economic potentials, environmental impact or otherwise. The geodatabase eliminates man-hours of research exposing regions of previous coverage, development, and reporting. The ability to host mineral records and historical spatial information is extremely important. The portrayal of historic mineral activity and exploration affects many development decisions, from industrial and scientific to political and environmental. Recognizing GIS as an emerging language for abstracting and communicating geography and its interactive content will provide massive benefits in the development of these decisions. The creation of a geodatabase to host historical mineral development information in the South Thelon Watershed directly

aids this regions ability to be managed more efficiently and responsibly while revealing its full potential. The geodatabase contains static historical mineral and exploration data as the foundation for its development. This allows for the conceptualization and portrayal of many successive layers of various focuses to be built. The successive layers expose interactions of various research and activity types within this sensitive region. Analysis of events and spatial patterns placed in a temporal comparison within the South Thelon Watershed reveal exploration potential not previously entertained. The practical use and possible inter-governmental department employment is enormous as the geodatabase grows and evolves into a multi-disciplinary host to develop and apply informed explorative and mineral development decisions.

BEAUFORT SEA OFFSHORE GEOHAZARD RESEARCH

Bennett, R.[1], Blasco, S.[1], Kostylev, V.[1], MacKillop, K.[1], Beaudoin, J.[2] and Travaglini, P.[3]

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[3] Canadian Hydrographic Service

In August-September 2007 the Geological Survey of Canada in collaboration with the Canadian Hydrographic Service conducted a seabed mapping program from the Canadian Coast Guard vessel Nahidik. Research was focused on investigating geohazard and geoenvironmental constraints to offshore hydrocarbon development and marine transportation in the Beaufort Sea.

Two new extreme ice scours were mapped in 2007 bringing the total to only 268 events with depths greater than 2m over 17 years of repetitive mapping. A 2.2 metre deep scour in 64 metres water depth imaged in 2007 may be the deepest active scour observed on the Beaufort Shelf. Generally, scours in greater than 60m water depth have been found to be inactive through their scour morphology, repetitive seabed mapping, and through an increased understanding of seabed glacial features and the glacial history of the area revealed by multibeam data.

A group of ten mud volcanoes on the Beaufort Shelf in approximately 55 metres water depth was mapped in 2007. These features are distributed in a patch about 2 km in diameter as opposed to other mud volcanoes mapped near the Mackenzie Trough which occur along a corridor about 20 km long. The distribution of the 2 km wide patch could be controlled by a hole (or talik) in the sub-seabed permafrost of the area which is allowing the upward migration of hydrocarbons.

The abandoned artificial island Minuk, in 14m water depth, first surveyed in 2003 was resurveyed in 2007. The island is still actively eroding and has migrated 10m southeastward in 4 years. All other artificial islands repetitively mapped with multibeam have showed similar southeastward erosion. A new digital multichannel reflection seismic system showed the top of subsea ice-bearing permafrost to have a very variable topography.

THE "DESSERT LAKE" RED-BED BASIN: A NEWLY RECOGNIZED PROTEROZOIC BASIN (OUTLIER) OVERLYING THE SOUTHERN EXTENSION OF THE SLAVE AND BEAR PROVINCES

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SNORCLE seismic reflection data reveal a distinct basinal reflector at 0-1 s, west of the exposed Slave craton, between Edzo and Fort Providence. With only sparse drill hole control, this reflector has been interpreted to represents a thin cover of Paleoproterozoic Great Bear Magmatic Zone (GBMZ) rocks on more complex Hottah terrane basement (Cook et al., 1999, Tectonics).

Based on outcrops of the GBMZ to the north, we challenged this interpretation and proposed an alternative: the sub-Phanerozoic bowl-shaped reflector represents exactly what it appears to be on the seismic profile—a shallow sedimentary basin remnant, up to 2.5-3.0 km deep, with a prominent basal reflector representing an unconformity overlying more complex crystalline basement of GBMZ, Hottah terrane, and (or) Slave craton. We based this interpretation (Bleeker & LeCheminant, 2007, GAC abstract) on the following:

The basinal reflector occurs below thin, south-westward thickening, Phanerozoic platform strata. It shows only very shallow dips, while clearly overlying and truncating more highly structured basement. Although

there are weak reflections within the "basin", the main reflector occurs at the base and resembles the signature of an unconformity overlying crystalline basement. Its seismic character compares well with, for instance, the base of the Athabasca Basin. Two other shallow red-bed basins overlie the western shield (Athabasca, Hornby Bay) and there are few fundamental reasons against other basin remnants in this part of Laurentia, albeit largely underneath Phanerozoic cover.

Aeromagnetic maps of the southwestern Slave craton and adjacent GBMZ show high-amplitude, short-wavelength anomalies, interpreted as Archean basement intruded by ca. 1.9-2.2 Ga diabase dykes, which are being masked by southwest-thickening cover distinct from the thin Phanerozoic platform further to the southwest. This masking cover is cut by at least two Proterozoic dykes, a NNW-trending Mackenzie dyke (1.27 Ga) and an E-W trending dyke that extends across the inferred Bear-Slave boundary (i.e., <1.8 Ga). There are sparse outcrops of undifferentiated pre-Cambrian sandstones on the shores of Great Slave Lake (Henderson, 1985, GSC Memoir). And finally, at least some exploration drill core from the area of interest intersects shallow dipping, well-sorted, arkosic red sandstones that extend for >150 m below flat-lying (white!) basal Cambrian sandstones.

Since our initial proposal, we have surveyed the western shore of Great Slave Lake. South of Wrigley Point, there is indeed a prominent outcrop of Proterozoic red beds that dip shallowly (5-10°) to the southwest, below onlapping Ordovician dolomites. Observed geology along the lake shore correlates well with that observed in drill core further west. Although much remains to be done, there are several interesting implications. 1) Proterozoic red beds, with possible uranium potential, occur across a large area west of Great Slave Lake. Their full extent remains to be defined. 2) As a result, there are two unconformities in this area, and several potential redox boundaries, each of which may have played a role in the formation of economic mineralization. 3) Targets of interest could be the Proterozoic basal unconformity and localities within the basin where the red beds are intersected by basement faults.

ORIGIN OF OLIVINE IN KIMBERLITE: PHENOCRYST OR IMPOSTER?

Brett, R.C. and Russell, J.K. - Earth and Ocean Sciences, University of British Columbia, Vancouver, British Columbia

Olivine is the dominant component in all facies of kimberlite and constitutes a bimodal population based on grain size and form, including: 1) xenocrystic olivine derived from disaggregation of mantle peridotite, and 2) euhedral olivine inferred to represent crystallization from the kimberlite melt. Despite its modal importance and the attendant implications for kimberlite volcanism, there is a deficiency of published studies on the origins of olivine in kimberlite. Kimberlite deposits at the Diavik Diamond Mines show remarkable preservation of the primary volcanic mineralogy, rendering them ideal for addressing issues concerning the origins of kimberlitic olivine. Here we present observations and data derived from a suite of coherent kimberlite intruded as dykes associated with three of the Diavik kimberlite bodies (A154N, A154S, A21). On the basis of petrographic features, we identified three populations of olivine: i) anhedral to rounded, inequigranular (<1 mm to ~ 2 cm) olivine grains referred to as xenocrysts or macrocrysts, ii) euhedral olivine crystals, less than 1 mm in diameter that are commonly described as phenocrysts, and iii) subhedral to euhedral, < 1 mm grains of olivine occurring as polycrystalline fine-grained aggregates. This population is commonly associated with larger grains of strained olivine and represents recrystallized samples of strained/deformed mantle.

Both the large rounded grains of olivine and smaller euhedral olivine crystals have petrographically visible rims (jackets) that are partly marked by the presence of mineral and fluid inclusions. The cores of both types of olivine grains are inclusion free. The shapes of the large rounded olivine are essentially unchanged as the rims are thin (<0.01 mm) relative to the diameter of the original grain (core). In contrast, the shape of the smaller euhedral olivine grains appears to be controlled by the overgrowths (jackets) that modify the rounded shapes of the smaller original grains (e.g., cores). The composition of macrocrystic olivine cores varies from Fo_{89-93} whereas rims are more homogeneous (Fo_{90-92}). Although the variances of core and rim compositions differ, the means cannot be distinguished in terms forsterite content. Nickel contents, however, can discriminate between macrocryst cores (0.0038-0.0092 apfu) and rims (0.0019-0.0076 apfu) compositions. Compositions of cores (Fo_{89-93}) and rims (Fo_{91-93}) of euhedral olivine are indistinguishable from cores and

rims of macrocrystic olivine respectively. Nickel contents of rims (0.0014-0.0083 Ni apfu) and cores (0.0053-0.0093 apfu) of euhedral olivine are distinct, however, the core and rim populations of euhedral and macrocrystic olivine overlap in composition.

Our analysis suggests that primary magmatic olivine crystallizes only as 'jackets' on pre-existing mantle-derived olivine. Small macrocrysts and large macrocrysts serve as nuclei for olivine crystallization and produce euhedral and anhedral 'jackets' respectively. Euhedral olivine, therefore, result from primary crystallization of olivine on smaller (< 1 mm), mantle-derived olivine. The consequence of these origins is that the extent of olivine crystallization from kimberlitic melt during transport and eruption is greatly reduced. The reduction in extent of olivine crystallization has implications for the rheological properties of kimberlite magma, the rates and styles of kimberlite ascent, and the relationships between intrusive and pyroclastic kimberlite.

TUNING-IN AND TURNING-ON TO A CAREER IN MINING

Bruce, K. - Aurora College, Yellowknife, Northwest Territories

Aurora College – Yellowknife Campus, in partnership with the Mine Training Society and industry partners, has developed a six – week "Introductory Underground Mining Program" for delivery in Northern communities beginning in November 2007.

The goal of the program is to inform and connect Northern residents to the career potential at existing and future mining operations throughout the Northwest Territories. The program content includes an introduction to the mine life cycle, basic underground mining methods, the use of technology in training via desktop simulators for underground mining equipment, safety in the workplace, and essential skills assessment and training.

Students completing the short program may then choose to continue into a lengthened (12-16 week) program to be offered at the Yellowknife Campus. This program expands upon the initial introduction and includes modules on NWT geology, environmental studies, underground mining processes and underground mining equipment operation using the larger enclosed cab simulator for a variety of equipment being used at northern mining operations. The success of both programs will depend upon many unique challenges which will be investigated throughout the presentation.

Connecting northern employers with northern employees is a major concern. It is hoped that through the development and implementation of programs such as these, the connection can be made and sustained allowing continued employment for the life of northern mining operations.

2007 HACKETT RIVER PROJECT UPDATE: AT THE THRESHOLD OF DEVELOPMENT

Burgess, S. - Sabina Silver Corporation, Thunder Bay, Ontario

Sabina Silver's Hackett River Project is located approximately 480 km NE of Yellowknife, and approximately 75 km from Bathurst Inlet. The project is located 23 km from the proposed all season Bathurst Inlet Port and Road to Bathurst Inlet, and 105 km by road from the proposed tidewater port facility. The Hamlet of Bathurst Inlet, the closest community, is 100 km to the North.

The Hackett River VMS project consists of three main silver-zinc rich deposits: Main Zone, Boot Lake and East Cleaver Lake. Sabina Silver owns the project, subject to a 2% NSR, held by Cominco Mining Partnership, an affiliate of Teck Cominco. The deposits are all covered by Inuit Owned Surface Lands, with the mineral rights held under several mineral leases. The Hackett River property was first explored in the mid 1950's by a Canadian Subsidiary of RTZ, with diamond drilling commencing in 1969. Sabina optioned the property in 2004, and has drilled approximately 59,300m, in 223 holes to date. All told, approximately 81,250m has been drilled in 365 holes. A Preliminary Economic Assessment (PEA), completed by Wardrop Engineering in early 2007 to NI 43-101 requirements, established mineable mineral resources of 48.9 million tonnes, which include 7,280.45 million g (234 million Oz) silver, 2.24 million tonnes (4.9 billion pounds) of zinc, and appreciable lead, copper and gold.

The Hackett River project development model is based on production of copper, lead and zinc concentrates, which will be trucked over an all-season road to a port and concentrate storage facility currently proposed for construction at tidewater, approximately 45 km south of the Hamlet of Bathurst Inlet.

Much of the work done in 2007, at Hackett River was done in support of the pre-feasibility study, due for release in Q2 of 2008. AMEC Americas Limited has been retained to provide technical support services and pre-feasibility assessment. Based on the PEA, Hackett River will produce an estimated 385.43 million grams (12.4 M Oz) of silver, 147,300 tonnes of zinc, 9,400 tonnes of copper, 16,800 tonnes of lead and 535,000 grams of gold annually. Mine life is estimated to be 13.6 years, at a 10,000 tonne per day milling rate.

The 2007 program at Hackett River included exploration and infill drilling as well as environmental baseline studies in support of the upcoming prefeasibility study. This year, 65 holes, for a total of 17,590 m were drilled. Approximately 85% of the drilling was concentrated on the Main and Boot Lake deposits, upgrading inferred mineral resources to indicated status. The exploration highlight of the year was a significant upgrade to the previously known JO Zone deposit, located immediately to the SE of the Main Zone. As well, Sabina began comprehensive baseline environmental studies in the Hackett River area of influence in 2007. Rescan Environmental Services, Ltd., is managing this, leading up to a planned final EIS submission in early 2009.

GIANT QUARTZ VEINS WITHIN THE GREAT BEAR MAGMATIC ZONE: AN EXAMPLE FROM NICO, NORTHWEST TERRITORIES

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The Great Bear magmatic zone (GBmz) of the Wopmay Orogen is a series of Paleoproterozoic calc-alkaline intrusive and extrusive rocks. Late in the GBmz's tectonic history, regional transcurrent faulting resulted in a large number of NE-trending faults. Giant quartz veins were emplaced intermittently along these faults throughout the GBmz and generally trend 040-055º. Giant quartz vein zones can be up to 100 metres wide and 10 kilometres long and crosscut all magmatic and metamorphic rocks. Many veins are barren, but some contain, or are proximal to areas of, mineralization. However, whether or not the veins are genetically related to the mineralization remains unclear. This study will investigate the paleoconditions of the fluids that deposited the quartz veins and attempt to determine whether there are significant differences between mineralized and barren veins.

One such example is at NICO, which is regarded as one of Canada's few iron-oxide copper gold, (IOCG)-type, deposits. NICO contains a Co-Au-Bi mineral reserve of 22Mt. The polymetallic mineralization is hosted mainly by biotite-magnetite-amphibole-sulfide-rich ironstone and schist; however, NICO drillcore occasionally intersects zones of quartz veining, and some of these veins are mineralized. The giant quartz vein at NICO is less than 400 metres north of the high grade ore zone. The giant quartz vein is 25 metres wide and trends 050˚ over a strike length of 4 kilometres. The vein and stockwork zone at NICO shows a variety of textures and cross-cutting relationships with at least two distinct episodes of veining. The results of petrography and microthermometry of the giant quartz vein compared with the quartz veining contained in the drillcore are presented. Preliminary microthermometric results indicate the temperature, pressure, and salinity conditions of the veins at NICO are similar, in part, to the drillcore at NICO.

SEDIMENT-HOSTED COPPER MINERALIZATION, KEELE RIVER, MACKENZIE MOUNTAINS, NWT

Cameron, R. and Stokes, L. - Freeport-McMoRan Copper and Gold Inc., Vancouver, British Columbia

The Keele River area was last explored for sediment-hosted copper deposits by Shell Minerals in 1978 resulting in the discovery of the small but high grade June and Jay deposits. The discovery hole at June had returned 52 m grading 2.3% copper. For the past 2 years Freeport-McMoRan Copper and Gold and Kaska Minerals have been jointly exploring the area and have completed 2386 m of reconnaissance drilling over a large region west of the June deposit. Two new well mineralized occurrences have been discovered and additional targets remain to be tested. Copper is hosted at 2 stratigraphic horizons; the base of the Proterozoic age Coppercap Formation in an algal laminated dolomite and at the base of the overlying Sayunei Formation within a dolomitic siltstone and breccia.

SNAP LAKE DIAMOND PROJECT EXTRACTION PLANNING

Campbell, S. - DeBeers Canada Mining

The Snap Lake diamond project, located 220 kilometres north east of Yellowknife, is currently moving from the commissioning phase to the production phase. Underground development and surface facilities are sufficient to begin production, ramping up to a targeted operating throughput of 3,150 tpd. Defined and mineable reserves, by drifting and bore-hole radar, are targeted at 18 months ahead of production, which will migrate to two years further in the life of mine.

The planned mining method is room and pillar. The key parameter for success at Snap Lake will be dilution control within the mining block. The impact of dilution will be to increase costs significantly on a per unit basis and has the potential for reducing recoveries in the processing plant. The exact parameters for recovery impacts in the plant are not well understood until our technical group begins to collect meaningful data under operating conditions. Thus far, the mine has relied on company wide experience and bulk sample processing to give direction to the costing models.

The minimum mining height currently used in our planning scenarios is 3.4 metres. The kimberlite dyke is variable within (and at times outside) the 3.4 metre envelope. When mining, the producing faces will be incurring some level of dilution on primary extraction. Planned dilution will be significantly reduced in the secondary extraction phases via greater knowledge of the hanging wall and footwall contacts. The other benefit of maximizing the secondary extraction sequence is increased overall productivity underground. The mining team will be collecting and analyzing data to quantify the bottlenecks in the evolving system and where gains could be maximized to increase IRR.

ADAPTIVE "NATURAL" REMEDIATION OF A FINE-GRAINED BORROW PIT IN THE NORTH – THE FINAL CHAPTER.

Cassie, J.[1], Claypool, G.[1], Johnson, B.[2] and Pike, E.[3]

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[2] AEL
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As part of the closure work at Discovery Mine in the NWT, a borrow pit was developed within ice-rich overburden proximal to a nearby large lake. Significant problems subsequently ensued with the borrow pit due to permafrost degradation and erosion. An incremental and adaptive approach using low-key natural elements, in combination with on-going water treatment and pumping, was selected as the desired option for remediation. The approach consisted of enhanced revegetation of side slopes, regrading of steep sections of the side slopes, armouring of erosional gullies and construction of in-pit, rockfill separation dikes. By 2006, the incremental approach to remediation had achieved its desired closure objective of creating discharge-compliant water within the borrow pit. In 2007, the last main element of the project, an overflow weir, will be constructed for discharge of compliant water. This paper reviews the successful approach to remediation which permitted the remediation plan to be implemented by a small workforce at a remote site thereby reducing capital costs for the government and providing work, capacity-building and salaries for northerners. In addition, the engineering and construction monitoring costs are compiled in order to compare the finally-selected "incremental" option against the original "fixed-schedule" approach. Important considerations for the use of this approach are also summarized.

SOUTHAMPTON ISLAND: AN UPDATED GEOSCIENCES DATABASE

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Outdated reconnaissance-scale mapping of Southampton Island, coupled with an absence of geophysical data, have distinguished the Southampton Island region for its significant geoscience knowledge gap. In an effort to address this gap, the Southampton Island Integrated Geoscience (SIIG) project, a collaborative effort between the Canada – Nunavut Geoscience Office, Geological Survey Canada, and the University of Waterloo, is focused on updating the geoscience database for the northeastern Kivalliq region of Nunavut, in order to better serve mineral and/or hydrocarbon exploration in the area.

During the 2007 field season, several steps towards improving the knowledge base for the Southampton

Island, Kivalliq region were made, including: 1) acquisition of high-resolution aeromagnetic data over much of the area underlain by Precambrian rocks, to be used in conjunction with newly acquired teleseismic and magnetotelluric data; 2) re-mapping (1: 250,000 scale) of > 15,000 km^2 of the exposed Precambrian basement leading to the identification of previously unmapped rocks with precious- and/or base-metal potential; 3) examination and sampling of the island's Paleozoic strata to reassess the oil-shale occurrences and their associated potential; 4) resolution of the Quaternary ice-flow history on the island coupled with stream and till sampling. This presentation will focus on results from the bedrock mapping component of this collaborative project.

The Precambrian geology of central Southampton Island comprises, among the oldest recognized units, a sequence of impure and rusty quartzite, semi-pelite, minor calc-silicate and associated silicate- and oxide-facies iron formation. The supracrustal sequence is cut by an ultramafic – mafic plutonic suite comprising peridotite ± gabbroic anorthosite, gabbro and diorite. Subsequent intrusion of these rocks by various granitoid phases has limited the exposure of the metasedimentary and mafic sequences to xenoliths of various size and degrees of assimilation. Locally, the preservation of garnet + sillimanite + cordierite ± pseudomorphed kyanite in impure quartzite, and garnet mantled by plagioclase + orthopyroxene symplectite in the mafic rocks suggest these rocks experienced high-grade metamorphism prior to exhumation to shallower crustal depths. The regional and locally orthopyroxene ± clinopyroxene bearing granodiorite - monzogranite appears also to have sustained high-grade metamorphism prior to retrogression into the biotite stability field. Intrusion of later and lower grade granodioritic – monzogranitic rocks likely followed peak metamorphism.

Contrary to the central region, the northern most exposed basement comprises structurally complex, agmatitic rocks characterized by abundant pyroxenite and gabbroic xenoliths cut by hornblende-bearing monzonitic rocks. They are separated from the high-grade rocks by an east-west trending shear zone which may correspond to an important structural boundary. In the southwestern part of the island, a Precambrian inlier of pyroxene bearing garnet amphibolite that is intruded by a blue-quartz tonalite not seen elsewhere on the island; and escaped felsic magmatism for which evidence is ubiquitous in the northern and central regions, suggests the presence of a second structural break. The implications of these observations are that Southampton Island comprises a central high-grade 'block' that is bounded by a lower grade block to the north, and potentially 'exotic' block to the south.

AERATION OF A PIT-LAKE TO REMOVE THIOCYANATE AND AMMMONIA AT COLOMAC NT

Coedy, B., Pieters, R. and Ashley, K. - Contaminants & Remediation Directorate, INAC, Yellowknife, Northwest Territories

In 1999 the Department of Indian and Northern Affairs (Canada) inherited the abandoned Colomac gold mine located in the remote boreal forest about 220 km northeast of Yellowknife, NT. Gold was recovered using conventional cyanide vat leaching and carbon adsorption. At the end of operations, the Tailings Containment Area contained about 2 million cubic metres of water at elevated concentrations of cyanide complexes and related degradation compounds of thiocyanate and ammonia. An emergency transfer of water was made to Zone 2 Pit (the main ore excavation site) when the water level in Tailings Lake first reached its capacity limit in 1998

As part of the remediation of contaminated wastewater at Colomac, both Tailings Lake and Zone 2 Pit were treated with phosphate fertilizer to enhance the natural biological rate of degradation of cyanide and ammonia. The Enhanced Natural Removal (ENR) treatment was successful in reducing contaminant levels in Tailings Lake to acceptable water quality levels by 2006 well in advance of original predictions. However, the rate of removal in Zone 2 Pit was slower.

Physical measurements collected over several years from a raft moored over the deepest part of Zone 2 Pit indicated that the pit-lake did not fully circulate. The depth of mixing was limited to the top 25 m of the 110 m deep lake. Below this surface layer, the water column was devoid of dissolved oxygen. As a result, the effectiveness of the ENR treatment at reducing the concentration of thiocyanate and ammonia was limited to the surface layer.

In order to improve the water quality by the time Zone 2 Pit reached nearby Baton Lake levels, an aeration system was installed in 2006. The purpose of introducing the contingency was to destratify and circulate the water body and increase the concentrations of dissolved oxygen to accelerate the removal of thiocyanate and ammonia. Within 9 days of aeration, the entire water column was mixed and by the end of the open water season, thiocyanate was below

detection. The aeration system was operated again in 2007 to remove the residual ammonia.

GEOSCIENCE AND EXPLORATION TOOLS FOR MULTIPLE DISCOVERIES WITHIN THE EXTRAORDINARY RANGE OF IOCG (U) POLYMETALLIC MINERAL DEPOSITS

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With 7,738 Mt total mineral resources and ore reserves of 399 Mt @ 1.87 % Cu, 0.58 kg/t U3O8, 0.68 g/t Au, 4.0 g/t Ag, the Olympic Dam deposit in Australia underscores the exciting exploration potential of IOCG (U) polymetallic deposits. Canada has no such mine yet, but in the Great Bear Magmatic Zone (NWT) it has stunningly exposed IOCG deposits under development (NICO) or advanced exploration. Moreover, Canada's ancestral active continental margins, now frontier felsic-to-intermediate volcano-plutonic terranes and their metamorphic derivatives, represent prime geological targets. IOCG ore zones are "non-traditional" and can be difficult to identify in that they are oxide-rich rather than sulphide-rich and some are cryptically disseminated over kilometres within barren iron oxide and alkali-altered host rocks. Fortunately, their large alteration footprint allows effective regional scoping of prospective territories for IOCG type signatures and, within such systems, the alteration effects may constitute excellent vectors toward ore.

In this talk, we use the remarkable exposures of the Port Radium – Echo Bay district (past production of 15,000,000 lbs U3O8 and ~32,000,000 Oz Ag), and of the NICO (total mineral reserve: 21.8 Mt@ 1.08 g/t Au, 0.16 %Bi, 0.13 % Co) and Sue Dianne deposits to illustrate some of the variations in IOCG ore compositions and the tools we need to find them. We also illustrate that key alteration zones, overprinting relationships, breccias and paragenesis are important geological criteria for locating economic IOCG settings. At the same time, such variations can pose significant challenges where cryptic or misinterpreted. Detailed field work is key to overcoming these difficulties, including the use of field and airborne spectrometers to measure U, Th and K. Follow-up mineralogical and geochemical studies are an integral part of effective field mapping, allowing for the proper interpretation of field observations through correct identification and classification of hydrothermal zonation and vectors. Finally, because IOCG is a relatively new deposit type and encompasses a great variety of large deposits that may have associated peripheral to distal-type high-grade copper, uranium, silver, and other metal rich veins, the host rocks of some past-producing vein-type mines are now being recognized as parts of large IOCG systems. Such associations have positive implications for both exploration and environmental baseline studies, as the extent over which areas can be naturally enriched in metals is large – 10's of square km. Moreover, old mine tailings may now be ore and mining them may be the best remediation approach. Though much work is needed before we can assess the full mineral resource endowment of the Great Bear Magmatic Zone, current knowledge can already help us to find development solutions at our doorstep.

ALTERATION VECTORING TO IOCG(U) DEPOSITS: THE PROJECT

Corriveau, L.[1], Mumin, H.[2], Ootes, L.[3], Jackson, V.[3], Somarin, A.[2], Bennett, V.[4], Cremer, J.-F.[5,6], Rivard, B.[7], McMartin, I.[8], Beaudoin, G.[9], Neale, K.[10], Goad, R.[10], Robinson, G.[11], Long, B.[5] and Antonoff, V.[5]

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Vectoring to Iron Oxide Copper-Gold (± U-Ag-Co-Bi; IOCG(U)) deposits in Canada can be a major exploration challenge as most prospective targets are located in frontier felsic-to-intermediate volcano-plutonic terrains. Many of these terrains were mapped

prior to the recognition of the IOCG deposit-type in the 1990's. In this poster presentation, we highlight the vectoring protocols being developed through a joint government-industry-academia research project taking place under the government TGI-3 and SINED programs umbrellas.

Case examples include the stunning exposures of the NICO (Am-Mag-Sulphides-Au), Mile Lake (skarn-like), K2 (Kfs-Hem) and Port Radium (U in veins) IOCG(U) deposits in the Great Bear magmatic zone, NWT. These examples provide a means to refine alteration zoning models, better define timing relationships for IOCG(U) deposits and associated alteration, and adapt alteration and geochemical vectors to frontier terrains. They also serve to develop reference rock and mineral indicator databases for till geochemical and mineral indicator fingerprinting, and predictive hyperspectral airborne or spaceborne capabilities. Collectively, these efforts will increase our ability to target potential mineral resources. In the Port Radium – Echo Bay district, non-mineralized, but regionally significant alteration types demarcate prospective hydrothermal systems and include: 1) early and intensive sodic alteration distal to mineralization and proximal to intrusive heat sources; 2) extensive calcic-iron (magnetite-actinolite-apatite) alteration that is commonly texture-destructive and forms away from intrusions, and; 3) subordinate vein-type overprint or laterally-extensive mild potassic alteration. Within the identified hydrothermal systems, areas where intensive replacement-type K-feldspar or biotite alteration develops (with magnetite at first) are proximal to mineralization. In these zones, brecciation and polymetallic sulphide enrichments are common and coeval with, or slightly post-date, the potassic alteration. Such zones can also be affected by skarn-like calc-silicate alteration, a late-stage K-feldspar overprint, and hematite alteration with their associated mineralization.

The intensive iron oxide and potassic footprints, the striking recrystallization associated with certain alteration types, and the systematic evolution of alteration (such as that described above) enable the development of strategic exploration tools at the regional to deposit-scale. It also provides a metallogenic framework for seemingly disparate Au, Cu, U, Ag, Co, REE showings or other geochemical anomalies and serves as an 'alarm system' where potential ore zones are largely cryptic. In the IOCG(U) world, remembering that there is no such thing as striking massive sulphides lenses or visible gold typical of many ore deposits is essential to sound exploration. Beyond alteration mapping, other tools used in this project for vectoring to mineralization include field measurements of K-Th-U with portable spectrometer to help identify cryptic K alteration, classical cobaltinitrate staining of rock slabs in the lab to distinguish early and late-stage K-feldspar alteration and enhance breccia textures or highlight cryptic textures, novel ITRAX^{TM} core logging to follow metal discharge and leaching as alteration progressed in the system, and CT-scanning to establish 3D distribution of ore. Development of IOCG(U) indicator minerals and hyperspectral case examples are bound to complement alteration mapping, lithogeochemistry, till geochemistry, geochronology, geophysics, surficial water geochemistry, and remote predictive mapping as the tools to target IOCG(U) systems.

PANDA, FROM PYROPE TO PRODUCTION (NOW YOU'VE FOUND A KIMBERLITE, THE WORK IS JUST STARTING)

Coutts, B., Heimbach, J. and Dyck, D. - BHP Billiton Diamonds Inc.

The timely and accurate provision and integration of geologic data has been critical to the successful mining of the Panda kimberlite pipe at the EKATI diamond mining complex operated by BHP Billiton Diamonds Inc. Even more so in the sub-arctic, all data from the first exploration hole onwards must be collected with the aim of full integration into any resultant mine development and operation.

Panda pipe is located within the Lac de Gras kimberlite cluster, Northwest Territories, Canada. These kimberlites were discovered as the successful culmination of a well documented exploration program. One of the key drivers in this program was the assessment of indicator minerals, including pyrope garnets.

Discovered in 1993, Panda deposit has been subjected to fourteen years of ongoing deposit definition, delineation and development drill programs. This sampling is summarized as follows:

- 27,000m of DDH drilling in 139 drillholes
- 7,700m of RC drilling in 44 drillholes
- 600 bulk samples totalling in excess of 4,000 tonnes
- 2,100 bulk density and moisture samples
- 5,000 down hole survey records

The extreme low grade and value variability inherent within kimberlites relative to other commodities requires a density of sampling to provide a spatially and statistically representative estimation of volume, density, tonnage, stone size, stone frequency and stone quality. Iterative modeling of these criteria has quantified sensitivities to support key decisions in the Panda project.

Major geological controls modeled at Panda include local geology and internal pipe geology, local structure, hydrogeology and mineralogical controls on ore processing. Open pit mining enabled validation of variables and assumptions made for geologic inputs during evaluation and execution of the transition to underground operations at Panda.

Panda has been in production since 1998, initially as an open pit and now as an underground sub level retreat operation. From 1998 to the end of June 07, total production from Panda has contributed approximately 40% of the total recovered carats, and approximately 45% of the total revenue, for the EKATI operation. Reconciliation over annual periods has returned +/-5% between mine-model to market product.

To complete the mining cycle, planning for the progressive closure and reclamation of the Panda pipe proposes flooding of the Pit-UG complex and remediation of the end pit lake to a naturally sustainable state.

PEEL RIVER WATERSHED SAMPLING PROGRAM: WATER AND SUSPENDED SEDIMENT

Czarnecki A. - Water Resources Division, Indian and Northern Affairs Canada

The Peel River is a transboundary river which originates in the Yukon and flows into the Northwest Territories and past Fort McPherson. The river joins the Mackenzie River, approximately 65 km south of Aklavik, NT. The Peel River supports the subsistence lifestyle of numerous residents within and around the area including the Tetlit Gwich'in, the Nacho Ny'a'k Dun and the Tr'on Dek Hwech'in.

To meet the requirements of the Mackenzie River Basin Board Transboundary Waters Management Agreement, a bilateral agreement was developed between the Yukon and the Northwest Territories. The purpose of the bilateral agreement is to manage, protect and conserve the waters common to the Yukon and Northwest Territories while facilitating sustainable use of the transboundary waters. Under the agreement, the Water Resources Division monitors the Peel River to ensure that the ecological integrity of the aquatic ecosystem is preserved for current and future generations.

The Peel River Watershed has widespread hydrocarbon potential with impending oil and gas exploration, particularly in the sedimentary basin of the Peel Plateau. Mineral exploration has been limited however there are approximately 2000 mineral claim blocks throughout the basin including one of the largest iron deposits on the continent. With future resource exploration potential, a better understanding of baseline chemistry was warranted. Water and suspended sediment samples were collected to develop a baseline of water and sediment quality conditions, as well as to address community concerns about possible contaminants in the Peel River. Water samples were analyzed for physical parameters, nutrients, major ions and metals. Suspended sediment samples were analyzed for the same parameters as well as organic compounds including organochlorines (such as DDT and herbicides), PCBs and hydrocarbons. The data collected from this study will be used to develop water quality objectives for the transboundary bilateral agreement between the Northwest Territories and the Yukon and to help detect changes in water quality due to future anthropogenic disturbances or natural phenomena. It is hoped that the Peel River Basin study will contribute to the understanding of water quality in this important northern watershed.

EXPERIENTIAL SCIENCE 10-20-30 – THE FINAL FRONTIER

Daniel, S. M.[1] and Bruce, K.[2]

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The 2007 year has been an exciting one in the development and implementation of the Experiential Science 10-20-30 science pathway. The program, developed by the Department of Education, Culture and Employment, is now in several classrooms in the NWT. Several pilot classes are currently underway for the ES-20 (Marine) course and more are set to start with the second semester in early 2008. Teacher in-service events have been held recently and the resource kits have gone out to school districts across the territory.

Student texts and teacher resource manuals are currently being reviewed for printing.

The focus of the presentation will be to review what has happened so far and what is still to come in the unfolding of this most anticipated new science curriculum for NWT and Northern students.

INTRODUCTION TO MINE TRAINING: PROGRAM DESCRIPTION

Dowe, D. - Kimberlite Career and Technical Centre, Yellowknife, Northwest Territories

The Kimberlite Career and Technical Centre, opened in 2004, offers high school courses in construction, welding, mechanics, hairstyling and most recently mine training. The mine training program is designed to equip students with the necessary knowledge and basic skills to enter the mineral resource industry. The program consists of five, 25-hour modules representing various topics in the minerals industry including Introduction to NWT Geology and Prospecting, Mapping (GIS/GIS), Introduction to the Mine Life Cycle, Environmental Studies, and Introduction to Surface and Underground Mining. The theoretical components are synchronized with practical applications allowing students to develop a sense for the complete picture of the various topics. Emphasis will be placed on the partnership between theoretical and practical applications to industry examples and current industry usage. Past, present and future industry requirements will also be addressed. Upon completion of the program, students will more confidently be capable of considering application for entry-level industry positions, or continue with mining-related post-secondary education.

SURFICIAL GEOLOGY RESEARCH PROGRAM IN THE SOUTHERN MACKENZIE VALLEY, CHAPTER III: GEOLOGY HIGHLIGHTS.

Duk-Rodkin, A. and Huntley, D. - Geological Survey of Canada, Calgary, Alberta

The southern Mackenzie Mountains region has a complex glacial history within the Canadian Cordillera, reflecting its situation along the point of coalescence between the Laurentide (continental/eastern-derived) Ice Sheet and the Cordilleran (montane/western-derived) Ice Sheet and local montane ice caps. Stratigraphic and geomorphic evidence indicates that Laurentide ice advanced west and northwest over the foothills and up major valleys after approximately 52 ka BP (C-14 ages) but before 29 ka BP (Cl-36 ages). Several ages from pre-glacial alluvial deposits underneath Laurentide till were obtained in exposures of Dahadinni and Ochre rivers. These ages have yielded several uncalibrated radiocarbon dates bracketing between 52.2 ka BP to 45.43 ka BP. Coalescing montane and Laurentide ice sheets led to buttressing and thickening of the regional ice cover such that near the north-south divide, it eventually overtopped the highest summits at 1820 m above sea level. Large ice-dammed lakes formed in valleys such as the South Nahanni River, and Canadian Shield-derived granite erratics, deposited by Laurentide ice, have been found over 150 km west of the mountain front. Laurentide ice was the first to retreat, whereupon stratigraphic evidence indicates that Cordilleran and montane ice advanced short distances eastward overtopping continental glacial deposits. Ice-dammed lakes once again re-formed in valleys between the retreating ice masses. This pattern of glaciation is similarly reflected in late Pleistocene stratigraphic records from the northern Mackenzie Mountains. The Late Pleistocene glaciation caused a number of major changes to the landscape of the southern Mackenzie Mountains and Mackenzie River region. At some point, glaciers blocked and diverted the Redstone River. In pre-glacial time, the Redstone River had drained eastward across the Franklin Mountains, of which there is a discernible geomorphic signature superimposed upon the Paleocene uplift of the region including meanders of former tributaries within intermontane valleys. Glacial diversion of the Redstone River occurred around by 9.2 ka BP (age obtained from a silt-clay-sand bed under 22 m of till) indicating the presence of Laurentide ice nearby blocking the river giving a late age for the presence of the continental ice in the corridor. The channel incised through a highly folded and faulted terrain, triggering extensive landsliding that continues today. Several other changes occurred in the drainage such as: lower Root River and North Nahanni River including: unusual surficial geology from indications of the first Laurentide till preserved in stratigraphic sections, major drainage diversions glacial outburst floods. Recognizing the pressing need for geoscience data in light of the proposed Mackenzie Valley Gas Pipeline, we have not only undertaken a wide diversity of studies, but also the manner and formats in which this data is being published.

THE USE OF THRESHOLDS IN EIA: WHERE TO DRAW THE LINE

Ehrlich, A. - Mackenzie Valley Environmental Impact Review Board

The use of thresholds as a tool for managing cumulative impacts has been identified by the NWT Cumulative Effects Assessment and Management strategy and framework. Thresholds have been applied successfully in other settings, primarily for biophysical components of the environment. In the NWT, and in the Mackenzie Valley in particular, thresholds offer a normative model for evaluating the cumulative significance of biophysical, social and cultural impacts arising from human activities. This talk will examine challenges and opportunities related to the application of thresholds in environmental impact assessment in the Mackenzie Valley. Recommendations will be provided for increasing their effectiveness as a tool for promoting sustainability in decision-making.

CONSULTING WITH THE AKAITCHO DENE FIRST NATIONS

Ellis, S. - NWT Treaty #8 Tribal Corporation, Lutsel K'e, Northwest Territories

The Akaitcho Dene First Nations (AKFNs) expect to be consulted by both industry and government prior to the issuance of regulatory approvals for mineral exploration and mining. Exploration and mining companies are expected to engage in up-front, face-to-face meetings with the relevant AKFNs to describe their proposed projects, to understand issues and concerns from a First Nation perspective, and to develop a plan of accommodation. Accommodation of First Nation concerns and issues should occur prior to the submission of permit and license applications.

In some cases, a company and the relevant AKFN may want to enter into an exploration agreement. An exploration agreement is a legally-binding document providing First Nation support to a proposed exploration project and disposing of consultative obligations, provided certain terms and conditions are honoured by the proponent (e.g. environmental monitoring, information sharing, training and employment, etc.). For a company, entering into an exploration agreement greatly increases regulatory and consultative certainty, and should significantly streamline both the permitting/licensing process and future First Nation relations.

While it is a business best practice for industry to engage the AKFNs in an up-front manner, it is Canada's constitutional obligation to resolve potential infringements of treaty and aboriginal rights. However, the current regulatory framework under the MVRMA is not equipped to adequately address rights-based assertions in the Akaitcho territory. Canada must therefore develop and implement a process over and above the MVRMA that will meet the standards outlined in the recent case law.

Canada has a duty to consult with the AKFNs when it has knowledge of the potential existence of an aboriginal or treaty right and contemplates an authorization or activity that might adversely affect these rights. Canada must proactively engage in consultation with the objective of substantively addressing the concerns of the AKFNs before any infringements occur. Resulting accommodations may take the form of controlling resource development through legislation, requiring First Nation consent, or providing fair compensation.

Consultation with First Nations is a modern reality of mineral exploration in the north. To ignore this reality is to invite conflict, uncertainty, and financial risk. To embrace this reality in good faith is to build a strong foundation for future returns on investment.

STREAM SEDIMENT SAMPLING IN THE MACKENZIE MOUNTAINS: A STATUS REPORT

Falck, H.[1], Day, S.J.A.[2] and Lariviere, J.[3]

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[3] Contaminants and Remediation Directorate, INAC, Yellowknife, Northwest Territories

Regional stream sediment surveys have historically been implicated in the discovery of many of the major economic deposits in the Canadian Cordillera. The contribution of these surveys towards economic development in hinterland regions has encouraged provincial and territorial governments to ensure nearly complete coverage for both British Columbia and Yukon. Coverage in the Northwest Territory is not nearly as continuous but new surveys are being added, including a new project in the headwaters of the Arctic Red River (Western half of NTS 106 B and 106C).

In 2004, a survey was conducted over the Macmillan Pass/Sekwi Mountain area (NTS 105 N east and 105O). The samples were collected to achieve a density of one sample per 13km^2 across the survey area. The results, which have been released as Geological Survey of Canada Open File 4949 / NTGO contribution 14, include the chemical analyses of over 50 elements from stream sediment samples and 54 variables from water samples collected at 916 sites. The sample collection and analyses followed the methodology published at http://gsc.nrcan.gc.ca/geochem/ngr/method_e.php .

The lithostratigraphy exposed in Sekwi Mountain area is composed of five assemblages which reflect distinct tectonic and depositional settings; Mackenzie Mountains Supergroup representing a stable platformal deposition during the Proterozoic, Windermere Supergroup deposited during the Neoproterozoic rifting and disintegration of Laurentia, Mackenzie Platform consisting of Lower Cambrian to Early Devonian siliciclastic and carbonate rocks deposited on a passive continental margin with the coeval Selwyn Basin representing deeper water facies equivalents, and the Earn Group recording mid Devonian and Mississippian submergence and deformation of the Platform. These assemblages were deformed by folding and thrusting from the Jurassic (~170 Ma) and to the Paleocene (~55 Ma), and intruded by voluminous granitoid batholiths during the Cretaceous (~90 Ma) collision of an island arc with western North America.

The complex regional geology has resulted in a host of mineral occurrences with a variety of characteristics, which have been classified into a series of 'types', including: banded iron formation (BIF); redbed-associated Cu, carbonate-hosted Pb-Zn (Irish-type; minor Mississippi Valley-type); shale-hosted SEDEX Pb-Zn; Cretaceous intrusions and associated skarns with a variety of commodities, most significantly W, Au, emeralds and other gemstones, lithium and rare elements (in pegmatites). Occurrences with in the survey area can be identified by the anomalous silt sample analyses. More exciting are additional anomalous samples, which do not appear to be associated with known mineral occurrences. This includes elevated gold in samples near the Cretaceous plutons in the western half of the survey.

HYDROLOGICAL MONITORING AT COLOMAC MINE SITE FOR REMEDIATION PLANNING

Faria, D. - Water Resources Division, Department of Indian Affairs and Northern Development, Yellowknife, Northwest Territories

The Water Resources Division (WRD) of the Department of Indian Affairs and Northern Development (DIAND) operates a hydrological monitoring program at the Colomac Mine site in the Northwest Territories (NWT). This monitoring program is currently conducted by WRD under the auspices of the Contaminants and Remediation Directorate (CARD) of DIAND.

The program was begun during mining operations in June 1995 when WRD assisted the mine operator in establishing a Campbell Scientific meteorological station to provide lake evaporation and rainfall data for the management of tailings water. With the onset of remediation planning by CARD, hydrological monitoring was expanded incrementally to include annual snow surveys (since the spring of 1999), stream-flow monitoring during open-water season (since the summer of 2003), and year-round lake level monitoring (since the summer of 2004).

The purpose of these activities is to determine site hydrologic conditions to help develop site-specific remediation options. The data which WRD provides to CARD has allowed planners to better understand the balance of inputs and outputs to the local hydrologic system and to forecast the outcomes of various operational scenarios. This forecasting has in turn enabled the effective management of the contaminated water on site and has allowed the implementation of water treatment options within a logistical time frame, and continued monitoring and forecasting should eventually permit the timely release of treated water which meets the requirements of the operational water license.

STRATIGRAPHY AND MINERALIZATION AT THE AB-C CARBONATE-HOSTED ZINC (-LEAD) SHOWING, MACKENZIE MOUNTAINS: PRELIMINARY OBSERVATIONS

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The AB-C showing consists of sphalerite(-galena) hosted by Early Cambrian Sekwi Formation dolostone, in the Mackenzie Mountains, Northwest Territories. The showing is located in NTS map sheet 106C16, 255 km WSW of Norman Wells, NT and 230 km NE of Mayo, YT. It is being studied as part of an M.Sc. project aimed at understanding controls on mineralization in the Sekwi Formation, which regionally is a preferred host for sulphide mineralization despite the presence of numerous other, seemingly acceptable carbonate formations.

Impressive zinc sulphide mineralization at the AB-C property is hosted by thoroughly dolomitized ooid grainstones, oncoid rudstones, and bioturbated, mottled dolostones. These rocks were deposited in a shallow, energetic marine setting in the inner part of a carbonate ramp. Like most of the other showings hosted by the Sekwi Formation elsewhere in the Mackenzie Mountains, mineralization here appears to be in the upper part of the Sekwi Formation.

Structural and lithofacies controls on mineralization in the AB-C area are as yet poorly constrained owing to a dearth of outcrop in the critical areas. The property is in the fractured zone between two north-vergent thrusts and near the leading edge of a NW-vergent reverse fault. Visually striking gossans at the main showing are characterised by brecciated, densely veined, heavily altered gouge-like material in roughly vertical, planar zones on the order of 5 metres wide, but no substantive evidence of fault displacement on these structures has yet been documented.

Zinc sulphide occurs as a cement phase in thick veins and breccias, along with marcasite, barite and dolomite. This style of mineralization occurs primarily in the cortoid units. Seemingly stratiform, replacive mineralization is locally present and is best developed in bioturbated units. Evidence available to date (field data from 2007; core logs from 1977) suggests that neither mineralization style has appreciable lateral continuity, and that they are limited to the vicinity of subvertical gossanous zones. The intersection of such paleo-fluid conduits (faults and/or fractures) may have been one of the most important factors in localizing sphalerite mineralization at this showing.

The package of host strata consisting of bioturbated dolostones, skeletal dolofloatstones, and cortoid dolostones is considered regionally prospective, especially where cross-cut by intersecting faults or fractures.

Continuing work will concentrate on mineral paragenesis and the nature of mineralizing fluids, using stable isotope ratios and fluid inclusion microthermometry.

HYDROCARBON POTENTIAL OF UPPER PALEOZOIC AND CRETACEOUS STRATA, EASTERN RICHARDSON MOUNTAINS AND PEEL PLATEAU, YUKON

Fraser, T. and Allen, T. - Yukon Geological Survey, Whitehorse, Yukon

This poster presents field observations and analytical data obtained as part of the interdisciplinary "Regional Geoscience Studies and Petroleum Potential, Peel Plateau and Plain" project (details at http://www.nwtgeosciences.ca/petroleum/PeelPlateau.html). The aim of this thematic study is to examine the sedimentology, stratigraphy and hydrocarbon potential of Upper Paleozoic and Cretaceous strata in the Yukon Peel region and adjacent Richardson Mountains.

Upper Paleozoic stratigraphy in the east Richardson Mountains and Peel Plateau of the Yukon consists of basinal sediments overlain by a siliciclastic sedimentary wedge derived from the Late Devonian Ellesmerian Orogeny. Unconformably overlying Paleozoic strata in the Peel Plateau are Cretaceous sediments deposited in the foreland basin of the Cretaceous Cordilleran Orogeny.

Investigated as part of this study are the Canol (Upper Devonian), Imperial (Upper Devonian) and Tuttle (Upper Devonian-Lower Carboniferous) formations, an 'unnamed shale' unit (Upper Devonian-Lower Carboniferous), as well as the Martin House, Arctic Red and Trevor formations (Lower Cretaceous). Research for this project was compiled from field investigations conducted in 2006 and 2007 and builds on exploration data acquired prior to 1980. Like many

areas in northern Yukon, the Peel region geology is relatively understudied. This collaborative project will substantially increase the geological knowledge of the region.

Source rock and reservoir rock potential has been examined, where appropriate, in the above mentioned units. Preliminary conclusions suggest that Tuttle Formation sandstone has poor to very good reservoir rock potential, with porosity and permeability in outcrop samples measuring as high as 26 % and 127 mD, respectively. Potential source rocks were identified from the Canol, Imperial, and Tuttle formations, the 'unnamed shale' unit and the Martin House and Arctic Red formations.

AQUATIC SCIENCE EDUCATION IN THE NWT: CHALLENGES AND OPPORTUNITIES

Friesen-Pankratz, B. and Lafferty, G. - Indian and Northern Affairs Canada

Many NWT communities do not have the capacity to critically read technical reports related to aquatic sciences. As such these communities are unable to fully engage in decision making processes that could impact their local aquatic environments. Considering the significance of some of these decisions, the time has come to build community capacity in the area of aquatic science expertise. The typical approach (university degree) to gain this expertise is not always appealing to NWT community members. The great distance (both cultural and physical) between communities and universities deters some potentially interested individuals. In addition, most university programs are not designed specifically in relation to the NWT context. Consequently, opportunities for delivering an aquatic science program that is relevant to the Northern experience, from an institution located within the NWT, need to be pursued. Existing educational programs and infrastructure (e.g., the NWT high school curriculum; Aurora College) should be considered in this pursuit. The following presentation highlights the value of establishing aquatic science expertise within NWT communities. The presentation also focuses on the challenges and opportunities related to the goal of building this expertise.

LOWER DEVONIAN ARNICA FORMATION AS RESERVOIR IN A PETROLEUM SYSTEMS CONTEXT; PEEL PLATEAU AND PLAIN, NORTHWEST TERRITORIES AND YUKON

Gal, L.P. - Northwest Territories Geoscience Office, Yellowknife, Northwest Territories

Lower (to Middle?) Devonian Arnica Formation is widespread throughout the subsurface of Peel Plateau and Plain (Peel region). Examination of outcrop exposures, and measurement of stratigraphic sections along the Mackenzie Mountain Front adjacent to Peel area, has largely confirmed earlier work. Arnica Formation is chiefly dolomite mudstone, often laminated or strongly bioturbated; and indicative of shallow marine platform or shelf depositional environment.

At its eastern limit, there is a facies change to correlative anhydritic evaporite deposits of Fort Norman Formation. Outcrop exposures of Arnica Formation, across the transition from dolomite to dominantly evaporite, display increasing amounts of breccia. These breccias have been proposed by previous workers to be at least partly due to dissolution and collapse of evaporite interbeds within the dolomite – anhydrite sequences. The common term for the map-scale massive breccia unit is Bear Rock Formation.

At its western limit, limestone is more commonly preserved, typically in fossil rich packstone, wackestone, and less common boundstone biostromes. Fossil assemblages are dominated by crinoids, brachiopods, colonial corals, stromatoporoids, solitary corals and gastropods. These fossiliferous limestone units of Arnica Formation have been termed Cranswick Formation in the literature. Near the western margin of Peel region, Arnica Formation carbonate rocks shale out into basinal Road River Group shale.

Arnica Formation exhibits some good reservoir properties in localized beds throughout its areal distribution. Medium grained sucrosic dolomite, with porosity up to 6.1%, is common in decimeter to metre scale beds, with gross intervals of usually several metres in many locations. Arnica breccia beds, as well as the massive Bear Rock breccias, are also porous (6% porosity). In southwestern Peel region, surface exposures of limestone biostromes did not show particularly good primary porosity, however porosity

may be enhanced by secondary agents in the subsurface.

From a petroleum systems standpoint, source rocks for Arnica Formation reservoirs are more problematic. In the west, Road River Group shale is overmature. There are few if any organic shale interbeds within Arnica Formation, nor within overlying (Landry Formation limestone) nor underlying (Delorme Group silty carbonates) units. However in eastern Peel area, a mature source rock did exist, and migration did occur, as evidenced by oil-stained Arnica dolomite and Bear Rock breccia at Stratigrapher Cliffs and Powell Creek. Middle to Upper Devonian shales (Hare Indian, Ramparts, Canol formations) are the likely sources.

Study of possible petroleum systems including Arnica Formation will continue, with an aim of outlining possible Arnica play fairways. At this point it seems that structural traps will have been important in juxtaposing mature source rocks and Arnica reservoirs. However, the timing of petroleum formation and migration with respect to formation of these structural traps, may pose further exploration risks.

RARE AND LESSER-KNOWN SPECIES OF THE NWT: UPDATE ON SURVEYS AND PROPOSED BEST PRACTICES FOR ASSESSMENTS

Gau, R.J. and Carrière, S. - Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, Northwest Territories

The Northwest Territories (NWT) is home to about 30,000 known species. A large proportion of these are not very well known, and unknown portions of these are rare, species at risk, or species that may be at risk. New inventories are performed every year for an array of programs, for example the General Status Ranking program, impact assessments, ecological assessments of proposed protected areas, and ecological classification programs. The results of these inventories are complemented with information stored in Canadian museums to form a better understanding of where rare species may be found in the NWT. This information is used to update NWT species lists and evaluate the general status ranks of entire groups of species according to priorities set amongst all jurisdictions in Canada. This information is also used to inform impact assessment practitioners and propose best practices for managing rare species or species at risk. We will provide updates on some of the new information learned about some rare and lesser-known species in the NWT.

VIKING GOLD EXPLORATION INC. ACTIVITIES IN THE MORRIS LAKE AREA, NORTHWEST TERRITORIES.

Ginn, R.M. - Viking Gold Exploration Inc., Toronto, Ontario

The Viking Yellowknife gold prospect was discovered in 1945 by conventional prospecting and was explored during the late ‘40’s by Viking Yellowknife and ‘80’s by Canamax Resources. Both companies confirmed the presence of significant gold values but withdrew because of corporate changes. In 2004 Viking Gold Exploration Inc. optioned the remaining mineral leases covering 327.4 ha and began annual exploration programs. Initial geologic mapping disclosed that a high percentage of the rocks are of volcanic origin and offer an attractive setting for an economic gold deposit. Viking Gold has conducted winter drilling programs in 2005 and 2007, recovering 5275 ha of core in 31 drill holes, extending the Viking Gold Zone from a length of 440m to 1350m and the width of the enveloping alteration envelope from 60 m at the north end of the zone (shaft area) to 220 m one km to the south. The untested projection of this trend continues for 700m to two wildcat holes drilled in 1989 which intersected gold values of interest.

Additional sampling of the main property included the cutting of 718 channel samples at 77 sites and collecting 1878 humus samples from bogs between outcrop areas. These provide additional drill targets because of gold values exceeding one gram per tonne and anomalous concentrations of pathfinder elements. Pathfinder elements and hydrous silicates and carbonates define the alteration zone. Since 2004 Viking Gold has selectively added to its original land interest by purchase, option and staking additional ground, now holding a controlling interest in 7,120 ha. To guide further exploration two regional surveys have been performed in 2006 and 2007. Fugro flew a DIGHEM and magnetic gradiometer survey at 100m line spacing, completing total coverage of 714 line-km. Several signatures were obtained which suggest the presence of conductive sulphide targets, and a total of 549 responses are interpreted to reflect bedrock conductors. In 2007 Viking staff participated in a helicopter supported limnic survey, providing 154 organic mud samples at a density of two per square km., four times the density considered to be high density by governmental surveys. The analyses of these

samples are awaited from the laboratory to which they were submitted in August, and so cannot be reported here. In summary, the application of modern exploration methods has provided Viking Gold with an abundance of drill targets in a known gold-bearing belt of rocks extending from a high grade past producing property. This summary is intended to advise other explorers of methods found to be useful by Viking Gold in this area, and is not necessarily compliant with NI 43-101.

DEVELOPMENT OF THE NICO COBALT-GOLD-BISMUTH PROJECT NORTHWEST TERRITORIES, CANADA

Goad, R.E., Neale, K.L., Samuels, M.T., Mucklow, J.P. and Schryer, R.P. - Fortune Minerals Limited, London, Ontario

Fortune Minerals Limited is developing its wholly-owned NICO cobalt-gold-bismuth deposit on Tlicho lands located 160 km northwest of the City of Yellowknife Northwest Territories. The deposit is 22 km west of the Snare hydro complex and is close to the communities of Wha Ti, Gameti and Behchoko. Fortune is working in a trilateral government-industry initiative to re-align the existing winter road and establish an all-weather road connection to the Tlicho communities and proposed mine.

NICO and Fortune's nearby Sue-Dianne copper-silver deposit are currently the only known Canadian examples of IOCG deposits, also referred to as Olympic Dam-type. They are situated in the south part of the Proterozoic Bear structural province at or near the unconformity between Snare (Treasure Island) Group sedimentary rocks and felsic volcanic rocks of the Faber Group and related granitic intrusions.

NICO has been assessed in a positive bankable feasibility study, which verified proven and probable mineral reserves of 21.8 million tonnes to support a 15-year mine life at a 4,000 tonnes/day production rate. Additional resources can also be mined during periods of high metal prices. NICO will be developed primarily as an open pit mine, although mill feed will be augmented during the first two years with higher grade ores mined by trackless underground methods. The process plant will utilize conventional crushing and grinding, and simple flotation to produce gold-bearing cobalt and bismuth concentrates. Hydrometallurgical process methods (pressure acid leaching/electro-winning, ferric chloride leaching and carbon-in-pulp) will be used to produce high value co-products at the site, including 99.8% cobalt cathode, 95% bismuth cement, and gold doré, respectively. Small amounts of saleable copper and nickel will also be produced from purification of the cobalt. NICO contains approximately 30% iron oxides (primarily magnetite), which is currently being assessed in metallurgical testwork to determine if it can also be economically recovered.

Fortune has carried out two programs of underground test mining to assess the mining and environmental conditions, confirm ore grades and geometry, and collect a sample for large-scale pilot plant testing (currently in progress at SGS Lakefield Research in Ontario). The Company has also purchased the Golden Giant mill and surface facilities at Hemlo, Ontario from Newmont Mining which is in the process of being dismantled for relocation to NICO. These latter activities will reduce project risk and the capital required to build the mine.

Extensive environmental and social studies have been conducted at NICO since 1998 in order to establish baseline conditions, assess impacts and design mitigation strategies for mine development. Class A Water License and Land Use Permit applications have been submitted to the Wek' èezhii Land and Water Board and Fortune is working with the Tlicho Government to secure the requisite approvals to permit the mine for planned production in 2010. Capital costs are estimated at $225 million to build the mine. NICO will employ 255 people directly as well as a larger workforce during construction. It will be a significant economic opportunity for the Northwest Territories and Tlicho people.

BEDROCK TRANSECT ACROSS THE MACKENZIE MOUNTAINS AT 64.5°N: A NEW LOOK AT CRUMPLED OLD PLATFORM STRATA

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During 2007 an NTGO-GSC field party conducted regional mapping (nominal 1:50,000 scale) in a 25 km-wide swath across map area 106A ("Mount Eduni") to better understand the rock units and structure of this part of the Cordilleran fold-thrust belt. This is the second in a three-year mapping initiative (Sekwi Project) to produce updated and integrated maps and a digital atlas for Sekwi (105P), Mount Eduni (106A) and adjacent areas north and northwest.

The area is underlain by unmetamorphosed sedimentary strata ranging in age from Neoproterozoic to Upper Devonian. In a general sense Paleozoic formations thicken towards the southwest. In the same direction, a major hiatus beneath Cambro-Orodivician strata diminishes leading to preservation of additional stratigraphic units. This 700 million year record spans events on the supercontinent of Rodinia, the breakup of this supercontinent coincident with Neoproterozoic glaciations, and subsequent passive margin sedimentation on the margin of Laurentia. It was not until mid-Cretaceous folding and thrust-faulting that the region underwent significant deformation.

In the eastern half of the mapped area, mountain-scale box anticlines are cored by Neoproterozoic Katherine Group sandstone flanked by lower Little Dal Group shale and dolostone. A major unconformity separates these units from overlying Cambro-Ordovician to Devonian platformal carbonate (Franklin Mountain, Mount Kindle, Delorme, Bear Rock Hume formations) of the Mackenzie Platform. These northwest-trending ranges are separated by 5 km wide valleys floored by Upper Devonian shale of the Canol and Imperial formations.

The central part of the area features large cylindrical folds of upper Little Dal Group evaporite and carbonate, as well as Rapitan Group glaciomarine strata. These successions are repeated above steeply dipping Paleozoic carbonate formations on the southwest-dipping Plateau thrust and related splays. The Plateau thrust is one of the longest such features in the Cordilleran fold and thrust belt.

The western third of the map area is underlain by large areas of gently dipping strata within the hanging-wall of the Plateau thrust. The oldest units comprise coarse clastic sedimentary rocks of the Neoproterozoic Coates Lake (locally preserved) and Rapitan groups overlain by Cambrian sandstone (Backbone Ranges Formation) and carbonate (Sekwi Formation). Within this area the Cambro-Ordovician to Devonian units of Mackenzie Platform undergo some facies changes that presage their southwesterly transition to time-equivalent shale of Selwyn Basin. These include abundant shaly limestone and chert within the Cambro-Ordovician Franklin Mountain Formation, and the appearance of the Devonian Sombre and Arnica formations (dolostone).

SILVER ENRICHMENT IN THE 2.68GA HACKETT RIVER VOLCANOGENIC MASSIVE SULPHIDE (VMS) DEPOSITS, HACKETT RIVER GREENSTONE BELT, NUNAVUT

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There are few studies of the behavior and mineralogical residence of silver in volcanogenic massive sulphide (VMS) deposits, particularly those in a localized high-grade metamorphic setting such as the Hackett River Zn-Pb-Cu-Ag VMS deposit, within the Hackett River Greenstone Belt (HRGB). The HRGB, and other volcanic belts of the eastern Slave Craton are thought to have been deposited in an arc-like setting constructed marginal to, and on top of the continental crust of the Central Slave Basement Complex in a marginal to continental arc setting. This actively extending arc

evolved into a back-arc basin subsequently infilled with turbidite sedimentary rocks. The deposit is hosted in the amphibolite grade 2680 Ma Ignerit Formation that is composed primarily of Archean felsic volcanic rocks of the predominantly less metamorphosed supracrustal Yellowknife Supergroup.

The Hackett River deposit is comprised of five mineralized zones (Main, East Cleaver, Boot Lake, Knob Hill, Jo) that occur over a 5 km-long strike length. Indicated resources from 2006 at a silver-equivalent cut-off grade of five ounces (171.4 g/t) per ton for the Main Zone, Boot, East Cleaver and Knob Hill contains 47.1 million tons with average grades of 149.8 g/t Ag, 0.32% Cu, 0.68% Pb, 4.67% Zn and 0.31 g/t Au. Resources have not been reported for Jo Zone. Some zones exhibit extreme Ag enrichment (grading up to 3000 g/t) and are in the range of the 90^{th} to 95^{th} percentile ranking on a global inventory of VMS deposits. The other significant VMS deposits in the HRGB, Musk and Yava, are also significantly enriched in silver (343 g/t Ag and 102.8 g/t Ag, respectively).

The Hackett River Main Zone (HRMZ) consists of two principal massive sulphide lenses in an open synformal structure separated by a calc-silicate marker horizon. The centre of the deposit is dominated by an intensively altered barren pyrite core depleted in base metals relative to the massive sulphide deposits. Comparison of bulk rock assays to mineralized core indicates two prominent high grade silver associations; an earlier, lower mineralized zone comprising chalcopyrite-rich veins and an upper massive sulphide lens with galena and two generations of sphalerite. Bulk analyses of mineralized core samples from the Hackett River Main Zone indicate elevated Te-Se-Bi-Sb-As contents where the silver enrichment occurs compared to global VMS averages. Discrete Ag-bearing minerals such as Fe-Cu-Ag sulphosalts and sulphides, Sb-rich freibergite, argentite and native silver have been documented in the HRMZ.

This study, which is a M.Sc. thesis project by the senior author, is using bulk sulphur isotopic analyses to determine sources of sulphur, and by inference, the associated metals such as silver. Electron microprobe (EMPA), SEM and LA-ICP-MS analyses integrated with field and petrographic observations are being utilized to establish the mineralogical residence and overall paragenesis for silver-bearing phases. Increased knowledge of the residence and mass balance of silver within the complex mineralogical assemblages will assist Sabina Silver Corporation in genetic and exploration models specific to the silver-rich Hackett River deposits.

METHANE SEEPS IN THE SVERDRUP BASIN: EVIDENCE FOR HISTORIC GAS GENERATION AND MIGRATION

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The Arctic Islands hold 25% of Canada's proven gas reserves and with rising prices it may soon be economically feasible to transport these to market. Most know gas and estimated reserves are associated with conventional structural traps, with predicted undiscovered reserves of over 85 TCF. Gas reserves in the basin could be significantly larger if untested plays are considered. To support regional gas resource assessment work has been conducted to better characterise ancient methane seep sites in the basin. Methane discharging into sea water is oxidized to CO_2 forming localised zones of carbonate over-saturation. The resultant carbonates deposited have stable isotope values characteristic of a methane source. These seeps locally supported cold-water benthic communities. Some localities are associated with fault structures, suggesting these features allowed migration of deeper generated gas to surface. Newly recognised localities suggest gas migration, is also associated with emplacement of diapirs. Combined these sites from across the Sverdrup Basin provide evidence for generation and migration of gas at different stages in the basin history.

ENVIRONMENTAL SCIENCE AND TRADITIONAL INUIT KNOWLEDGE COLLABORATION: DEVELOPING THE GROUNDWORK FOR COMMUNITY INVOLVEMENT IN ENVIRONMENTAL CONSULTING

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[2] Angoniatit Niovikvia Ltd.

Angoniatit Niovikvia Limited (ANL) is the business arm of the Kugluktuk Hunters and Trappers Organization, a well respected Inuit organization involved in issues related to land, water, fish and

wildlife resources in Nunavut. ANL is taking steps to build Inuit capacity in the field of environmental consulting, and has been providing support and contract employees for consulting companies for many years. ANL and Golder Associates Ltd. have collaborated on a number of projects since 1993. These organizations created a Memorandum of Understanding to provide mutual benefits, and in early 2007 Golder opened an office in Kugluktuk. A keystone of this strategic alliance is to expand ANL's work in consulting and bring more Inuit Kugluktukmiut into professional, full time employment in environmental science and Inuit Qaujimajatuqangit (IQ/traditional Inuit Knowledge) studies. Challenges are faced in developing and maintaining a pool of trained staff due to a lack of targeted education/training in these disciplines. To develop future employees in the environmental sciences, the ANL summer student program was augmented and a multi-organization community-run traditional Inuit Knowledge field camp program made a large contribution to the success of the program. ANL and Golder recognize the importance of providing traditional land skills training along with environmental science training to maintain Inuit culture and ecological knowledge, and provide a basis for understanding and adapting to changes in the environment and economy. The most important element behind the success to date is careful attention to the priorities and goals of ANL. This year's successes will form the base for further collaboration.

METAL MINING EFFLUENT REGULATIONS: AN UPDATE

Groskopf, G. - Environment Canada, Prairie and Northern Region, Regina, Saskatchewan

Over a decade ago, Environment Canada began a process to modernize its regulation of the metal mining industry. In June 2002, some 5 years ago, the Metal Mining Effluent Regulations (MMER) were promulgated under the federal Fisheries Act to replace the Metal Mining Liquid Effluent Regulations. The new Regulations prove a minimum standard for all metal mines across Canada and harmonize to leading provincial standards. Nonetheless, the MMER is one of the most comprehensive and stringent regulations in the world. A three tiered approach to monitoring effluent quality is now required: physical/chemical characteristics at the end of pipe, biological (acute lethality) nature of the effluent at the end of pipe; and observed affects in the receiving environment (environmental effects monitoring). A process to authorize the use of fish-bearing natural water bodies as depositories for mining wastes is also defined in the Regulations. The Regulations required various reporting and notifications, and these requirements are described. Guidelines are available to assist the mining community to meet their obligations under the MMER. A Code of Practice is also being developed to assist the industry.

SEDIMENTOLOGY OF THE ALBIAN MARTIN HOUSE FORMATION, PEEL REGION, NT

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Martin House Formation of Peel Plateau and Plain region is a marine sandstone at the base of the Cretaceous succession. It is 10 to 50 m thick and unconformably overlies mudstones, siltstones, and sandstones of the Late Devonian Imperial Formation.

Martin House Formation is subdivided into three facies. 1) Mudstone facies record deposition in an offshore environment. 2) Complexly cross-stratified sandstone facies contain hummocky and swaley cross-stratification representing a wave and storm dominated shoreface environment. 3) Cross-stratified, strongly bioturbated sandstone facies record upper shoreface deposition in a wave and possibly tide influenced setting devoid of major storm events.

In the study area Martin House Formation comprises at least two distinct sandstone units separated by mudstone facies. The lowermost sandstone unit, marked by strong to intense bioturbation, is regionally widespread and locally overlies the sub-Cretaceous unconformity. Cross-stratified, bioturbated sandstone facies contains traces *Diplocraterion*, *Skolithos*, and *Thalassinoides* that compose the *Skolithos* ichnofacies. The lower sandstone is truncating by a flooding surface succeeded by offshore mudstone facies.

The second sandstone records shoreface progradation. It is composed of an upward-coarsening succession of complexly stratified sandstone. Hummocky cross-stratified sandstone occurs near the base, interbedded with mudstone and associated with *Skolithos*, *Diplocraterion*, *Rosselia*, and *Chondrites*. This is considered to be a distal component of the *Skolithos* ichnofacies. Swaley cross-stratification occurs at the

top of the sandstone unit in the eastern sections, indicative of a landward facies change to the east. The second sandstone is overlain by a flooding surface and succeeded by offshore mudstone.

In western sections, such as at the Hume and Arctic Red rivers, the second sandstone unit is overlain by mudstone of the Arctic Red Formation. In the easternmost section, at Imperial River, there is a third storm-dominated sandstone forming the top of a parasequence, consistent with a landward facies transition to the east.

Sedimentology of the lowermost sandstone unit indicates that storm events were muted, possibly due to a laterally discontinuous interior sea during the initial stages of transgression. This gave way to a more extensive seaway allowing sufficient fetch to deposit wave and storm-dominated sandstone facies of the upper sandstone units of the Martin House Formation.

NWT PROTECTED AREAS STRATEGY AND NON-RENEWABLE RESOURCE ASSESSMENTS

Hamre, K. - NWT Protected Areas Strategy, Yellowknife, Northwest Territories

The NWT Protected Areas Strategy is a process for identifying, protecting and managing a network of permanently protected areas. Areas of high cultural and ecological values are typically sought for permanent protection, though areas of 'ordinary' ecological values are also important as benchmarks. Cultural, ecological and economic assessments are done on all areas. An important part of these assessments includes gathering information on mineral and hydrocarbon resource potentials. This information is then used to determine economic values for non-renewable resources and make recommendations on actual protected areas designations, boundaries and management. Where possible, areas of high non-renewable resource values are avoided.

An overall hydrocarbon potential map (Gal 2005) helps qualitatively compare hydrocarbon potential between different parts of the NWT. Quantitative studies are being done by GSC for the Mackenzie Valley, which includes about 12 areas of interest for protection.

Mineral assessments are done in two phases. Phase 1 involves the compilation of existing geoscience information, presents a preliminary assessment of mineral potential and makes recommendations for Phase 2 studies. Phase 2 involves the collection of new data to better understand the resource potential and to increase the confidence in the mineral resource assessment completed in Phase 1. Three integrated Phase I hydrocarbon and minerals assessments have been completed.

The existing geologic information is then refined through field studies, focusing on the collection and analysis of geochemical samples (Phase II assessment). Phase II mineral assessments typically involve a field reconnaissance, then one to two years of sampling, followed by one to two years for lab results and write-up. Field methodology varies with the terrain involved; stream sediment and till samples are typically taken, and analysed for 50 elements. Bulk samples are sieved to extract the Heavy Metal Concentrates (HMC's), which includes the KIMs (kimberlite indicator minerals). Water samples are also analysed for 50 elements.

One Phase II assessment has been completed. A draft second Phase II report (for Edehzhie) is being presented at this Geoscience Forum. Field work for two other sites has begun: Ts'ude niline Tu'eyeta candidate protected area (in the mountains near Fort Good Hope) and reconnaissance work was done in the Sambaa K'e candidate protected area (Trout Lake area). Field work is expected in both areas next year.

A review of the status and on non-renewable information available and anticipated will also be given for:

Pehdzeh Ki Ndeh (Dehcho Region, Wrigley area)
Ka'a'gee Tu (Dehcho Region, Kakisa area)
Buffalo Lake, River and Trails (Dehcho Region, Hay River area)
Sahoyúé/?ehdacho (Sahtu Region, west Great Bear Lake)
Edaiila (Sahtu Region, east Great Bear Lake)
Tulita Mountain Area (Sahtu, Tulita District)

THE DUTY TO CONSULT AND ITS RELATIONSHIP TO PROJECT APPROVAL PROCESSES: IS A CLEARER PICTURE EMERGING?

Hardin, M.J. - Vancouver, B.C.

Significant issues have arisen in ensuring that the Crown fulfills its common law duty to consult with aboriginal peoples within the context of statute-based processes for the review and approval of nature

resource development and transportation projects. Consequently, legal challenges resulting in the delay or deferral of approvals have ensued in relation to mining projects, winter road construction and the development of petroleum resources. With an emphasis on the most notable instances, this presentation will focus on the guidance to be derived from the resulting court decisions. They include the July 2007 judgments of the Federal Court of Canada in *Chicot* v. *Attorney-General of Canada* (the "Paramount Resources" cases) that address the scope and nature of the duty to consult in relation to project approval under the *Mackenzie Valley Resource Management Act.*

MINERAL RESOURCE ASSESSMENT – A GSC PERSPECTIVE

Harris, J., Chung, C., Kerswill, J., Keating, P., Hillary, B., Grunsky, E. and Chorlton, L. - Geological Survey of Canada, Ottawa, Ontario

The Geological Survey of Canada has a long and productive history in developing methods for generating mineral potential maps. A proposed project under the new Natural Resources Canada Northern Mineral Resource Development Program encompasses these techniques as well as new quantitative methods for assessing the reliability/uncertainty of prediction maps.

This presentation outlines some key issues and concerns that can plague the mineral potential modeling process, provides some possible solutions to these challenges, and considers some statistical methods that deal with uncertainty. Examples are drawn from several areas within Canada, including the western Churchill Province (iron-formation-hosted gold in central Nunavut), the Slave Province (diamondiferous kimberlites in the Lac de Gras district, NWT) and the Superior Province (gold and base metals in the Red Lake and Swayze greenstone Belts of Ontario).

REMOTE PREDICTIVE MAPPING (RPM): EXPERIENCES FROM BAFFIN ISLAND, NUNAVUT

Harris, J.R.[1], Schetselaar, E.[1], De Kemp, E.[1], St-Onge, M.[1], Sanborn-Barrie, M.[1], Budkewitsch, P.[2], McGregor, R.[2] and Lynds, T.[1]

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The remote predictive mapping (RPM) process is now being systematically integrated into the Geological Survey of Canada's mapping programs creating a new paradigm for regional geological integrated projects. The remote predictive mapping method simply involves deriving interpretive geological information from any available geoscience data to construct first order geology map layers in support of pending field work or for mapping areas where field work is not viable (i.e. poor exposure, harsh environmental conditions, etc.). In many cases, the data may have been acquired remotely. These data may include sensing devices that measure a variety of properties of the Earth's surface and subsurface. The properties can include magnetic total field (from which magnetic susceptibility can be derived) measured by a magnetometer, radioelement emission measured by a gamma-ray spectrometer, density variations measured by a gravimeter, visible and infrared spectral reflectance measured by various optical and infrared sensors, emitted heat measured by a thermal radiometer, microwave backscatter by a radar, and terrain height measured by an altimeter or extracted from aerial photography. These parameters can be useful alone or in combination for producing a remote predictive geological map, or a series of predictive map layers in a Geographic Information System (GIS) database. Field data and analysis, if available, can be incorporated into the RPM process to aid, verify and geologically calibrate interpretations.

The method of information extraction may involve photogeological interpretation of enhanced and/or fused images derived from the various data types or computer-assisted techniques that are useful for the identification of spectral and spatial patterns in the data. The output, either a predictive geological map or GIS database, can constrain potential map units (bedrock, surficial, tectonic, etc.), various geological structures (faults, lineaments, contacts, fold axes glacial flow indicators, etc.), bedrock outcrop, structures, and possibly highlight critical field traverses.

This presentation reviews examples of how various remotely sensed data have been analysed and interpreted to produce predictive lithological and structural maps of southern Baffin Island. These maps are useful for field mapping but also can be considered as stand-alone thematic maps that contribute to the final geological compilation process. The advantages of sensors offering either high spatial resolution and/or high spectral resolution are demonstrated and discussed and the role of new hyperspectral remote sensors is reviewed. Examples are drawn from earlier mapping initiatives in southeastern Baffin Island and a more recent mapping program in southwestern Baffin Island.

REQUIRED DESIGN FOR CLIMATE WARMING IN PERMAFROST

Holubec, I. - I. Holubec Consulting Inc.

Climate warming is having a great impact on Canada's permafrost region that covers about 50% of Canada. Air temperature records across northern Canada show that permafrost will disappear across mainland permafrost regions within 20 to 100 years. This may have profound effect on existing structures and/or mine closure designs that are supposed to be stable for the *'long-term'*. Climate warming is already causing buildings supported on piles to settle and is disrupting pipelines in the eastern Russian permafrost region. It is imperative that the designs of structures, roads, pipelines and mine waste deposits in Canadian permafrost regions take into consideration the warming/thawing of permafrost either or both during the operation phase and in the closure design to eliminate or minimize environmental problems when permafrost warms or thaws.

This paper reviews the measured air temperature warming trends across the Canadian mainland permafrost region and suggests air temperatures criteria for the operation and closure phase of structures and waste deposits. It provides an overview of how climate warming may affect structures and waste deposits in permafrost and what design could be employed to minimize/prevent problems due to the warming/thawing of permafrost.

A STUDY ON DIAMONDS AND THEIR MINERAL INCLUSIONS FROM THE RENARD KIMBERLITES, QUEBEC

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The Renard kimberlites are located in the Northern Otish Mountains of Quebec. They were emplaced into Archean basement gneisses, which are metamorphosed to upper amphibolite to lower granulite facies. Radiometric dating of the hypabyssal Renard 1 kimberlite body indicates Neoproterozoic emplacement, with a 206Pb/238U model age of 631.6 ±3.5 Ma (2σ) (Birkett et al., 2004). As such the Renard pipes are one of the oldest kimberlite districts in Canada, fitting into the NE of the Eocambrian/Cambrian Labrador Sea Province of Heaman et al. (2004). Having only been discovered in 2001, little research has been carried out on the Renard kimberlites or their diamonds. A study of these diamonds is imperative in order to learn more about the diamondiferous lithospheric mantle beneath the eastern Superior Province.

This project focuses on a subset of Renard diamonds and their associated inclusions. The subset consists of 56 diamonds; derived from early-stage exploration DMS test samples from the Renard 1, 2, 3, 4, and 65 bodies. The stones range in mass from 0.01 to 0.76 carats, equating to the +0.85-3.35 mm Tyler sieve range. In the subset, resorbed dodecahedral (tetrahexahedroidal sensu stricto) diamond morphologies dominate (45%) with considerably fewer octahedral stones (13%) being present. A number of stones (18%) are macles, whilst a small proportion are aggregates.

Surface features restricted to dodecahedral faces, such as hillocks and terracing, are prevalent, with trigons having been identified on all but a few octahedral faces. A high proportion of the diamonds have a pale colour, typically yellow (39%) to brown (34%), the latter being indicative of plastic deformation. As a consequence plastic deformation lines are common on the brown resorbed crystals. Dark green spots were recognised on a number (18 %) of the samples and are particularly abundant in pipes 4 and 65. Green spots originate through alpha particle irradiation and may indicate prolonged contact with radioactive minerals, consistent with Neoproterozoic kimberlite emplacement. These morphological observations may not extend to larger

diamonds, where colourless and less resorbed octahedral stones become more prevalent.

The inclusions studied so far suggest a predominantly peridotitic paragenesis, being mostly olivine (seen in 48% of the stones) and to a lesser extent chromite (16%), both of which appear to form in clusters (3 or more inclusions) within the stones. Minor amounts of sulphides (11%) and purple garnets (5%) were also identified. There is no correlation between inclusion paragenesis and diamond shape.

TERRAIN GEODATABASE AND LANDSLIDE HAZARDS: SOUTHERN MACKENZIE VALLEY REGION, NORTHWEST TERRITORIES

Huntley, D., Duk-Rodkin, A., Smith, I.R., Macdonald, L. and Koszarycz, L. - Geological Survey of Canada, Calgary, Alberta

As part of the Northern Energy Development Mackenzie Valley Project and Secure Canada Energy Supply Program, Geological Survey of Canada (Calgary) is presently working to improve our understanding of regional glacial geological processes in the Northwest Territories. Between 2005 and 2007, surficial deposits and landslides were described and mapped in three physiographic regions: 1) mountainous areas with exposed bedrock, high relief and steep slopes; 2) drift covered lowlands with little relief; and 3) broad, deeply incised river valleys draining to the Mackenzie River. Geoscience data collected includes the spatial distribution of surficial deposits and landforms, classification, dimensions, physiographic setting and age of landslide event(s). Digital terrain and landslide hazard maps and their accompanying geodatabases will provide essential information for land management decisions regarding construction of pipelines, highways and settlements; evaluation of property rights decisions; extraction of fossil fuels, minerals, aggregates and groundwater; assessments of environmental risk and impact, ecological sensitivity and archaeological potential. GIS maps and geodatabases also provide calibration for future predictive landslide mapping and hazard analyses. Important outcomes that can be achieved through the use of geoscience databases, landslide hazard maps and related products include the attraction of new investment and reduction of risks for development. To reduce the possibility of landslides in the transportation corridor, construction should aim to minimally disturb steep slopes at stream and river crossings; and where gently sloping terrain dominated by fine-grained glacial sediment with discontinuous permafrost is indicated in the geodatabase, and on surficial geology and applied terrain maps. Passive construction techniques that avoid potentially unstable terrain identified by terrain mapping; installing piles into permafrost; construction of aggregate pads to insulate subjacent permafrost; and preserving the protective cover should be employed where possible. Non-passive construction involving the removal of surficial cover to competent bedrock may be possible in areas where a drift cover of less than 5 m thick is recorded.

RECONNAISSANCE DRIFT SAMPLE SURVEY AND GLACIAL HISTORY OF THE TROUT LAKE 95A NTS MAP SHEET, NWT

Huntley, D., Duk-Rodkin, A.[1], Mills, A.[2] and Paulen, R.[3]

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[2]Northwest Territories Geoscience Office, Yellowknife, Northwest Territories
[3]Alberta Geological Survey, Edmonton, Alberta

The Geological Survey of Canada (GSC) is compiling an inventory of terrain, landforms and geomorphic processes for the Mackenzie Valley transportation corridor, including parts of the proposed Sambaa K'e Protected Area Strategy Candidate area. Here, we present a preliminary interpretation of air photos, field data, shothole records and digital elevation models for the Trout Lake map area (NTS 95A) to better understand the history, character and distribution of surficial deposits. This work will provide government agencies, industry and the public access to secure and reliable geoscience information on surficial materials and surface processes such as landslide hazards, and regional mineral and aggregate potential. Project outputs, including GSC Current Research papers, Open Files and Maps, can be used in mineral and energy resource evaluations, environmental assessments and land-use planning. Possible outcomes of our work include the attraction of new investment and reduction of risks for exploration and development of natural resources in the Northwest Territories.

INAC-NWT REGION'S INTERIM APPROACH TO S.35 CROWN CONSULTATION

Jackson, J. - Indian and Northern Affairs Canada, Yellowknife, Northwest Territories

In 2004 and 2005, the Supreme Court of Canada issued three landmark rulings (*Haida Nation, Taku River Tlingit and Mikisew Cree*) that represented a major shift in the legal requirements for consulting Aboriginal people. In these decisions, the Court gave further legal clarification on the nature of the Crown's legal duty to consult with Aboriginal peoples. In short, the Courts said that when there are actions or decisions that the Crown is contemplating, that could potentially have a negative impact on an established or potential Aboriginal or treaty right, the Crown has a duty to consult, and possibly accommodate, Aboriginal groups in question.

The Government of Canada is developing a policy to make sure this duty is met. However, due to the unique nature of the Northwest Territories' legislative and regulatory environment, the status of Aboriginal negotiations processes and the fast pace of natural resource exploration and development there has been a need for a proactive, interim approach in the NWT to deal with non-Mackenzie Gas Project-related Crown consultation issues. This presentation will provide an overview of the INAC-NWT Region's progress with respect to its interim approach to s.35 Crown Consultation.

THE SOUTH WOPMAY BEDROCK MAPPING PROJECT: A SUMMARY OF FIELD AND INTEGRATED LABORATORY STUDIES

Jackson, V.A. - Northwest Territories Geoscience Office, Yellowknife, Northwest Territories

The south Wopmay bedrock mapping project lies along the western edge of the exposed Canadian Shield, approximately 225 km northwest of Yellowknife. The completed map represents a transect from the west edge of the Archean Slave craton across the Paleoproterozoic Wopmay orogen to the Cambro-Ordovician platform. The presentation summarizes the results of four seasons of bedrock mapping, focused on Wopmay orogen, and provides a preliminary overview of a variety of results from related integrated studies.

Wopmay orogen is bisected by the N-S Wopmay fault zone (Wfz). Areas east of the fault zone are underlain by variably deformed Paleoproterozoic and Archean supracrustal and plutonic rocks, whereas in areas west of Wfz, Archean rocks are absent and Paleoproterozoic plutonic rocks of the Great Bear magmatic zone, including volumetrically minor volcanic rocks and subvolcanic porphyries predominate. Archean basement rocks of the Slave craton are exposed to within a kilometre east of Wfz and the Paleoproterozoic Snare and Akaitcho(?) groups are mainly autochthonous with respect to this basement. Mafic sills, possibly correlative with the Morel Sills, and weakly deformed Proterozoic granitoids intrude both Archean basement and Proterozoic cover rocks. The Paleoproterozoic metamorphic grade increases from greenschist facies adjacent to the Slave craton to at least mid-amphibolite facies in the northwest. West of Wfz, the only identified basement consists of semipelitic rocks of the Paleoproterozoic Treasure Lake Group.

U-Pb zircon crystallization and detrital geochronology, and preliminary isotopic investigations suggest that: Archean basement may not extend west of Wfz; the ages of Proterozoic plutonic rocks on both sides of Wfz (except deformed mafic sills) are ca. 1.88 to 1.86 Ga and; some Proterozoic magma interacted with rocks equivalent in age to the enigmatic Hottah Terrane (ca. 2.0-2.4 Ga). Detrital zircon studies on the Snare, Akaitcho(?), and Treasure Lake groups reveal a spectrum of Archean zircons, whereas the Akaitcho(?) and Treasure Lake Groups contain 'Hottah' zircons and the Treasure Lake Group contains significant ca 1.8 Ga detritus. Regional geochemical characterization of the major magmatic suites and tracer isotopic studies are underway and detailed studies are being undertaken on selected volcanic and subvolcanic rocks of the Great Bear magmatic zone and on Proterozoic mafic dykes and sills. ^{40}Ar-^{39}Ar analyses provide targeted cooling age determinations on intrusion of the 'Arm' Lake ultramafic plug, the movement history of Wfz, the extent of Paleoproterozoic overprint on Archean basement rocks and, along with Re-Os analyses, Mo-U mineralization at DeVries Lake; interpretation of the results is pending. Metallogenic studies suggest differing economic targets on either side of Wfz. IOCG/U potential is described in the Great Bear magmatic zone, and a newly recognized potential for unconformity-related U is stressed (see Ootes et al., this volume). East of Wfz, fine-grained clastic rocks (Snare/Akaitcho(?) Group) contain abundant stratabound sulfide-rich zones. Finally, reassessment of the kimberlite and diamond potential of the area is warranted from seismic and magnetotelluric studies that indicate the Slave cratonic margin may extend westward beyond the Wfz.

CYCLIC GROWTH CONDITIONS FOR DIAVIK DIAMONDS? INSIGHTS FROM CARBON ISOTOPES

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It is well-established that the two stable isotopes of carbon (^{13}C and ^{12}C) partition variably into different mineral and fluid phases. Although the magnitude of this effect is small (less than 4‰ at 1000°C), this phenomenon makes carbon isotopes an ideal medium for the study of the behaviour of carbon-bearing species in the mantle, and in particular for the study of mechanisms of formation of diamond. The diamonds studied come from the A154 South pipe of Diavik Mine, NWT, a location known for producing exceptionally high quality diamonds.

In addition to clear, gem-quality crystals, diamond can also be translucent to opaque, with shades ranging from creamy white to dark grey. The opacity of this type of diamond is due to the presence of millions of sub-micron inclusions which sometimes occur radially aligned, giving the diamond a fibrous appearance. In the central (Ekati, Diavik) and southern Slave (Snap Lake) octahedral diamonds commonly exhibit an opaque coat surrounding a clear core, while cuboid crystals may be opaque throughout. Clear coats surrounding opaque or clouded cores are rare. The diamonds in this study exhibit both clear cores with opaque coats and vice versa. Some samples show alternating clearer and opaque layers.

It is evident that distinct processes are responsible for the formation of clear and opaque diamond. A study of intra-diamond carbon isotope variation has been conducted by secondary ion mass spectrometry (SIMS) with the goal of elucidating these processes. The carbon isotope composition was measured across the samples in profiles with a spacing of spots ranging from 80-100µm. Measured $\delta^{13}C$ values are approximately -4 to -5‰ and -6 to -8‰ (PDB) for clear and opaque diamond, respectively. These values correspond well with earlier studies of diamonds from the same location.

Although contacts between clear and opaque layers within the diamonds are sharp and have correspondingly abrupt $\delta^{13}C$ variations, some $\delta^{13}C$ profiles show gradational boundaries on scales of up to several hundred microns. Two possible explanations for this phenomenon are considered: 1) Initially sharp $\delta^{13}C$ boundaries have been blurred by diffusive relaxation, and 2) different layers of diamond were formed by pulsed injection of fresh fluid that gradually reached equilibrium with its surroundings.

ENVIRONMENTAL STUDIES RESEARCH FUNDS ONLINE SUMPS DATABASE

Robert Jenkins - Water Resources Division, Indian and Northern Affairs Canada

In 2004, an Environmental Studies Research Funds (ESRF) Technical Advisory Group (TAG) with Government, the Inuvialuit, and Industry representatives was formed to develop a strategy by which to inventory and assess historical sumps in the Mackenzie Delta area of the Inuvialuit Settlement Region, N.W.T. The TAG developed a site assessment protocol that was to be tested by assessing a limited number of historic sumps. The protocol outlined sampling requirements and methods to be undertaken at the site during the collection of environmental information. Other industry parties agreed to apply the ESRF assessment protocol to numerous historical sumps in the Mackenzie Delta Region and to provide the assessment data to INAC for compilation. In summer 2004 a total of approximately 80 sites were assessed by the ESRF and Industry initiatives. In summer 2005, industry continued its assessments, collecting environmental information from remaining historic sump locations in the Mackenzie Delta Region. During the initial project permitting stage in 2004, all parties agreed that site assessment data should be compiled in a central database accessible to all interested parties and it was proposed at that time that INAC would house the data. The provision of site assessment data will greatly enhance the ability to make informed decisions on how to manage the historical sites. Currently, all information collected during the ESRF and industry site assessments have been compiled within the database, which will be publicly available through the Indian and Northern Affairs Canada website. Public release is anticipated to be early in 2008.

PERIDOTITE XENOLITHS FROM THE MONUMENT PROPERTY, SLAVE CRATON, NWT, CANADA

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Fresh peridotite xenoliths and xenocrysts from two diamondiferous kimberlites, Nic and DD-17-11, from New Nadina Explorations Ltd.'s Monument property, Slave Craton, Lac de Gras, NWT, were selected for this study. The twelve mantle xenoliths based on petrographic criteria include harzburgites (two samples), lherzolites (nine) wehrlites (one) and two macrocrysts of clinopyroxene. The Mg# [Mg/(Mg+Fe)] of olivine in these peridotites ranges from 0.88-0.93 with a mode of 0.92, similar to olivines from cratonic garnet peridotites world wide. All analyzed garnets are lherzolitic (G9) in composition and show a range in Cr_20_3 from 2.39-8.93 wt%. Garnets from the majority of lherzolitic xenoliths plot in the G9D field of Grütter et al. (2003) indicating derivation from potentially diamondiferous mantle. Two garnets were analyzed for their trace element content using LA-ICPMS and show "normal" REE_N patterns (positive slope from $LREE_N$-$MREE_N$, flat $MREE_N$-$HREE_N$ at about 10x chondritic abundance). "Normal" REE_N patterns are commonly observed for garnets from lherzolitic xenoliths derived from kimberlites world-wide. Geothermobarometic calculations based on the single cpx geothermobarometer of Nimis and Taylor (2000) and the two pyroxene thermometer and garnet-opx barometer of Brey and Köhler (1990) indicate derivation of the xenoliths and clinopyroxene macrocrysts from 150-190 km depth, i.e. exclusively from within the diamond stability field. The samples show a spread in suggested geothermal gradients, indicative of thermal perturbations or incomplete equilibration; on average, equilibration along a model geotherm consistent with 38-40mw/m^2 surface heatflow is indicated. Overall, the samples compare well with previous studies on the deeper, more fertile portion of lithospheric mantle beneath the Lac de Gras area (Griffin et al. 1999).

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PERMAFROST RESPONSE TO CLIMATE WARMING SOUTH OF TREELINE, MACKENZIE DELTA, NORTHWEST TERRITORIES, CANADA

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The mean annual ground temperature (MAGT) at two sites in the Mackenzie delta, south of treeline, has increased by 0.3 ºC and 0.7ºC over the past 40 years. This ground warming is less than reported from the adjacent tundra uplands. The hypothesis that MAGTs in the boreal forest region of the delta may have a reduced response to climate warming due to the thermal influence of numerous water bodies has been investigated with an equilibrium geothermal model. The model indicates that water bodies have a warming influence on MAGTs up to 750 m from the lake or channel. If lake-bottom temperatures do not respond to climate warming, or warm more slowly than ground surface temperatures, then MAGTs at sites close to water bodies will warm more slowly than sites located greater than 750 m away. This may partly explain the apparent dampening of ground thermal responses to climate change in the delta.

THE NORTHWEST TERRITORIES GEOSCIENCE OFFICE – CURRENT AND FUTURE DIRECTIONS AND EVOLVING PARTNERSHIPS

Ketchum, J. and Cairns, S. - Northwest Territories Geoscience Office, Yellowknife, Northwest Territories

The Northwest Territories Geoscience Office (NTGO) is the geological survey organization for the NWT. Located in Yellowknife, NTGO staff carry out a diverse range of activities including geological mapping, non-

renewable resource assessments, outreach and education, data management and delivery, and administering a portion of the Canada Mining Regulations. Both the federal and territorial governments are partners in NTGO.

Since 2005, Indian and Northern Affairs Canada's Strategic Investments in Northern Economic Development initiative has funded NTGO geoscience work to the tune of $2 million a year through the Targeted Investment Program (TIP). This financial commitment recognizes that improved public geoscience knowledge can stimulate private sector investment in non-renewable resource exploration and development. An improved knowledge base can also contribute to better-informed land use decisions. With TIP support, NTGO has been able to 'grow' a number of activities including framework geological mapping, contracted airborne geophysical surveys, development of a GIS web portal, data mining and database enhancements, and a number of smaller projects. Many of these projects involve partnerships with the Geological Survey of Canada, industry, and/or universities. Field activities in particular provide excellent training opportunities for students and early-career geologists.

NTGO is currently looking ahead to the future. Of particular interest are opportunities linked to both existing and new federal government programs. One such program is the multi-year Northern Mineral Resource Development (NMRD) program. NMRD targets important public geoscience work in Yukon, NWT, and Nunavut, and expands the opportunity for partnerships with the Geological Survey of Canada. Enhanced federal-territorial sharing of human and fiscal resources can yield a competitive advantage in providing relevant, modern, and easily-accessible public geoscience knowledge. This knowledge is critical for reducing exploration risk and helps to attract a larger share of the global mineral and petroleum exploration budgets. It can also assist with the land use planning and economic development aspirations of aboriginal communities and corporations.

PELLY BAY DIAMOND DISTRICT: UPDATE ON DISCOVERY

Kienlen, B. - Diamonds North Resources Ltd, Vancouver, British Columbia

The Pelly Bay Diamond District is developing into one of the most significant diamond plays in Canada. Diamonds North has discovered 22 kimberlites on the property during the last two drill seasons, 17 this past summer. The company believes that world class diamond deposits are found in areas with the right geological setting, where there are numerous kimberlites, strong mineral chemistry, high ore grades, good tonnage and high stone value. For a company's shareholders to recoup their investment and earn a significant profit, a company needs to have a large interest in the property. We believe these ingredients are present in Diamond North's Pelly Bay Diamond District and this presentation will demonstrate the evidence from our 100% Amaruk project.

The Pelly Bay Diamond District is situated at the southern end of the Boothia uplift on the Wager Plateau in north central mainland Nunavut. The basement is the Archean aged Rae Province with overlying Paleozoic sedimentary rocks (sandstone and carbonate) preserved on the Simpson Peninsula. Recent age dating by the GSC revealed that 3.0 Ga crust underlies the Amaruk Property.

Approximately 100,000 line kilometres of detailed airborne magnetics to date, with more detailed magnetics planned for 2008, has revealed more than 500 geophysical targets across an area approximately 100km x 50km. Ground magnetics has been completed on >250 targets, detailed helimagnetics on >150 targets, ground truthing on >450 targets. Nearly 85 targets have been drill tested to achieve the 22 discoveries. Each year's drilling campaign has helped to refine the characteristics of kimberlite signatures which will guide us toward further discoveries over the coming years.

Amaruk's mineral chemistry is strongly indicative of a significant diamond bearing mantle below the earth's crust. Abundant G10D garnets, DI chromites, and chrome diopsides provide compelling evidence of a cool sizable diamond forming environment and these indicators are used to assist in selecting the highest diamond potential anomalies. Microdiamonds from two locations on the property show characteristics of very high value stones. This years sampling of two highly diamondiferous bodies will provide better estimations of size and grade potential of these two bodies as well as their prospective value. Caustic samples from the new discoveries will provide direction for 2008 diamond drill sampling.

This season's short summer and technical difficulties forced us to leave opportunities for the coming season. Most of this years detailed 50m spaced magnetic data has only been rapidly interpreted before final levelling and this winter the data will be thoroughly studied.

Planning for next years programs has begun and new discoveries are around the corner.

Diamonds North Resources Ltd. controls the Amaruk property 100% and has partnerships with International Samuel on some of the adjacent priority ground. Partnerships are also with Arctic Star Resources and Shear Minerals in the Franklin Diamond District to the southwest of the Pelly Bay Diamond District.

NEW NADINA EXPLORATIONS LTD DRILLS AND DISCOVERS MORE KIMBERLITE AT LAC DE GRAS

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New Nadina Explorations Ltd and partners continue aggressive exploration on the Monument Property at Lac De Gras, NWT. Large diameter drilling sampled DD17 and RIP in 2007 resulted in cumulative samples of 2.17 and 2.36 tonnes respectively, which being processed now. Exploration drilling around the Blue Pearl complex and DD39 complex discovered new kimberlite dikes and blows, and testing of land-based geophysical targets resulted in a new kimberlite discovery named Genie. New targets under lakes and swamps remain to be drill tested.

The Monument property has a high density of diamond-bearing kimberlites, and kimberlite pipe and dike complexes. Drilling between Rip and DD17-11 intersected a 30 cm kimberlite dike that suggests kimberlites DD17, Rip and DD17-11 are not only close to one another, but may be comagmatic. These kimberlites are part of the Blue String of Pearls complex, and each kimberlite contains significant diamonds, and are similar to one another in eruption style and geophysical signature, and have similar mantle nodules, mineralogy and diamond content.

Recent diamond drilling near kimberlite DD39 has identified another string of kimberlite blows and dikes that is similar to the blue string of pearls. DD39 has a row of geophysical anomalies that will likely result in discovery of new kimberlite blows and dikes as this area.

Kimberlite Genie was the most significant discovery in 2007. Anomaly M94-07 was picked from detailed ground magnetics as a pipe-like feature, and has a magnetic signature was unlike other kimberlites on the property. Other similar magnetic targets are in the cue for testing in spring 2008.

New Nadina is well positioned for future exploration, with two diamond drills on site, and a brand new camp consisting of 5 framed cabins, a first aid building and latrine, a large kitchen-dry and an office-coreshack. In winter a 40 km spur connects the camp to the Tibbitt-Contwoyto winter road.

The Monument Property consists of three mineral leases located on the south shore of Lac De Gras where operator New Nadina Explorations Ltd holds 57.49% interest with partners Chris and Jeanne Jennings 22.11% and Archon Minerals Ltd 20.4%. A 1% royalty is payable to Kennecott Canada Exploration Inc and DHK Diamonds Inc. New Nadina Explorations Ltd is operator, and subcontracted SouthernEra Diamonds Inc in 2007 to conduct field operations.

CLIMATE CHANGE AND THE ARCTIC

Kochtubajda, B. - Environment Canada
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Climate change is projected to considerably alter future physical, biological, and socio-economic systems over many regions of the world. Of particular concern are high latitudes that are extremely sensitive to climate variations, and are expected to experience the greatest impacts resulting from climate change. In the Arctic, significant changes to temperature and precipitation will affect several physical processes such as the magnitude and timing of freshwater entering and exiting the Arctic Ocean, sea-ice duration, permafrost and snow cover extent, and the timing of freshwater freeze-up/break-up. Projected changes will also impact various socio-economic activities ranging from transportation and infrastructure to natural resource exploration and development. The importance of the Arctic is reflected in major international assessments including the Arctic Climate Impact Assessment (ACIA, 2005) and the Third and Fourth Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC, 2001; 2007).

MASSIVE ENVIRONMENTAL CHANGE IN THE OUTER MACKENZIE DELTA: A TEMPLATE FOR DETECTING ECOSYSTEM CHANGE

Kokelj, S.V. - Water Resources Division, Indian and Northern Affairs Canada, Yellowknife, Northwest Territories

With recent increases in hydrocarbon exploration and the proposal to develop the Mackenzie Gas Project, government agencies, corporations, and local residents seek to understand, mitigate and reduce the impacts of development. In this paper we describe a recent, large scale, unprecedented ecosystem change that has occurred in the outer Mackenzie Delta. An intense storm in September 1999 caused the incursion of seawater onto low-lying terrain of the outer Mackenzie Delta. This event salinized soils causing willow and sedge wetland vegetation to die, impacting hundreds of square kilometres of migratory bird habitat from Niglintgak Island to the Blow River Delta. Eight years later, soil chloride concentrations exceed 5000 mg/l at some sites and vast areas of once productive habitat remain devoid of vegetation. The frozen active layer and poor drainage inhibits flushing of the salts by spring flooding so that saline conditions may persist for decades. Stratigraphic, dendrologic and anecdotal evidence indicate that the event is unprecedented during the last century. In this context we discuss the importance of establishing a monitoring framework and implementing a program than will help us understand natural environmental variability in a complex setting such as the Delta. This type of program can generate information that is essential for discriminating development impacts from natural drivers of change.

ENVIRONMENTAL ORE DEPOSIT MODELS FOR THE CANADIAN NORTH – PROGRESS REPORT

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In 2006, CANMET Mining and Mineral Sciences Laboratories, Ottawa, the Yellowknife and Iqaluit Mineral Resources Divisions of Indian and Northern Affairs Canada, and the Yukon Geological Survey began a collaborative project to correlate selected Canadian northern ore deposits with their environmental behaviour pre-, during and post-mining. By integrating baseline, mining method, mineral processing and mine waste management information with geological models, the three-year project aims to highlight environmental challenges and possible solutions for mining specific types of ore deposits. It is hoped that such knowledge will encourage mine proponents to recognize potential risks, especially during advanced exploration, such that cost-effective solutions may be implemented early in the mine life. This will in turn aid all stakeholders to make appropriate development and future land use decisions.

Initial project efforts have focused on uranium in Nunavut, diamonds in the Northwest Territories and sedimentary exhalative lead-zinc deposits in the Yukon. To date we have compiled background information on the geology and mineralogy of the three selected deposit types. A site visit to AREVA Resources' Kiggavik uranium property near Baker Lake gathered data for comparison with similar deposits in the Athabasca Basin and to identify unique challenges associated with uranium development in permafrost terrains. Reconnaissance surveys conducted at Selwyn Resources' XY deposit near Howard's Pass and at the Faro Mine, currently under remediation, led to a better appreciation of mineralogical controls of acid generation, metal leaching and attenuation occurring at these two geologically contrasting, lead-zinc deposits. Much insight was also gained on how sulphidic mine waste could be managed to avoid or minimize long-term acid mine drainage problems. Data review of environmental monitoring reports submitted to government agencies by Diavik Diamond Mines Lac de Gras and Billiton's Ekati diamond mine indicates that climate-change disruptions to chemical and physical stability of waste rock piles and dams constructed in permafrost, and dispersion of mine process elements into drainage basins and open pits through unexpectedly permeable structures pose some of the environmental challenges to mine operators. Complementary field work will be conducted next year to clarify the environmental signatures of diamond deposits in the Northwest Territories.

In order that stakeholders may fully appreciate the linkages among geologic attributes of an ore deposit, its environmental setting, mining history/future and its environmental behaviour, targeted deliverables of the inter-agency project will include a simple-language

report for lay people in addition to scientific publications. Technology-transfer workshops will help build and disseminate research findings.

COLOMAC REMEDIATION PLAN DEVELOPMENT - INVOLVING TRADITIONAL KNOWLEDGE APPROACH OF THE TLICHO ELDERS

Lafferty, G. - Indian and Northern Affairs Canada, Yellowknife, Northwest Territories

The reclamation of mines, both operating and abandoned, has become an important issue for Northern Aboriginal Peoples. Industry and government need to involve peoples most affected by these projects in the decisions related to determining a reclamation plan. Decisions must be made that consider legal, regulatory and policy requirements, scientific and technical standards and practices, traditional knowledge and cultural values. A Colomac Mine Project case study will be presented to highlight the Tlicho Elders involvement during the remediation development plan, the decision process developed by INAC, and the collaborative mine options selections process completed by both the Tlicho First Nation and the Department of Indian Affairs and Northern Development (DIAND). The presentation will conclude with highlights on the benefits of involving aboriginal people. Tlicho Chief Executive had the opportunity to use its values and priorities to systematically assess project risks and to ultimately select a preferred option for the closure of Colomac. Although the process encountered many challenges, the mine closure plan, or project description, resulting from the process met the needs of both partners. The planning and decision-making process involving the aboriginal people has resulted with positive feedback and minimum concern during Public Consultation Meetings and therefore did not require a public hearing. This presentation will include: Introduction of the issue; Description of the remediation plan process and decision-making process; Highlights of the challenges and benefits for each partner; Highlights the benefits of aboriginal involvement during the pre-construction and progressive remediation stages.

PRELIMINARY STRUCTURAL INTERPRETATION OF SEISMIC DATA IN THE SOUTHERN PEEL PLATEAU AND PLAIN: LINKING THE NORTHERN MACKENZIE AND FRANKLIN MOUNTAINS

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Peel Plateau and Plain lie within the Interior Plain of the Northern Mainland Sedimentary Basin in the Northwest Territories and Yukon Territory. The region is bounded by the Mackenzie Mountains, Mackenzie Plain and Franklin Mountains to the south, and the Anderson Plain to the east. Peel Plateau and Plain have widespread hydrocarbon potential, yet the area is underexplored and its geological history remains poorly understood. To expand geoscience knowledge of the area, thematic studies have been initiated by the Northwest Territories Geoscience Office and collaborators to address knowledge gaps pertaining to basin evolution, tectonic history, and petroleum potential of the area. The geometry and kinematics of Phanerozoic regional structures are being re-examined in light of recent detailed fieldwork and preliminary interpretation of seismic data.

The southern Peel Plateau and Plain region marks a profound change in structural style from broad anticlines with intervening narrow synclines in the northern Mackenzie Mountains, to linear and narrow ridges in the northern Franklin Mountains to the east-northeast. Although south-vergent structures are observed locally, the Mackenzie Mountains are dominated by north to northeast-vergent thrust faults and commonly expose Proterozoic strata of the Katherine Group and Tsezotene Formation in the core of broad anticlines, suggesting translation above a "deep" detachment. The northern Franklin Mountains, however, are marked by drape folds, reversal of fold asymmetry and direction of faulting, and expose no strata older than Cambrian Saline River, above which they appear to be detached. Dominant structures typically trend northwest-southeast, but swing to the west near Carcajou Ridge, mimicking those of the Mackenzie Mountains. The contrast in structural style between these two belts has been attributed to a physical link between a deep detachment beneath the Mackenzie Mountains and a shallow one underneath

the Franklin Mountains, but the nature of this transition remains poorly understood.

The Whirlpool fault, a southeast-vergent thrust fault of regional extent, has been identified as a potential structure linking the western termination of the Franklin Mountains to Southbound Ridge, a structurally complex area marking the Mackenzie Mountain front near Hume River. Preliminary observation of subsurface data along the Whirlpool fault indicates, however, that it is a complex transfer zone marked by southeast-vergent thrust faults, northeast- and southwest-striking reverse faults, and northeast-trending folds that can be mapped continuously from Carcajou Ridge to Southbound Ridge. The northeast-southwest structural trend of this transfer zone is in marked contrast with those in adjacent areas, and may suggest some degree of oblique contraction.

Interpretation of subsurface structures suggests left-lateral transpressive deformation associated with the zero edge of Saline River evaporites. East of the evaporite zero edge, the Franklin Mountains sheet moved northward above a weak basal detachment; to the west, however, the Mackenzie Mountain front, and Peel Plateau and Plain sheet was "pinned" to its substratum due to the absence there of the Saline River Formation. The orientation of pre-existing basement structures may have influenced the development of this northeast trending transfer zone.

MVLWB'S PUBLIC INVOLVEMENT GUIDELINES

Lennie-Misgeld, P. and Bayly-Atkin, J. - Mackenzie Valley Land and Water Board

The Mackenzie Valley Land and Water Board (MVLWB) is a regulatory authority established under the *Mackenzie Valley Resource Management Act*. The MVLWB's primary function is the issuance of Land Use Permits and Water Licences in the unsettled land claims areas of the Mackenzie Valley. The Board also processes transboundary Land Use Permit and Water Licence applications in the Mackenzie Valley.

The MVLWB requires applicants to conduct public engagement before submitting an application to the Board. When an application is submitted to the Board, detailed information documenting all public engagement activities must be included. If this information is not provided, the application will likely be declared incomplete resulting in delays in obtaining approvals.

To assist applicants in conducting their public engagement activities, the MVLWB has developed 'Public Involvement Guidelines'. The presentation will outline:

- Purpose of the guidelines
- Public engagement information requirements
- Key public engagement principles and elements
- Public engagement methods and 'how-to' advice
- Benefits of conducting early public engagement

DIATREMES AND RELATED VOLCANIC ROCKS OF THE LOWER PALEOZOIC MISTY CREEK EMBAYMENT, MACKENZIE MOUNTAINS, NT

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A comprehensive study of volcanic deposits (Marmot Formation) associated with the lower Paleozoic Misty Creek Embayment (MCE) in the central Mackenzie Mountains, NWT, was undertaken to characterize the geochronological, petrographical and geochemical nature of this submarine volcanism in the middle Ordovician. The MCE is a 100 x 150km, northwest trending, rectangular basin bound by Ordovician platformal carbonates with volcanic complexes dominating in the centre and cross-cutting diatremes and associated volcaniclastic deposits along the basin margins. A reconnaissance level sampling program of 16 different exposures of mafic igneous units within the MCE was undertaken in August, 2007, in collaboration with the Sekwi Mountain Project, NTGO.

Igneous deposit types within the MCE comprise diatremes, volcanic vents and related dykes, volcanic tuffs and basaltic lava flows. The diatreme-related volcanic rocks are presumed to be mid Ordovician in age, based on stratigraphic relationships such as cross cutting dykes and their related strata-bound volcaniclastic deposits. Early to Late Ordovician platformal carbonates of the Franklin Mountain and Mount Kindle formations and their basinal equivalents contain the volcanic deposits. Some diatremes are exposed at deeper stratigraphic levels owing to

differential erosion. The diatremes range from small (~50m in diameter) breccia pipes to large (~700m in diameter) internally complex pipes (e.g., Mountain Diatreme). They generally consist of highly fragmented carbonate±chlorite altered breccia bodies with a modally high percentage of angular to rounded country rock xenoliths. Local zones (e.g., central pipe) comprise phlogopite, chlorite and carbonate altered olivine-bearing pyroclasts in a more homogenous, fine-grained, green groundmass. Tuffisites are commonly observed and are locally strata-bound with brachiopod-bearing carbonate rocks of the Franklin Mountain Formation. The tuffisites are typically phlogopite porphyritic in a green, aphanitic groundmass. Where observed near diatreme centers they contain abundant country rock xenoliths ± phlogopite phenocrysts, and weather rusty orange. Basaltic lavas are commonly observed along the western margin of the basin, including thick deposits (~300m) that are locally pillowed and bedded. These volcanic units are distinct in that they contain fresh olivine and clinopyroxene phenocrysts.

The Mountain Diatreme has been of economic (diamond) interest for many years, however, it has only received a limited amount of petrological study. This investigation will provide new insight into the nature of this volcanic activity and characterization of the mantle source. Twenty-five samples, selected on the basis of spatial relationships and preservation of fresh volcanic textures, are currently being processed for whole rock geochemistry. Ar-Ar dating of phlogopite phenocrysts from 15 different samples from many of the deposits is also underway. These new data will provide critical information regarding the evolution of the MCE and the Selwyn Basin.

CRETACEOUS COAL IN THE SEKWI RANGE, MACKENZIE MOUNTAINS, NWT (105P/11).

Long, D.[1] and Gordey, S.[2]

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Over 1.3 km of steeply dipping, predominantly muddy, organic rich, post-Berriasian to Campanian strata, are preserved between two high-angle faults, in a 2 km x 20 km panel immediately south of the Canol Road in the Sekwi Range of the Mackenzie Mountains. Sandstones form about 10% of the exposed sequence, and are interpreted as deposits of high to intermediate sinuosity sandy meandering rivers and associated levee and splay facies. Conglomerates form less than 5% of the succession. They are common near the base of the exposed sequence, where they form sheets of possible braided stream origin, and form a minor component in the upper km, where they record deposition in intermediate sinuosity gravel-bed meandering systems that occupied only a small part of the alluvial plane. The thicker pebble and cobble conglomerates are dominated by clasts of silicified quartz arenite, which may have been derived from the Cambrian Backbone Ranges Formation. Associated clasts of black and grey chert, which forms up to 20% of some units, may have been derived from Devonian carbonates of the Landry Formation, or from units no longer preserved in the Sekwi area, such as the Permian Fantasque Formation. At least four 40 to 50 cm thick seams of low-volatile bituminous to semi-anthracitic coal, are present in this sequence. Further seams may be hidden in covered intervals, as coal is a common component in talus. All of the strata within this Cretaceous outlier are highly deformed and have been subject to intense shearing during the later part of the Cordilleran orogeny. The coals and associated clastics appear to have been deposited in a restricted terrestrial intermountain setting, characterized by relatively stable sand and gravel-bed rivers which meandered through extensive flood-plain marshes. The predominance of chemically resistant pebbles in the conglomerates suggest deposition in a humid tropical to subtropical setting, similar to that responsible for deposition of Early Cretaceous coals preserved to the west in the Whitehorse Trough.

THE PLATEAU THRUST: A DETAILED INVESTIGATION AND CHARACTERIZATION OF THE DEFORMATION IN ITS FOOTWALL, NTS SHEET 106A, MACKENZIE MOUNTAINS, NWT, CANADA.

MacDonald, J. and Lin, S. - University of Waterloo, Waterloo, Ontario

The Plateau Thrust is the most significant NW-SE striking structure in the Mackenzie Mountains. It has long been hypothesized to be either a low angle, far traveled thrust fault consistent with a “thin skinned” model, or a higher angle, basement-controlled, reverse fault more akin to a “thick skinned” model. There is potential that the Plateau Thrust may incorporate both styles of faulting along strike.

An obvious pattern is visible at the map scale whereby the hanging wall of the thrust consists of relatively undeformed, gently to moderately southwest dipping sedimentary rocks, and the immediate footwall is intensely shortened, with steeply southwest dipping strata that is in some instances overturned. In the 106A map sheet, the deformation in the immediate footwall is confined to a zone that is bounded on the southwest by the Plateau Thrust and on the northeast by the Shattered Range Anticline, a gentle box fold. This zone is approximately 10 kilometres wide and is locally continuous along the strike of the thrust, and was the focus of 2006/2007 detailed structural mapping.

The shortening in this deformation zone is accommodated by high angle imbricated thrust faults thought to have formed by steepening as they approached the synorogenic erosion level, resulting in surface dips of approximately 40 – 60 degrees. In addition to faulting, large scale open to tight asymmetric folding is observed in the carbonate units, and chevron and kink folds are observed in the Devonian clastic units. Several examples of back-thrusting have also been observed in this zone.

The immediate footwall sedimentary rocks are thought to deform above a large detachment commonly occurring at the level of the Gypsum Formation, upper Little Dal Group. Farther to the southeast the nature of the thrusting changes, whereby a second detachment forms at a lower stratigraphic level, resulting in Katherine Group sedimentary rocks structurally overlying the younger Upper Carbonate Formation, Little Dal Group. In addition, detailed mapping identified a unique structure in the form of a folded thrust fault. This structure might have formed by contemporaneous thrusting and folding, resulting in an anticline where the Paleozoic Bear Rock Formation is exposed in the core and is structurally overlain by the Proterozoic Gypsum Formation, Little Dal Group.

In addition to structural mapping, part of this thesis is concerned with the hydrocarbon potential underneath the Plateau Thrust. The presence of bituminous limestone in the Devonian Hume Formation suggests potential for hydrocarbon in the Paleozoic rocks underlying the thrust sheet. However, this is dependant on the model preferred to explain the structure of the Plateau Thrust.

A high angle fault would suggest little to no coverage of the Paleozoic sedimentary rocks and ultimately no potential for trap formation or accumulation of fluids. Alternatively, a low angle fault scenario would imply that the geometry is acceptable for trap formation, and there exists potential for a hydrocarbon reservoir. Ultimately, there are many criteria that must be fulfilled to allow for formation and accumulation of hydrocarbons, the correct structural setting for trap formation being one of utmost importance.

USE OF NINESPINE STICKLEBACK FOR ECOTOXICOLOGY STUDIES IN YELLOWKNIFE

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Miramar Con Mine Ltd. (MCML) has undertaken two phases of Environmental Effects Monitoring (EEM) of fish and benthic invertebrates in the Yellowknife area. Treated effluent is discharged from the water treatment plant and ultimately enters a small, narrow bay on Great Slave Lake called Jackfish Bay. The total length of the area exposed to treated effluent is approximately 7 km. Water quality parameters that are of potential environmental concerns are chloride, cyanide, ammonia, and nitrate and several metals including arsenic, copper, lead, nickel, zinc, and strontium. In 2004 and in 2007, ninespine stickleback were studied in areas exposed to effluent and areas away from effluent. Preliminary results showed that liver and gonads were different between the exposure and reference areas. In general though, there is no direct evidence that these effects have impacted the ninespine stickleback ability to survive or reproduce in the exposure area. The ninespine stickleback has proven to be a good species for ecotoxicological studies; baseline data collection about the species in the north is required.

THE IMPORTANCE OF EARLY ENGAGEMENT

Mackenzie-Scott, G., Tapsell, M. and Haefele, M. - Mackenzie Valley Environmental Impact Review Board

Consultation is a process of two-way communication where one party wishes to consult (or gather viewpoints) from others. Industry consults with interested parties about its proposed development and based from this consultation it predicts impacts and potential mitigation. This information is then presented to the Mackenzie Valley Environmental Impact Review

Board (Review Board) and the Review Board consults with the public, aboriginal organizations, communities and government departments on the environmental impacts of a proposed development. Finally, the Crown is consulting specifically with the aboriginal groups it is required to consult with under s. 35 on infringements on treaty or aboriginal rights. At least that is the theory. In reality, neither those consulting nor those consulted can easily and clearly distinguish between the various types of consultation and the water gets especially cloudy as to when exactly and how government should engages to perform its Crown consultation role.

This presentation will take a broad look at consultation from the Review Board's point of view. In the Review Board's view early engagement is key to good consultation and ultimately a successful and timely regulatory or impact assessment process. A clear separation between roles in the consultation process is virtually impossible. It may be in industry's best interest to set the distinction aside and "get on with the job". The presentation will include case studies showing how early engagement or lack thereof can have wide ranging effects on all involved and result in a relatively fast process or significant project delays.

ON THE PLATEAU FAULT AS A CONCEPTUAL HYDROCARBON PLAY

MacNaughton, R.B. and Fallas, K.M. - Geological Survey of Canada, Calgary, Alberta

The Mackenzie Mountains present poor prospects for hydrocarbon exploration. Published data indicate thermal maturities beyond the oil window, and large-scale structural traps are breached by erosion. The Plateau Fault—a westward-dipping, Laramide structure with a strike length of ~270 km—is a notable exception to this negative assessment, having been previously pointed to as a potential natural gas play. Any gas potential hinges upon the Plateau Fault having the geometry of a low-angle thrust in a region with appropriate source, reservoir, seal, and thermal history. Current work by the Geological Survey of Canada (Project Y59; "Mackenzie Corridor: Access to Northern Energy Resources") on the Plateau Fault aims to determine the fault's detailed structure, identify potential source rocks, and clarify thermal maturity in the Mackenzie Mountains. This work is being done in partnership with NTGO's "Sekwi Mountain Project".

New mapping demonstrates that the geometry of the Plateau Fault varies along strike. In Mount Eduni map area (NTS 106A), the Plateau Fault is a moderate-to-steep reverse fault, with cross-cutting relationships in the footwall and hanging wall. To the southeast, in Wrigley Lake map area (NTS 95 M), however, the Plateau Fault is a shallowly to moderately dipping thrust. Detachment is consistently within the rusty shale and gypsum formations of the Proterozoic Little Dal Group; these units could provide a seal along the hanging wall. The fault's surface trace suggests that a segment of relatively flat-lying hanging wall has overridden Palaeozoic strata in the footwall, producing a structural relationship similar to the Lewis Thrust in southwest Alberta.

Proterozoic units and platformal Palaeozoic (i.e., Mackenzie Platform) units have no known source-rock potential. The basinal Road River Group can preserve 2-3% TOC, but is a viable source for a Plateau Fault play only if present as tongues in the footwall succession. Clastic-dominated Devonian units (Hare Indian, Canol, and Imperial formations) are the most likely source rocks and are being studied by W. Zantvoort (NTGO; see abstract, this volume). Possible reservoirs include sandstone beds within the Imperial Formation or porous Palaeozoic platform carbonates. In Mount Eduni map area, pore-filling hydrocarbons (pyrobitumen?) are present in Lower to Middle Devonian strata (Arnica Formation?) in the Plateau Fault's footwall, immediately west of Ten Stone Range.

Because most samples have low TOC values, Rock-Eval methods commonly cannot be used to determine thermal maturity for units below the Canol Formation. Thermal maturity data from GSC paleontology reports (CAI for conodonts, TAI for palynomorphs) indicate that Cambrian to Devonian units are over-mature with respect to oil generation. However, in Wrigley Lake map area, where the Plateau Fault is most likely to form a trap, CAI data suggest that neither the footwall nor the hanging wall are overmature with respect to gas generation. The best prospects for a gas play would appear to lie within this map area—particularly in its northwest quadrant, where the Plateau Fault has thrust Little Dal Group upon Canol and Imperial formations.

WALLEYE MOVEMENTS AND LIFE HISTORY IN TWO INTER-CONNECTED LAKES IN THE NT - NICO PROJECT, FORTUNE MINERALS LTD.

MacNeill, W.S. - Golder Associates Ltd., Edmonton, Alberta

Fortune Minerals Limited (Fortune) proposes to develop a new gold-cobalt-bismuth deposit ("Nico

Project") in the Tli Cho Region of the North West Territories (NT). The project is located 150 km northwest of Yellowknife and 40 km northeast of the community of Wha Ti. Three years of baseline water quality and fish and fish habitat data were collected as part of the environmental impact review process. The primary goal of the aquatic surveys was to describe fish and fish habitat resources in all waterbodies that could be impacted by the mine development. Seven lakes located in close proximity to the mine site provide fish habitat; two connected lakes (Lou Lake and Lion Lake) support walleye populations. Although walleye are known to inhabit the Mackenzie River basin, including Great Slave and Great Bear Lakes, the presence of isolated populations in smaller lakes in the NT is uncommon. For this reason, the life history and biology of these populations are not well understood. To address concerns expressed by Fisheries and Oceans Canada (DFO), Fortune assigned additional resources to a walleye monitoring program, which began in 2005. Although walleye monitoring efforts were increased, due to the inherent sensitivity of walleye to light and the low turbidity (0 - 10 NTU) encountered in these waterbodies, walleye were primarily found in deep water habitats in Lou Lake (i.e. > 10 m), and although angling records indicated that walleye are abundant in Lion Lake, none were captured. Sampling with short duration gill-net sets at depths > 10 m was a successful sampling technique in Lou Lake, but resulted in increased mortality. It was hypothesized that the higher mortality levels encountered in deep water nets sets, was a result of insufficient time for individuals to ventilate their swim bladders when brought to the surface.

Beginning in 2007, to address the low walleye capture rates and elevated mortality rates caused by gill-netting at depths > 10 m, a fish counting/tagging fence was installed on the stream connecting Lou and Lion Lake, during the spring spawning period. Walleye have been observed spawning in this section of stream. Because walleye were not captured in Lion Lake during the fall surveys, it was hypothesized that individuals were moving into Lion Lake following spawning and migrating back into Lou Lake prior to freeze up. The fish fence was intended to provide insight into walleye migratory patterns and the size of the spawning population. To increase the sampling effort (while minimizing capture mortalities), a controlled catch and release angling program was implemented in Lou and Lion Lakes. The results and future initiatives of the Fortune Minerals walleye monitoring and catch release program will be discussed.

PRACTICE AND PERFORMANCE OF RECLAIMED MINE SITES IN TEMPERATE CLIMATES

MacPhie, L. - Technology, Mine Reclamation, Mining and Metallurgical Division, SNC-Lavalin Inc., Montreal, Quebec

Mining of ore and extraction of concentrates or precious minerals produce large quantities of mine wastes that have to be stored and managed permanently above ground over the long term. The wastes come in the form of mine rock that is stored in dumps and tailings that are stored in impoundments. At the end of mine life these wastes are rehabilitated to ensure that they do not adversely impact the environment. Particular consideration is required for rehabilitation of wastes which are potentially acid generating (PAG) since they may oxidize and leach metals. Mining companies have developed and applied rehabilitation measures to these wastes for many years in temperate climates and have tracked their performance.

This presentation will provide an overview of the common rehabilitation measures used in temperate climates, their performance and the need for monitoring and maintenance. The common rehabilitation measures addressed will include dry covers and collect and treat designs used for PAG rock wastes, as well as dry covers and water covers over PAG tailings. Finally the applicability of temperate zone rehabilitation measures to northern remote areas will be discussed.

NORTHERN ICE ROAD CHALLENGES AND FUTURE OPTIONS

Madsen, E. - Winter Roads Operation, Diavik Diamond Mines, Yellowknife, Northwest Territories

The Tibbitt to Contwoyto Winter Road operated by BHP Billiton Diamonds Inc. and Diavik Diamonds Mine Inc is considered the life line in supplying the annual requirements such as diesel fuel, prill, cement, and other general freight to maintain mining production levels. However, climate change is effecting the operation of this road. In 2006, only 6841 of the predicted 9000 loads reached site and forced the companies to airlift supplies at a considerable higher cost. This talk will describe the issues that face the Tibbitt to Contwoyto Winter road, the interim mitigations that are being undertaken as well as the longer term solutions under consideration to supplement the winter road moving forward.

THE NOVAYA ZEMLYA ARCHIPELAGO AND THE OIL BEARING POTENTIAL OF MIDDLE-UPPER PALEOZOIC CARBONATE AND TERRIGENOUS-CARBONATE STRATA OF BARENTS - NORTH KARA REGION, RUSSIA

Malysheva, S.V. – Currently BHP Billiton Diamonds Inc., Northwest Territories, Canada. - Research sponsored by Research Institute for Geology and Mineral Resources of the World Ocean, St-Petersburg State University, St-Petersburg, Russia

Oil and gas resources contained within the Russian Arctic Continental Shelf are currently an issue of international importance. Approximately 80 % of the estimated potential resources of the Russian Arctic Shelf are located under the Barents and Kara Seas where many oil, gas and gas-condensate fields have been identified. In this area, Mesozoic strata have proven to host most of the gas bearing formations, while Paleozoic strata are also oil bearing beneath the Pechora Sea, the offshore limb of the Timano-Pechorskaya Oil-and-Gas Bearing Province. To date, only minimal investigation has occurred in the Paleozoic strata of the Barents-North Kara region. The Novaya Zemlya (The New Land) archipelago lies adjacent to the Barents - North Kara region, and is an important study area for the interpretation of geological structure due to its development history, and the oil-and-gas content of adjacent basins.

This poster discusses the results of the most recent field investigation on the Northern Island of the Novaya Zemlya archipelago (VNIIO). Geological data and associated samples from Middle-Upper Paleozoic carbonate and terrigenous-carbonate strata were collected and petrographic, chemical, and Rock-Eval pyrolytic analyses performed. Positive factors for hydrocarbon potential in the area's Middle-Upper Paleozoic strata include high organic matter content, type of organic matter, lithological composition, and others. Moreover, in the North-Kara area Middle-Upper Paleozoic strata are located in the "Oil Window" zone. Thus, the major finding from this research is that the North-Kara Oil-and-Gas Perspective Area displays a high potential for oil reserves, located in the Middle-Upper Paleozoic strata.

U-PB ISOTOPIC SYSTEM OF ZIRCONS OF THE LOWER RIPHEAN SANDSTONES FROM THE EAST ANABAR SHIELD: PROVENANCE AND LOCAL SEDIMENTARY BASINS RECONSTRUCTION

Malyshev, S.V.[1], Khudoley, A.K.[2] and Molchanov, A.V.[3]

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One of the most important stages during exploration of unconformity-type uranium deposits is the study of the structure throughout a sedimentary basin and possible identification of a relatively undeformed clastic basin. The sandstones of the Anabar part of the East-Siberian platform have a potential for unconformity-type uranium deposits. An isotopic approach to restore provenance of sandstones complement the information inferred from petrography and facial studies. During the course of this work, research was completed into the U-Pb isotopic system of detrital zircons, which were extracted from sandstones from different parts of the Anabar shield. The results of this isotopic investigation established that the oldest age sedimentation is the same for both east and west part of this basin (1690 Ma) and concluded that sedimentation occurred in different localized basins. For the eastern part of the basin, a volcanic type of provenance has been defined on the basis of prismatic and needle morphology of detrital zircons and high abundance of detrital zircons with age 1731 Ma which correspond with the age of Kotuysko-Fomichevskiy rift (Surkov V.S., Grishin M.P., 1997). Furthermore, the results established that most of Archaean rocks of the Anabar shield were strongly metamorphized around 1900-2000 Ma on the basis of high abundance of same age detrital zircons.

SEKWI MOUNTAIN PROJECT YEAR 2: OVERVIEW OF BEDROCK MAPPING AND COLLABORATIVE STUDIES IN CENTRAL MACKENZIE MOUNTAINS, NWT

Martel, E.[1], Roots, C.[2], Gordey, S.[2], Ootes, L.[1], Fischer, B.[3], Leslie, C.[4], Macdonald, J.[5] and Mercier, M.[6]

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The Sekwi Mountain project is a 3-year multidisciplinary study of the central Mackenzie Mountains, initiated by the Northwest Territories Geoscience Office and being conducted in collaboration with the Geological Survey of Canada, university researchers and industry partners. The project is aimed at providing an up-to-date understanding of the stratigraphy, geochronology, geochemistry, metallogeny, and tectonic history of Proterozoic and Paleozoic strata exposed in NTS map sheets 105P, 95M and 106A. This presentation will provide an overview of the collaborative studies and thesis projects included in the Sekwi Mountain Project.

Detailed studies in concert with regional mapping include 1) investigation of map-scale structures in the footwall of the Plateau Thrust; 2) evaluation of potential hydrocarbon source and reservoir rocks; 3) detailed stratigraphy of Cretaceous coal-bearing strata, the Devonian Imperial Formation, Ordovician-Silurian Whittaker Formation, Neoproterozoic, Little Dal Group and Proterozoic Katherine Formation; 4) investigation of structural and stratigraphic controls on carbonate hosted Zn-Pb mineralization; 5) geochemical studies of volcanic rocks and associated diatremes; and 6) examination of newly discovered mineral prospects.

Discoveries of potential economic interest made this year include an occurrence of vein-hosted green beryl, which is currently being investigated as part of a B.Sc. thesis study. The beryl is spatially associated with malachite, chalcopyrite, pyrite, pyrrhotite, galena, and sphalerite but the genetic relationship between the beryl and sulphides remains to be clarified. The commonly Cu-bearing Coppercap Formation was found in previously undocumented locations in NTS 106A. This formation contains and overlies stratabound Cu occurrences to the southeast of 106A, some of which are currently being investigated by exploration companies. The project area is known to host numerous carbonate-hosted Zn-Pb prospects. The structural and stratigraphic controls on some of these prospects are being investigated as part of an M.Sc. study. Finally, several diatremes in and west of NTS 106A (including the Mountain diatreme), are being studied as part of an M.Sc. project. Previous reports of diamonds and G-10 garnets derived from the diatremes allow speculation that there may be diamond potential in this part of the Mackenzie Mountains.

The beryl is spatially associated with malachite, chalcopyrite, pyrite, pyrrhotite, galena, and sphalerite but the genetic relationship between the beryl and sulphides remains to be clarified. Also of economic interest, the Cu-bearing Coppercap Formation was found in previously undocumented locations in NTS 106A.

COMMUNITY INVOLVEMENT IN THE KIGGAVIK PROJECT

McCallum, B.A. - AREVA Resources Canada Inc., Baker Lake, Nunavut

The Kiggavik Project is an advanced uranium exploration project located 80 km west of the hamlet of Baker Lake. The project is owned by AREVA Resources Canada Inc. in joint venture with Japan Canada Uranium Corporation and Daewoo International Corporation. A viability study has been underway since 2006 with the purpose of confirming the project viability to the extent required to support a decision to proceed to the Feasibility and Environmental Assessment phases.

For the Kiggavik project to be successful, it will need the support of the people in the region. The starting point presented some challenges. It wasn't clear how 2 clauses in the Keewatin Land Use Plan pertaining to uranium development could be met and uranium mining was not permitted on Inuit-owned land. Furthermore, a proposal by a previous owner to develop some of the same deposits in the late 1980's was met with considerable public opposition locally.

A key to gaining community support is dialogue and community involvement. More than a year before we started technical work on the project, we started dialogue with several community stakeholders including the Hamlet of Baker Lake, Inuit Associations and their committees, and the Baker Lake HTO. Our simple message was that we have been mining uranium in northern Saskatchewan for 30 years while protecting workers and the environment and maximizing benefits to northerners and we would like to mine uranium in Nunavut using the same basic principles. The message was well received. We would continue with the approach of dialogue and community involvement.

Significant progress has been made to remove the barriers to mining uranium in Nunavut during the past year due to initiatives taken by the government of Nunavut, the IPG's and the Inuit organizations. NTI has adopted a uranium policy that supports uranium development on Inuit owned land subject to conditions. NPC has determined the requirements to meet the uranium specific conditions in the Keewatin Land Use Plan and has held a Workshop that met one of the conditions. KIA held uranium information sessions throughout the Kivalliq further paving the way to meet the uranium clauses in the Land Use Plan. The government of Nunavut has announced it will develop a uranium policy based on 6 guiding principles. AREVA's role was to participate where appropriate in these Nunavut lead initiatives. We made industry presentations at the NPC workshop as well as at the KIA information sessions and the NTI public consultation sessions.

AREVA has engaged in a series of initiatives to involve the community in the Kiggavik project. We opened an information office in Baker Lake and hired a local Community Liaison Officer. With the support of Baker Lake Council, we formed a Baker Lake Community Liaison Committee of members appointed by their stakeholder groups. The CLC has been meeting about once a month for the past year and has become an excellent community sounding board – a means of keeping the community involved in our plans and a community sounding board for important project initiatives such as possible road routes and the approach to obtaining IQ. We are in the process of establishing a regional committee to enhance regional dialogue and involvement. We have taken groups of elders to see our project site and visit their traditional homeland.

Support for uranium developments continues to grow in Nunavut. AREVA's approach to community relations of dialogue, community involvement, and cooperation is working and will continue throughout the development of the project. The Kiggavik Project could enter the environment assessment process within the next year presenting new challenges and opportunities.

DRAFT SAHTU LAND USE PLAN: ONGOING PROGRESS

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The Sahtu Land Use Planning Board was created by the Sahtu Dene and Metis Comprehensive Land Claim Agreement (Section 25.2) and empowered by the Mackenzie Valley Resource Management Act (Part 2). The Board is responsible for developing and implementing a land use plan for the Sahtu Settlement Area. Draft 1 of the Sahtu Land Use Plan was released on February 16, 2007. Twenty-two organizations including industry, government and non-government organizations submitted comments to the Board. The poster presentation will display changes to the Sahtu Land Use Plan as a result of this consultation process.

GEOLOGY AND MINERALOGY OF THE MOUNTAIN RIVER BERYL (EMERALD) SHOWING, MACKENZIE MOUNTAINS, NORTHERN CANADIAN CORDILLERA, NWT, CANADA

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The newly discovered Mountain River Beryl showing occurs adjacent to the Mountain River, in the Mackenzie Mountains of the northern Canadian Cordillera, NWT, Canada, and was found during regional mapping of the Sekwi Mountain project. The occurrence outcrops on a steep hillside of a mountain about 1370 m.a.s.l., near a subsidiary stream of the Mountain River, near Shale (Palmer) Lake (NTS sheet 106A).

Green beryl is intergrown within numerous quartz-carbonate veins that are hosted by the thinly-laminated to medium-bedded pyritic shales, siltstones and sandstones of the Neoproterozoic Twitya Formation, located at the base of the Windermere Supergroup. The veins are 1 to 15 cm in thickness and are found in at least 3 zones, over 20 m across. A powder X-ray diffraction pattern confirms that the mineral is beryl, which surprisingly turned out to be the first documented occurrence in the region.

The beryl occurs as euhedral hexagonal prismatic crystals that are 1 to 5 mm in diameter and up to 2 cm in length. The beryl is a brilliant green colour corresponding to the 5G 6/6 reference of the Munsell rock colour chart. This colour indicates the variety as emerald. The crystals have a vitreous luster and are translucent. They are often disposed in radiating clusters or grow perpendicular to the vein margins, suggesting that they are extensional fracture fillings. The style of mineralization has many geological similarities with the well-documented black-shale-related hydrothermal emerald occurrences of Columbia. The source of the hydrothermal fluids that deposited the veins and associated beryl at this locality may be related to felsic plutons or alkali diatremes that outcrop in the region.

Interestingly, several copper minerals are found in outcrop adjacent to the beryl mineralization, including bornite, chalcopyrite and malachite. However, the relationship between the beryl and copper mineralization is uncertain. Regardless, the occurrence of green beryl (emerald) with proximal copper mineralization makes this an exciting new mineral occurrence in the Mackenzie Mountains.

NON-RENEWABLE RESOURCE ASSESSMENT OF THE EDEHZHIE CANDIDATE AREA: RESULTS AND INTERPRETATION

Mills, A.J.[1] and Day, S.J.A. [2]

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[2] Geological Survey of Canada, Ottawa, Ontario

The NTGO has completed a Mineral Resource Assessment for the Edehzhie candidate area for protection as part of the Non-renewable Resource Assessment required under the Northwest Territories Protected Areas Strategy. The Edehzhie area covers 25,233 km2, lies between 61°15'N and 63°00'N latitude and 117°15'W and 123°15'W longitude, and encompasses the Horn Plateau, Mills Lake and most of the Willowlake and Horn rivers. Sponsoring communities include Fort Simpson, Fort Providence, Jean Marie River, Wrigley and Wha Ti.

Bulk stream sediment for heavy mineral concentrates (HMCs), stream silt sediment and water samples were collected from the Edehzhie area during the summers of 2003 and 2005, using the methodology employed by the National Geochemical Reconnaissance Program. A total of 617 sites were sampled, yielding 606 silt samples, 602 stream water samples and 326 bulk stream sediment samples. In addition, 25 surficial material samples were collected in 2006 by personnel from GSC Calgary and NTGO. The HMCs and till samples were analyzed for kimberlite indicator mineral (KIM) content and gold grains. The silt samples were analysed for 65 variables and the waters for 60 variables.

Preliminary results indicate two areas with moderate Mississippi Valley-Type Zn-Pb mineralization potential located along the south-facing escarpment of the Horn Plateau. A third area with moderate potential lies on the west side of the Horn Plateau and is coincident with the north-south trend of the Bulmer Lake Gravity Arch. Modest potential for sedimentary exhalative mineralization is also inferred for the south-facing, east-west-trending escarpment of the Horn Plateau. Potential for stratiform copper mineralization is considered low, and locally observed high gold concentrations are interpreted to be sourced from far-travelled glacial debris.

Cr-pyrope was the most abundant KIM type with 1646 grains picked from 325 samples, followed by Mg-ilmenite (813 grains), chromite (325 grains), Cr-diopside (157 grains), olivine (112 grains), and eclogitic garnet (3 grains). Highest KIM concentrations were found in deeply incised gullies draining the Horn Plateau to the north and southeast. This is interpreted as a secondary effect owing to heavy mineral accumulation in high energy streams and not an indication of proximity to the KIM source. The streams draining the Horn Plateau are likely sampling a KIM dispersal train from a single kimberlite that may be located outside the Edehzhie candidate area. Based on the chemistry of the KIMs, the kimberlite source contains garnet-peridotite xenoliths from both fertile and depleted mantle sources, as well as metasomatized lherzolite and wehrlite. Lack of garnet grains derived from a megacryst source, common in Slave kimberlites, suggest the source kimberlite may be located off-craton. Follow-up till sampling would help to determine the extent of the KIM train and possibly help to locate the kimberlite source.

MINING INDUSTRY ATTRACTION, RETENTION, AND RECRUITMENT STRATEGY (MARS) COLLABORATIVE ACTION TO ENSURE THE VITALITY OF CANADIAN MINING

Montpellier, R. and Sturk, M. - Mining Industry Human Resources (MiHR) Council

Presentation attendees will gather information on MiHR's comprehensive Mining Industry Attraction, Recruitment and Retention Strategy (MARS). Discussion will include an overview of the MiHR Council, background on the MARS project, and details on a plethora of exciting attraction, recruitment, and retention deliverables.

Over the next 10 years, the Canadian minerals and metals sector will face a shortage of approximately 92,000 workers. As an industry, we must collectively take action to attract, recruit, and retain tomorrow's workforce, while facilitating the transfer of knowledge from our most experienced workers to new entrants.

The Mining Industry Attraction, Retention, and Recruitment Strategy (MARS) is one of several integrated strategies developed by MiHR in direct response to the gap between supply and demand of skilled labour for the industry focuses on the attraction, recruitment, and retention of six under-represented, or target groups: Aboriginal peoples, new Canadians, women, youth, mature workers (retirees), and expatriates (individuals who have left the sector to work in other sectors either domestically or overseas). MiHR will target these groups through promotional and outreach tools, programs, and communications initiatives.

Specific deliverables of the project are listed below:

Employer's Manual on Best Practices in the Attraction, Recruitment, and Retention of Target Groups

Explore for More Brand and Communications Guide

Mining Career Paths

Mining Employer's Guide to Apprenticeship

Career Promotion Speaker's Tool box, including: Speaker's Guide, Online Speakers' Bureau, PowerPoint Packs, Banners and Pop-up Displays

Mining Employer's Guide to Conducting Youth Mine Tours

www.acareerinmining.ca Website Enhancements and Optimization

Strategic Communications and Marketing Initiatives

Secondary and Post-Secondary Student Summer Employment Job Board

Mining Mentorship Program

Video Catalogue, including Career Paths and Knowledge Transfer Videos

Expanded PDAC Mining Matters Curriculum

However, MARS is not just a list of deliverables. It is a coherent strategy that brings together representatives from industry, labour, education and other communities of interest around a common goal: recruiting and retaining tomorrow's workforce.

UPDATE ON GNME'S NI-PGE EXPLORATION ON VICTORIA ISLAND, NWT

Morgan, D. - Great Northern Mining and Exploration, Toronto, Ontario

Two years ago, the first two years of exploration by Great Northern Mining and Exploration on Victoria Island, NWT, in search of Noril'sk-style Nickel-PGE deposits, were presented. A lot of water has passed under the bridge (and through the boreholes!) since then, with a second airborne EM survey, drilling, and extensive till sampling, and we find ourselves holding new ground, and searching for an additional commodity – diamonds. This year will give an update on activities and prospects going forward, including developments on the multi-lateral environmental rehabilitation initiative, drawing comparisons with other similar initiatives in other jurisdictions.

ESTIMATING WOLVERINE ABUNDANCE ON THE BARRENS USING DNA MARK-RECAPTURE METHODS

Mulders, R.[1] and Boulanger, J.[2]

[1] Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, Northwest Territories
[2] Integrated Ecological Research, Nelson, British Columbia

On the central barrens, the cumulative level of mortality by northern hunters, outfitters and the mining industry could negatively impact wolverine distribution and abundance. The GNWT is collaborating with BHP

Billiton, Diavik Diamond Mine Inc. and DeBeers Canada to conduct field studies in an effort to address this issue and to establish a standard and reliable methodology for monitoring wolverines within Regional Study Areas.

This presentation provides a summary of DNA mark-recapture results for wolverines at Daring Lake, Ekati, Diavik and Gahcho Kue in 2005 and 2006. The objectives of this research is to provide yearly population and density estimates for each study area, provide preliminary estimates of population trend, explore factors associated with trend, and conduct power analyses to determine optimal monitoring strategies. This analysis demonstrates the utility of DNA sampling in estimating population size, trend and demographic parameters of wolverine populations. Most notably, the high trappability of wolverines at DNA posts makes it possible to obtain precise population estimates.

Population estimates were precise despite low numbers of wolverines on some of the study areas. Demographic analysis suggests that male and female wolverines display unique demography. Male wolverines display larger movements on grids, lower apparent survival and higher immigration/addition rates. Demographic and population estimates suggest that male wolverine populations are declining on all study areas, which is potentially influenced by higher rates of harvest. In contrast, females show higher rates of apparent survival, lower rates of movement and immigration into grid area and lower rates of harvest. Female populations appear to be more stable compared to male populations.

The results of demographic analysis are challenged by only 2 years of monitoring data. This is the minimal number of time points to determine a population trend, and at least 3-4 surveys are needed to verify the relationships suggested by the Pradel model demographic analysis. Results of power analyses suggest that sampling can be reduced to biannual effort after 2-4 years with minimal loss of power over annual efforts.

This collaborative research demonstrates that the use of post-sampling and genotyping of harvested wolverines, combined with sex-specific demographic analysis, provides a powerful method to estimate population trend and explore factors affecting demography of wolverine populations. We suggest that the DNA-based methodologies provide a more powerful and robust tool for monitoring wolverine populations than track count methodologies.

THE DOGMAG, A LOW COST ALTERNATIVE TO AIRBORNE MAGNETIC SURVEYS IN DIAMOND EXPLORATION.

Näher, U.[1] and Kivi, K.[2]

[1] SouthernEra Diamonds, Yellowknife & Mwana Africa PLC, London, England
[2] Kivi Geoscience, Thunder Bay, Ontario

The availability of integrated high quality differential GPS receivers in standard magnetometer consoles allows for a low cost alternative to conventional airborne magnetic surveys. Between 2005 and 2007 SouthernEra Diamonds completed several surveys using different survey platforms with great success. In Tshikapa, Democratic Republic of the Congo a boat borne system was developed to delineate dolerite dykes forming the trap sites of alluvial diamonds within the active channel of the Kasai River. At the Credit Lake, Monument and Lac de Gras projects a combination of dogsled and oak toboggan were utilized during the surveys to suit a variety of challenging terrain conditions. Over 10,000 line km of high resolution magnetic surveys were successfully completed at a cost the fraction of a conventional airborne survey. Two new kimberlite discoveries can be attributed to this new method.

URANIUM METALLOGENY IN THE GREAT BEAR MAGMATIC ZONE (WOPMAY OROGEN) AND ADJACENT TERRANES

Ootes, L.[1], Goff, S.[1], Corriveau, L.[2], Harris, J.[3] and Jackson, V.[1]

[1] Northwest Territories Geoscience Office, Yellowknife, Northwest Territories
[2] Geological Survey of Canada, Québec
[3] Geological Survey of Canada, Ottawa, Ontario

U_2O_3 spot prices, as of October 2007, remain over $70/lb (USD), having rocketed to just over $130/lb in July, 2007. This is part of a cycle of increasing value and spot prices since early 2005 after two decades in the $20/lb range (for historical details and current spot prices visit: http://www.uxc.com/). The ca. 1.87 Ga Great Bear magmatic zone (GBmz) of the Wopmay orogen was a major producing district for uranium with first production at Port Radium on Great Bear Lake in 1931. Port Radium, as with a number of other prospects

and past-producers in this area and throughout the GBmz, is polymetallic and is now recognized as part of the iron oxide copper-gold/uranium (IOCG/U) clan of deposits. Uranium has also been produced from the Rayrock Mine in the southern GBmz. At Rayrock, uranium is hosted by a giant quartz vein/stockwork, possibly representing the late-stage epithermal pulse of the IOCG/U event. More likely, it may be part of a later unconformity-related style of mineralization, perhaps similar to that at Beaverlodge Lake in Saskatchewan.

This presentation will briefly review uranium-bearing mineral prospects and past-producers in the GBmz and their generic mineral deposit types. In parallel, we will illustrate elevated background uranium values in host-rocks from a case study in the central Wopmay Orogen, using geochemical data and airborne derived regional-scale radiometric data. The uranium in IOCG/U deposits is genetically related to the uranium in the host-rocks and our data (when coupled with regional alteration studies) highlight lithologic units that are most favourable for new discoveries of uranium-bearing IOCG prospects.

Regionally elevated uranium in some igneous rocks and a high number of known uranium occurrences of the GBmz has implications for another style of mineralization. Unconformably overlying the Wopmay orogen is the Paleo to Mesoproterozoic Hornby Bay and Dismal Lakes groups of the Coppermine Homocline and Leith Peninsula south of Great Bear Lake. Parts of these sequences are considered equivalent to the uranium-rich Athabasca and Thelon basins and indeed the Coppermine Homocline and Leith Peninsula areas have known unconformity-related uranium prospects. The uranium-enriched GBmz basement could have provided a uranium source to circulating hydrothermal fluids, and/or basin-filling detritus, enriching the host sandstones in uranium-rich minerals to be leached during basinal fluid mobilization. The Wopmay orogen is also unconformably overlain by Paleozoic rocks to the west; significantly, it is likely that these Palaeozoic rocks may locally unconformably overly Hornby Bay and/or Dismal Lake group equivalents, such as the proposed "Dessert Lake" basin to the south and other sub-basins previously documented between the Wopmay and Paleozoic rocks. This possible unconformity and the regional metallogenic character encourages the speculation that there may be 'blind' unconformity-related uranium deposits hiding under the Paleozoic cover. With the currently strong uranium market, the GBmz of the Wopmay orogen provides a regional exploration target for uranium-enriched IOCG and the possible overlying Proterozoic sequences underlying the Paleozoic cover may turn out to be a new, exciting target for 'blind' uranium deposits.

THE GIANT CREST IRON DEPOSIT – YUKON AND NORTHWEST TERRITORIES

Ootes, L.[1], Lewis, L.[2] and Bradshaw, G.[2]*

[1] Northwest Territories Geoscience Office, Yellowknife, Northwest Territories
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[*](deceased 2006)

The Crest iron deposit (Crest IF) is located in the northern Mackenzie Mountains of the Yukon and Northwest Territories and is estimated to contain 5.6 billion tonnes @ 47.2% iron (drill-indicated historical resource estimate, not 43-101 compliant) with a regional reserve estimated at 18.6 billion tonnes. This is interpreted to be the third largest iron resource in North America, yet remains undeveloped due to total lack of infrastructure in the region. We completed a four-day reconnaissance study of Crest focusing on the Iron Creek area in the Yukon Territory and the farthest east occurrence in the Northwest Territories. Along with a brief review of the iron formation we will provide a geologic compilation, detailed measured sections, and dazzling outcrop photographs.

The Crest iron deposit formed syngenetically as iron formation within the Neoproterozoic, glacial-marine Rapitan Group. A granitic dropstone or 'stranger stone' in the Rapitan Group has been dated at 755 ±14 Ma, providing a maximum age of deposition; a minimum age is only provided by the overlying Cambrian unconformity, however it has been speculated that the iron formation was deposited between 730-750 m.y. ago. The iron formation outcrops in three fault bounded blocks over 50 km along strike and thicknesses range up to 150 m. Where we investigated the iron formation, it is composed predominantly of rhythmically layered specular hematite with jasper nodules (previously termed pisolitic) with local interbedded hematite-jasper (i.e. banded). Sporadically interbedded with the iron-formation are tillites and intermittent 2-10 cm thick hematitic sandstones and carbonates.

The iron formation and hence the iron deposit have been interpreted to have formed during glacial retreat or during an interglacial period in a rifted-margin setting. In the glacial setting, iron was sequestered in the poorly oxygenated seawater, and once glacial retreat occurred and oxygen was carried into the basin, iron oxide

precipitation occurred. We observed dropstones near the top of the iron formation, suggesting it was still overlain by glaciers late in its deposition history. This provides some conflicting evidence to the interglacial interpretation and future research could focus on this. Similarly, the glacial-marine rocks and the iron formation have been correlated globally as part of the Neoproterozoic 'Snowball' Earth hypothesis; however, precise geochronological constraints on the Crest iron-formation are not currently available (nor the Rapitan Group, nor overlying units) and dating targets remain cryptic and therefore correlations remain speculative. New U-Pb methods of dating (i.e. Laser-ablation ICP-MS) and dating of non-traditional minerals (e.g., diagenetic monazite, xenotime, apatite) may be applicable and provide evidence for the precise timing of iron formation deposition.

COSMOCLIMATOLOGY: A POSSIBLE PARADIGM SHIFT IN OUR UNDERSTANDING OF THE DRIVERS OF CLIMATE CHANGE

Patterson, T. - Department of Geology, Carleton University, Ottawa, Ontario

During its history our planet has been subject to dramatic climate shifts that have ranged from near global glaciations, to planetary greenhouse conditions. Although this extreme climate variability can be linked to a variety of factors (e.g. plate tectonics, changes in paleoceanographic circulation) the strongest influence on climate change at decadal to millennial and longer timescales has probably been the result of variations in the cosmic-ray flux due to solar magnetic activity.

During the past few years members of my research group have carried out detailed analysis of marine-laminated sediments from oxygen starved basins in several fjords along the British Columbia, which we have found to archive Holocene records of climate variability and marine productivity at annual to millennial scales. Our multi-proxy analysis results indicate that the marine productivity and sedimentary record of the NE Pacific responded to abrupt changes and long-term variability in climate that can clearly be linked to external forcing (e.g. solar and cosmic irradiance).

Using my own research results as an example I will explain why I am now convinced that celestial drivers are the primary control over climate change and why I now reject the 'consensus' view that variations in atmospheric CO_2 concentrations are the primary influence over climate change.

DO-27 AND BEYOND: AN UPDATE ON PEREGRINE DIAMONDS PROGRAMS IN THE SLAVE PROVINCE

Pell, J., Mathison, W., Friedland, E.V. and Crawford, J. - Peregrine Diamonds Ltd., Vancouver, British Columbia

Peregrine Diamonds is active on 5 projects in the Lac de Gras area of the Achaean Slave Province. Our flagship DO-27 Project, which is evaluating the +9 hectare pipe, continues to move forward. During the winter/spring 2006/2007 season, over 2000 dry tonnes of kimberlite were extracted from 28 large diameter (24"-28") holes, drilled to a maximum depth of 295 metres below surface and processed at the Bulk Sample Test Facility at BHP Billiton's Ekati ™ Diamond Mine. The majority of the material extracted was from the Main Lobe pyroclastic kimberlite (Main PK), which represents at least 80% of the DO-27 kimberlite complex. Some other minor lithologies were also sampled. The 2007 bulk sample returned an average modeled grade of 0.89 carats per tonne for the Main PK. This confirms Peregrine's previous bulk sample estimates. A significant number of large stones were present in the recovered 1,724.57 carat parcel, including 4 stones greater than 5 carats each; 22 stones between 2 and 5 carats each; 51 stones between 1 and 2 carats each; 219 stones between 0.5 to 1 carats each. Of particular note was a 4.35 carat Fancy Vivid Yellow octahedral gem. The parcel is currently being valued.

AMEC Americas Ltd. is preparing an internal Preliminary Technical Assessment report on DO-27 for Peregrine, which investigates various potential mining and processing scenarios and will include a resource estimate. Part of this study has includes scrubbing tests which show that the kimberlite can be pre-concentrated by using simple, relatively inexpensive, water-based scrubbing technology with minimal crushing, resulting in a substantial increase in diamond grade of the resulting concentrate. In the upper portions of DO-27 (to 121 metres depth) an estimated 90% of the kimberlite (<1mm) was eliminated by way of a relatively quick, 3-4 minute scrubbing test run. This is a substantial degree of pre-concentration and would result in the up-grading of the remaining kimberlite by a factor of 10:1. The same test procedures applied to deeper, more competent kimberlite intervals still showed that 70% (3.3:1, from 121-181 metres of depth) and 57% (2.4:1, from 181-275 metres of depth) of the

kimberlite could be removed simply by scrubbing. This could have important positive implications on reducing operating and capital costs of a potential future mining operation at DO-27.

Peregrine also has a large land position (>160,000 hectares) in 4 additional properties in the Lac de Gras area: the Lac de Gras East/WO, Lac de Gras West, Pellatt Lake and MacKay Lake West Properties. In addition to DO-27, at least a dozen kimberlites occur on the properties, including one discovered by Peregrine on the Pellatt Lake ground in 2006. More importantly, unexplained indicator mineral trains, with high-interest mineral chemistry with diamond inclusion (DI) field G10 garnets, DI field chromites & DI field eclogitic garnets have been defined on first two of these properties, as are untested geophysical anomalies (magnetic, electromagnetic and Falcon ™ gravity gradiometric anomalies). An aggressive exploration program is planned to find the sources of these, and other, anomalies.

TYHEE DEVELOPMENT CORP'S YELLOWKNIFE GOLD PROJECT

Pratico, V. - Tyhee Development Corp., Vancouver, British Columbia

Tyhee Development Corp continued the exploration of its wholly-owned Yellowknife Gold Project, 90 km north of Yellowknife in 2006. A resource estimate published in August 2007 reported a combined Ormsby deposit Measured and Indicated resource of 8.2 million tonnes grading 3.54 gpt gold, representing 936,000 ounces of gold. This is an increase of 206,000 ounces of gold from July 2006. The Nicholas Lake deposit has a Measured and Indicated resource of 1.1 million tonnes grading 6.87 gpt gold.

The focus of the 2007 exploration program shifted to include geological mapping and prospecting on a number of projects in addition to definition drilling on the Ormsby and Nicholas Lake deposits. Tyhee completed more than 21,000 metres of surface diamond drilling over the entire length of the Ormsby and Discovery metavolcanic members. Diamond drilling on the Nicholas Lake deposit totaled 4200 metres in addition to re-sampling of 20,000 metres of archived drill core. Geological mapping and prospecting occurred on the Teapot, Goodwin Lake, Clan Lake and Bigsky projects. Channel samples were collected on the Goodwin Lake, Clan Lake and Bigsky projects. Early results encouraged Tyhee to commence diamond drilling on the Teapot, Goodwin Lake and Bigsky projects. Further mapping, prospecting and diamond drilling are planned for all of these projects in 2008. Environmental and engineering studies continued at the Ormsby deposit during 2007.

REGIONAL GEOSCIENCE STUDIES AND PETROLEUM POTENTIAL, PEEL PLATEAU AND PLAIN, NWT AND YUKON

Pyle, L.J.[1], Jones, A.L.[2], Gal, L.P.[2], Lemieux, Y.[2], Hadlari, T.[2], Zantvoort, W.G.[2], Allen, T.L.[3] and Fraser, T.A.[3]

[1] Geological Survey of Canada-Pacific, Sidney, British Columbia
[2] Northwest Territories Geoscience Office, Yellowknife, Northwest Territories
[3] Yukon Geological Survey, Whitehorse, Yukon

Peel Plateau and Plain are prospective hydrocarbon exploration areas that are the focus of a four-year (2005-2009), multi-agency project within the Mackenzie corridor. The study area has widespread hydrocarbon potential, and more than 70 exploratory wells have been drilled. The project objective is to improve and update knowledge of the regional geology of the area, including stratigraphic relationships, depositional and tectonic histories, basin evolution, and petroleum potential. A reliable future domestic supply of oil and gas is a current priority of territorial and federal governments. An expanded geological knowledge base in the north is necessary to stimulate further petroleum exploration, industry investment, and economic development for the benefit of Northerners.

In 2005 and 2006, research on hydrocarbon resource potential involved fieldwork on outcrops within Peel Plateau, Peel Plain, and adjacent areas of the northern Mackenzie Mountains, Mackenzie Plain, and Richardson Mountains. Stratigraphic sections, spanning Cambrian to Cretaceous age, and structural relationships have been studied.

Additional section examinations, structural studies, and thematic studies are ongoing within seven 1:250,000 scale map areas of the Northwest Territories and Yukon (NTS 96 E, 106 E, F, G, H, I, and L). Samples were collected for sedimentary petrology, reservoir potential (porosity and permeability), source rock potential (Rock-Eval/total organic carbon analysis), and for biostratigraphic indicator fossils (conodonts, palynomorphs, and foraminifera). Data will be used to

improve regional correlation between exposures at surface and existing well and subsurface data of Paleozoic Mackenzie-Peel Shelf to Richardson Trough, and Mesozoic Peel Trough.

Results from thematic studies contribute new qualitative and quantitative geoscience data for the assessment of the hydrocarbon resource potential of Peel Plateau and Plain and expand upon the assessment carried out for this exploration region in Yukon. In 2007, Gal outlined seven established and conceptual plays continuous with plays in the study area: Basal Cambrian clastics; Cambro-Ordovician platform; Upper Devonian clastics; Arnica/Landry platform; Kee Scarp; Tuttle Formation; and Cretaceous clastics. Many of these plays are among those currently being assessed by the Geological Survey of Canada along Mackenzie corridor. A final synthesis volume and geodatabase on Peel Plateau and Plain will contain a data compilation, interpretations, as well as results from new structural mapping and seismic interpretation.

Visit *www.nwtgeoscience.ca/petroleum/PeelPlateau.html* for project updates, references, and participant information.

U-PB ZIRCON GEOCHRONOLOGY AND PROVENANCE OF THE HORNBY BAY AND DISMAL LAKES GROUPS HORNBY BAY BASIN, NORTHWEST TERRITORIES AND NUNAVUT.

Rainbird, R.[1], Davis, W.[1], Ramaekers, P.[2], Heaman, L.[3], Armitage, A.[4] and Bleeker, W.[1]

[1]Geological Survey of Canada, Ottawa, Ontario
[2]MF Resources Inc., Calgary, Alberta
[3]University of Alberta, Edmonton, Alberta
[4]Triex Minerals Corporation, Vancouver, British Columbia

The Hornby Bay basin is exposed in a region straddling the N.W.T. and Nunavut border, north of Great Bear Lake, where it unconformably overlies amalgamated Paleoproterozoic terranes of the 1.90-1.84 Ga Wopmay orogen (Hottah Terrane, Great Bear Magmatic Zone and Hepburn Metamorphic and Plutonic Belt). It is a composite intracontinental basin that developed over nearly 500 million years in the late Paleoproterozoic and Mesoproterozoic, but there are few constraints on its absolute age. The Hornby Bay basin includes the Hornby Bay Group (HBG) and Dismal Lakes Group (DLG). The HBG is a several kilometre-thick succession of mainly immature fluvial ± eolian sandstone and conglomerate unconformably overlain by more mature fluvial sandstone that passes gradationally upward into carbonate and mudrock deposited in shallow marine environments. Outliers of the HBG have been identified near Leith Peninsula on southeastern Great Bear Lake and recently in drill core and surface outcrops located along the northern shore of Great Slave Lake (Dessert Lake Basin). The HBG is unconformably overlain by the Dismal Lakes Group, a succession of deltaic and shallow marine quartzarenite that grades upward into carbonaceous mudstone, in turn overlain by a ~ 2 km-thick succession of mainly platformal, peritidal and sabkha dolostone. The DLG is capped by thick flood basalt flows of the Coppermine River Group. Existing U-Pb geochronology constrains the main regional stratigraphic unit of the Hornby Bay basin (Lady Nye Formation) to be younger than 1.74 Ga, the U-Pb age of underlying Cleaver dykes, although potentially older sandstone units are preserved in precursor basins to the main Hornby Bay basin (Fault River and Big Bear formations). U-Pb dating of detrital zircons from the Big Bear Formation (this study) yielded a maximum age of 1.77 Ga. Locally developed volcanic rocks near the top of the HBG (Narakay Volcanic Complex) were erupted at 1.66 Ga. The base of the DLG is considered to be younger than 1.59 Ga, the U-Pb age of the Western Channel diabase, which intrudes the HBG but not the DLG. Flood basalt flows that conformably overlie the DLG are part of the regional 1.27 Ga Mackenzie igneous event. Detrital zircon geochronology of several sandstone units from the HBG and DLG is in progress. A sandstone sample from the Big Bear formation shows prominent age peaks that suggest distal provenance from the Taltson-Thelon orogen and adjacent terranes of the western Churchill province (e.g. Queen Maud Block), but also contributions from more proximal sources in the Hepburn belt and recycling of supracrustal rocks contained in the Asiak and Tree River fold-thrust belts. A sandstone from the Dessert Lake Basin records similar provenance information with a stronger Taltson-Thelon component and a weaker late Archean-early Paleoproterozoic signature.

NEW U-PB GEOCHRONOLOGICAL CONSTRAINTS ON THE TIMING OF DEFORMATION AND THE NATURE OF BASEMENT OF SW BAFFIN ISLAND, NUNAVUT

Rayner, N., Sanborn-Barrie, M., Wodicka, N. and St-Onge, M. - Geological Survey of Canada, Ottawa, Ontario

The southwest Baffin Integrated Geosciences project is a partnership between the Canada-Nunavut Geoscience Office, the Geological Survey of Canada (Northern Mineral Resources Development Program) and the Qikiqtani Inuit Association designed to update geoscience knowledge through bedrock and surficial mapping and resource assessment activities. An outcome of this mapping initiative is the recognition of units prospective for base- and precious-metal mineralization, and better understanding of the extent of those prospective for carving stone and gemstone commodities. Knowledge of the complex deformational history of these rocks and of the nature of basement is an important component in guiding mineral exploration in the region.

Patterns of exposed supracrustal and plutonic rocks reflect a polyphase deformation history that includes penetrative fabric development (S_1) during southwest-directed D_1, and tight to isoclinal F_2 folding during southwest- to south-directed D_2. Non-penetrative strain events include open crossfolding (D_3) and localized dextral transcurrent shearing along the 100-km long Andrew Gordon Bay shear zone (AGBSZ).

To constrain the timing of deformation, four samples were targeted for U-Pb geochronological studies. A sample of biotite monzogranite collected from the westernmost map area contains psammite inclusions with a strong S_1 fabric, and itself carries a weak axial-planar S_2 foliation. Accordingly, it provides a minimum age of D_1 and the time of late-D_2 strain. A population of poor quality zircon yielded a minimum age of 1831±3 Ma. Inherited zircons, prevalent in this sample, range in age from 2.76 to 2.96 Ga. Unfoliated megacrystic monzogranite in the eastern map area is dated at 1834±5 Ma, providing a minimum age of penetrative strain ($D_1 + D_2$) for this region. Inherited zircons from this sample are chiefly 1.88-1.89 Ga in age, but also range between 2.05 and 2.86 Ga. Syenogranite, occurring as late, massive sills outside the AGBSZ but mylonitized within it, has a crystallization age of 1834±5 Ma, providing a maximum age for dextral shearing. A population of zircon cores and discrete grains yield inherited ages between 2.54-2.77 Ga. Strongly foliated orthopyroxene-bearing monzogranite also within the AGBSZ is tentatively interpreted to have a crystallization age of 1832±7 Ma. The zircon population of the monzogranite is dominated by exclusively Archean inherited material ranging in age from 2.78-2.96 Ga. These four samples provide independent evidence that penetrative strain across SW Baffin had ended by about 1.83 Ga, after which localized dextral shearing became the dominant deformational style.

Inherited zircon ages from these four samples, together with unpublished detrital age data, appear to reflect a fundamental difference in the antiquity of basement between the eastern and western parts of the map area. Analysed samples from the east are characterized by detrital and inherited zircons that incorporate a significant Paleoproterozoic (ca. 2.0-2.5 Ga) component, in addition to a smaller Archean component. In contrast, the western map area has so far yielded largely Archean detrital ages (Lona Bay cover sequence) and exclusively Archean inherited zircons. This may reflect a fundamental boundary between a dominantly Paleoproterozoic basement terrane (Meta-Incognita?) in the east, and a dominantly Archean basement terrane in the west.

DIAND WATER MONITORING PROGRAMS IN THE NORTHWEST TERRITORIES & NUNAVUT

Reid, R. - Water Resources Division, Department of Indian Affairs and Northern Development, Yellowknife, Northwest Territories

The Water Resources Division (WRD) of the Department of Indian Affairs and Northern Development operates water quantity and water quality monitoring programs in the Northwest Territories (NWT) and Nunavut (NU). The water quantity monitoring programs include participation in the National Hydrometric Network operated by the Water Survey of Canada. The network in NWT and Nunavut includes 130 water level and streamflow stations. Besides contributing to the national hydrometric program, WRD operates a network of 45 snow survey stations and a network of 9 weather stations. These data are used for determining local and regional hydrological conditions that assist with streamflow and flood forecasting, hydro-electric dam operations, and mine site water management.

For water quality monitoring, WRD operates a regional network of 12 sites in the Central Arctic. We also have transboundary water and suspended sediment quality monitoring programs on four major rivers entering the Northwest Territories from other jurisdictions. The information is used to 1) develop water quality objectives for transboundary bilateral agreements between the Northwest Territories and neighbouring jurisdictions, 2) establish environmental baselines prior to potential developments, 3) address community concerns about possible contaminants in water and suspended sediment and 4) help detect changes in water quality due to future anthropogenic disturbances or natural phenomena.

In addition to these regional programs, site specific water quantity and quality activities are conducted at six locations for the Contaminants and Remediation Directorate. The purpose of these activities is to aid in the development of remediation plans at various contaminated sites. Water quantity measurements are used to describe site hydrologic conditions; water quality measurements serve to identify the source of contaminants entering the aquatic environment, as well as to delineate the extent of the area affected.

STRATIGRAPHIC AND STRUCTURAL REINTERPRETATION OF THE CENTRAL WINTER LAKE GREENSTONE BELT, SLAVE PROVINCE

Relf, C.[1], Ootes, L.[1], Chacko, T.[2], Heaman, L.[2], DeSouza, R.[2], Jablonski, B.[2], Johnson, C.[2], Jonk, N.[2], Love, S.[2], Miller, E.[2], Knight, J., MacLean, K.[3], Owen, G.[3] and Hrkac, C.[3]

[1] Northwest Territories Geoscience Office, Yellowknife, Northwest Territories
[2] Earth and Atmospheric Sciences, University of Alberta, Edmonton, Alberta;
[3] GGL Diamond Corp., Yellowknife, Northwest Territories

Winter Lake greenstone belt was mapped between 1992-1994 by Hrabi and Grant (1999), and Thompson and Kerswill (1994). Both parties recognized pre-ca. 2.9Ga basement rocks in the area, and Hrabi et al. (1993, 1994) documented evidence for pre-, syn-, and post-Yellowknife Supergroup correlative sequences in the belt. Portions of the belt were staked between 2001-2007 by GGL Diamond Corp., who undertook high resolution airborne magnetic and electromagnetic surveys in the area. Several anomalies, potentially corresponding to massive sulphides, were identified and in spring 2007 GGL announced their intention to explore the belt for Ni-Cu-PGE mineralization.

In August 2007 University of Alberta undertook bedrock mapping in the central part of the Winter Lake belt as part of its NWT field school. The course was sponsored by GGL and run collaboratively with the NWT Geoscience Office. The central part of the belt, along the south shore of Big Bear lake (informal name), was mapped because it exposes the entire stratigraphic section documented by Hrabi et al. (1994) and contains folds with complex geometries.

Remapping revealed the presence of a previously-unrecognized package of sedimentary rocks overlying the volcanic belt. The package includes locally cross-bedded quartz-rich arenites (locally fuchsitic), quartz-pebble and polymictic conglomerates, a carbonate/calc-silicate unit, graphitic greywacke, and mafic fragmental rocks. Portions of this package were previously correlated with late Archean (Jackson Formation correlative) sedimentary rocks (Hrabi et al, 1994). The package is informally designated the Big Bear formation, and is overlain by greywacke-mudstone meta-turbidites. Based on field observations, the upper and lower contacts of Big Bear formation are interpreted as conformable. Minor mafic layers are interbedded with sedimentary rocks near the base, suggesting waning volcanism gave way to clastic sedimentation. Arenites near the top of the formation are interbedded with meta-turbidites, suggesting a transition from relatively shallow water, locally high energy sedimentation to a deeper basin setting. While Big Bear formation shares many features in common with the Raquette Formation of Bleeker (2001), the upper contact of the latter was interpreted as an unconformity. Nevertheless, the potential correlation is striking and warrants further investigation.

While we have re-assigned some clastic sedimentary rocks to the Big Bear formation, we agree with Hrabi et al.'s (1994) correlation of conglomerates southeast of Big Bear lake with the Jackson Formation. Here, sillimanite+cordierite-bearing meta-turbidites contrast in metamorphic grade with slatey interbeds in the overlying package, suggesting deposition post-dated peak metamorphism.

In the eastern part of the study area, volcanic rocks are exposed in what Hrabi and Grant (1999) interpreted as a structural dome rimmed by meta-turbidites. Re-examination of structures within and surrounding the dome suggest it is actually a Type 2 fold interference

pattern and the volcanic belt preserves early, map-scale isoclinal folds. The presence of Big Bear formation above the structure suggests it is contiguous with the main part of the volcanic belt farther west.

A number of samples were collected for U-Pb geochronology during mapping, and the ages will further constrain the timing of sedimentation and volcanism and allow more robust regional (pan-Slave) stratigraphic correlations.

Bleeker, W., 2001. Current Research, GSC Paper 2001-C

Hrabi, B. et al., 1993. Current Research, GSC Paper 1993-C

Hrabi B. et al., 1994. Current Research, GSC Paper 1994-C

Hrabi B. and Grant, G., 1999. GSC Open File Map 3676

Thompson P. and Kerswill, J., 1994. GSC Open File Map 2740

PETROLEUM HYDROCARBON REMEDIATION – COLOMAC EXPERIENCE

Richardson, A. and Breadmore, R. – Contaminants & Remediation, Indian and Northern Affairs Canada, Yellowknife, Northwest Territories

One of the major environmental issues remaining at the Colomac site is the Petroleum Hydrocarbon (PHC) impact through the camp-mill area. The source of the majority of the PHC was from the Tank Farm Area (TFA), where large spills leaked through the liner into the surrounding soil and bedrock. Other spills had also been reported in various areas between the camp and the south end of the mill.

Impacted soil was recovered from the TFA in 2005 and two biopiles were constructed on a specially built Land Treatment Unit (LTU), consisting of a membrane lined pad with a leachate collection system. Nutrients were added to the soil, and water and air forced into the piles were pre-heated in a control shack beside the LTU, allowing year-round treatment. After two years of active treatment, analytical results showed that thirteen of the eighty soil samples still reported concentrations that exceeded the remedial objectives. Additional remedial action was required for the remaining soil.

The soil of the two biopiles in the LTU was remediated to CCME guidelines in the Waste Oil (Laydown) Area, using a windrow treatment process. The soil in windrows was ready for decommissioning in October 2007.

Other areas of soil impacted above the CCME Tier 1 guidelines have yet to be recovered and also will require remediation. Areas of impacted soil around the Maintenance Shop, the mill and the eastern shoreline of Steeves Lake were delineated and site-specific remedial objectives were used to excavate some of the soil. The soil is stored in the LTU to await treatment in 2008.

Free Phase Petroleum Product (free product) was found in the soil and bedrock following installation of wells in 2000. Recovery of this product, and measurement of volumes recovered, has been sporadic in the seven years since the well installation. The volume of product that has been recovered is not known.

Monitoring and recovery of the free product on the site is on-going. Free product and water levels are monitored weekly. Free product is removed from the wells using a product recovery pumping system or passive bailers. The product removal has been a slow process because the mobilization of free product into the wells is very slow. In order to be assured of complete product recovery, a full year of well monitoring without detectable product layers will be required. All petroleum product must be removed at least one year before the closure of the site. Wells will then have to be properly decommissioned.

In order to achieve this schedule, a more aggressive treatment technology must be considered. Other treatment options are being investigating to increase the mobility of the product through the bedrock fractures. Any new treatment technology that would be used must be implemented as soon as practical in order for there to be sufficient monitoring after treatment is completed.

DIAMOND EXPLORATION ON BRODEUR PROJECT, NORTHWEST BAFFIN ISLAND

Ritcey, D., Moul, F., Clarke, D. and Kirkley, M. - Diamondex Resources Ltd., Vancouver, British Columbia

Diamondex optioned the Brodeur property from Kennecott Canada Exploration Inc. in 2005, and will have earned 100% interest in the project by the end of 2007. Previous work by Kennecott identified 3 areas of kimberlite intrusions on the property: Tuwawi, the Nanuk cluster, and the Kuuriaq kimberlite corridor. Additional prospective areas on the property have been identified over the past 3 years by several phases of indicator mineral sampling and airborne geophysical surveys. Fieldwork in 2007 had a dual focus on

assessing known kimberlite bodies, and on developing and testing additional targets.

Spring and summer exploration programs at Brodeur in 2007 included ground magnetic surveying on 16 targets or anomaly clusters. These targets were selected from previous airborne geophysical surveys coupled with kimberlite indicator mineral results from till and stream sediment samples. Kimberlites at Brodeur have a high magnetic susceptibility contrast to the limestone country rocks, and are readily imaged magnetically. At Nanuk and at the southwest end of the Kuuriaq corridor there are arrays or clusters of magnetic highs, whereas the northeast part of Kuuriaq is a strongly continuous magnetic lineament, indicative of a planar dyke structure. Overall length of the Kurriaq corridor exceeds 4 kilometres.

Twelve diamond drill holes at Tuwawi substantially delineated the size and shape of the intrusion, and yielded approximately 3 tonnes of kimberlite for a preliminary assessment of diamond grades. One drill hole also targeted the large magnetic anomaly at "Tuwawi East", approximately 300 metres from the main Tuwawi kimberlite. Fourteen drill holes were sited on magnetic targets at Nanuk and Kuuriaq. These exploration holes had a very high rate of success, and significantly extended known kimberlite occurrences at Kuuriaq.

Processing of drill core by caustic fusion is underway, and will constitute a major step in assessing the economic potential of the Brodeur Project. Untested, drill-ready targets, including those outlined by geophysics in 2007 and the Tuwawi East anomaly, along with zones of anomalous indicator minerals, hold great potential for new discoveries at Brodeur.

ICE FLOW AND DISPERSAL PATTERNS ON SOUTHAMPTON ISLAND, NUNAVUT: A PRELIMINARY ASSESSMENT.

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[2] Canada-Nunavut Geoscience Office, Iqaluit, Nunavut
[3] Geological Survey of Canada, Ottawa, Ontario

During the field season of 2007, the glacial features of Southampton Island were studied and a reconnaissance sampling survey (approx. 10-km sample spacing) of glacial and post-glacial sediments was completed for kimberlite indicator mineral (KIM) and geochemical analyses. The goal is to assess the exploration potential of Southampton Island which is still largely unknown, although the area has similar geology as parts of contiguous mainland Nunavut where there is significant private-sector interest and activity in diamond, gold and base-metal exploration. Over 150 sites were sampled. A 20 kg sample for KIM analysis and a 3 kg sample for geochemical and other laboratory analyses were generally taken at each station. The samples consist mainly of subglacial till, but glaciofluvial and alluvial sediments were also sampled from eskers and alluvial bars, respectively. Most sampling stations are located over the area underlain by Precambrian rocks. This area was largely unaffected by post-glacial marine reworking and although physical weathering and other periglacial modifications are ubiquitous, small-scale glacial erosional forms including glacial striae, roches moutonnees, whaleback forms and rock drumlins are relatively abundant. This is especially true along the north coast where Precambrian rock outcrops abound. Fluted landforms over unconsolidated sediments occur more frequently over the lowlands underlain by Paleozoic rocks. However, carbonate dispersal trains associated with elongated fluted landforms do occur on the lowest portion of the Precambrian terrain as well. Preliminary analysis suggest that a complex system of ice stream tributaries developed over the lowland portion of the Island during deglaciation, whereas the remaining higher part of the island was much less connected to the regional glacial dynamics of northern Hudson Bay. This small area of the Laurentide Ice Sheet is probably best described as a local stationary dome. The latter evolved into a remnant ice cap with small lobes in the main valleys before it completely vanished. From an exploration point of view, samples from stations located along the outer boundary of the Precambrian terrain and away of carbonate dispersal trains should provide information about source rocks located within relatively small ice flow catchments extending no more than a few 10s of kilometres toward the center of the island. Samples located closer to the potential local ice divide in the central part of the island will probably reflect even more proximal sources. Elsewhere, the compositional signature of potential mineral deposits is expected to be significantly affected (i.e. diluted) by the extensive dispersion of carbonates and by post-glacial marine reworking/mixing.

2007 MAPPING IN THE BOOTHIA MAINLAND AREA (NTS 57C AND 57D), KITIKMEOT REGION, NUNAVUT

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The Boothia mainland area in central Nunavut, is located in the north-central Rae domain of the Churchill province. The area comprises a high-grade gneissic terrain dominated by Neoarchean metaplutonic rocks, lesser Archean and Paleoproterozoic supracrustal sequences, and migmatitic gneiss. During 4 weeks of mapping in 2007, 13000 Km^2 were completed at a scale of 1:250,000, leading to a total area of 33000 km^2 completed for the project. Results of 2005 work in the southern part of the area demonstrated that the <2.76 Ga Archean supracrustal rocks outcrop as narrow, northeast-striking belts (e.g. Barclay belt) of psammite, semi-pelite, metabasalt, ultramafic schist, and sulphide-bearing (lean) iron formation, and probably correlate with the pan-Rae Prince Albert Group. Granitic rocks, and their gneissic equivalents, are dominated by I-type, meta- to peraluminous, polyphase, commonly porphyritic bt-hbl monzogranite to granodiorite of the widespread 2.61-2.59 Ga Rae event. Nd isotopes generally yield 2.85-2.70 Ga model ages for plutonic rocks and juvenile initial Nd ratios (+0.7 - +3.8).

To the north, the 2007 Boothia map area hosts several kilometric-scale discontinuous linear supracrustal belts, the largest of which is a variably exposed NE-trending 10 by 150 km panel. These comprise mafic to intermediate metavolcanic rocks, associated with pelitic to psammitic paragneiss and locally, banded iron formation. Gossans are widespread within these supracrustal assemblages, and a metre-scale lens of pyrite-dominated massive sulphide was discovered in a granulite-facies gossan. These belts are favorable hosts for base and precious metal mineralization. Geochronology will assess whether these supracrustal units represent higher grade equivalents of the Neoarchean Prince Albert Group.

The area is characterized by numerous tectonometamorphic domains that exhibit regional variations in structural style, strain and metamorphic grade related to polyphase Archean and Palaeoproterozoic events. Late-Archean orthogneiss grades from amphibolite to granulite facies toward the north and east across the NE-trending structural grain. Supracrustal host rocks are characterized by granulite-facies mineral assemblages, with highly domainal retrogression to amphibolite facies. Importantly, despite pervasive polymetamorphic overprinting, supracrustal rocks commonly preserve relict primary volcanic and sedimentary features.

Superposition of late, map-scale, shallow-plunging folds defines structural domains and controls first-order lithological distribution across the Boothia mainland. A prominent NE-SW oriented granulite belt divides the region into domains with contrasting lithological, structural and metamorphic character. Detailed mapping and structural analysis of the well-exposed northernmost tip of the area has revealed six generations of Archean to Paleoproterozoic deformational structures. Definitive evidence was observed for thrust imbrication of Archean rocks on top of the Paleoproterozoic Chantrey Group sedimentary succession. These thrusts are deformed about late regional north- and northeast-plunging open folds indicating that much of the structural control on the map pattern is Paleoproterozoic.

Glacial ice-flow studies carried out this summer at a reconnaissance scale are consistent with the 4 stage history determined in the 2005 field season to the south, with local late-glacial ice flow variations that are topographically controlled. Indicator minerals are

PERFORMANCE OF TAILINGS COVERS IN NORTHERN CLIMATES

Rykaart, M. - SRK Consulting (Canada) Inc., Vancouver, British Columbia

Soil covers on mine waste facilities (i.e. tailings, waste rock piles, heap leach pads etc.) are one of many possible practices that are used to achieve mine closure objectives. Over the last two decades the analytical tools used to design suitable covers have advanced rapidly; however, the experience base stems primarily from temperate climate zones.

Canada is host to a large number of historic mine sites, as well as a rapidly growing list of new mines. A large portion of these mines are located in permafrost regions, and are subject to arctic climatic conditions. Many of the historic mine closure projects include soil covers over mine waste facilities which were designed using state-of-the art cover design principles; but, as previously stated, these principles were not proven in arctic climate regions. Cover performance monitoring at these sites have over the last few years identified some very unique physical phenomena that are resulting in some instances to cover failure. These failures could not have been anticipated at the design stage, as even now many of these observed failure modes are not completely understood.

These issues are, however, not limited to the Canadian arctic, but include all locations where the covers are being subjected to extreme cold temperatures such as at high altitude sites. These extreme climatic zones not only pose challenges, but also create possible opportunities, such as tailings and/ore waste rock encapsulation in permafrost. Naturally, these kinds of approaches are not without potential risk, especially when considering factors such as climate change and the issue of closure design life.

Building on a review of over 200 cover case studies, focusing on design and construction practices for soil covers, SRK with financial support from MEND, has undertook a study to identify those criteria that would affect cover design and performance specifically in arctic climates. The study entailed three stages; First all physical processes that could theoretically affect cover performance were identified, including criteria such as arctic hydrology and physical processes such as solifluction. The second step was to identify as many arctic cover case studies as possible, not only in Canada but world-wide, to assist in identifying and possibly classifying the types of processes that are being observed. The third and final stage of the project was to identify prime target areas where further research could be focused to assist the industry in designing appropriate covers for arctic environments.

This talk will present key findings of this study; however, with a specific focus on tailings covers and how the design and long term performance of these covers differ in the cold northern climate zones of Canada.

THE GEOLOGY OF SOUTHAMPTON ISLAND, NUNAVUT, WITHIN A NE LAURENTIA CONTEXT

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Southampton Island, Nunavut, occurs in a critical, 400-km gap between the western Churchill Province, exposed in central Nunavut, and the Baffin-Ungava segment of the Trans-Hudson orogen, exposed on southern Baffin Island and northern Quebec. The bedrock geology of the island had only been mapped at reconnaissance (1:1 million) scale, and there was an absence of regional aeromagnetic and geochronological data. In light of newly identified diamond occurrences across eastern Nunavut and the potential for Cu-Ni-PGE and gold in the region, a better understanding of the mineral exploration potential, lithologic associations and regional crustal architecture of Southampton Island was necessary to meet the needs of the exploration industry and provide updated public geoscience for the Inuit community of Coral Harbour.

In 2007, 1:100,000-scale bedrock mapping of central and eastern Southampton Island by the Geological Survey of Canada and the Canada–Nunavut Geoscience Office revealed a varied lithologic association in which metasedimentary rocks including quartzite, semipelite ± calc-silicate are cut by a mafic plutonic suite that locally includes layered peridotite-gabbro-gabbroic anorthosite. Together, these are cut by regionally voluminous granodiorite-monzogranite±monzonite intrusions. Amphibolite-facies metamorphism is widespread, with granulite-facies assemblages locally preserved. Although undated, the lithologic association does not show an obvious correlation to Archean-age counterparts of the western Churchill Province, and may represent a dominantly Paleoproterozoic rock record. For example, the oldest metasedimentary rocks may correlate with the ca. 2.2-1.91 Ga Piling-Penrhyn group of central Baffin Island and Melville Peninsula, the intrusive mafic plutonic suite may be contemporaneous with ca. 1.9-1.88 Ga mafic rocks recognized throughout the Trans-Hudson orogen, and the youngest voluminous felsic plutonic rocks may be linked to regionally extensive batholithic emplacement (e.g., ca. 1.87-1.85 Ga Cumberland-Wathaman). Depositional basement to the metasedimentary rocks

was not identified in the field, however, its presence, character and age will be explored through tracer isotopic studies.

The Precambrian rocks have experienced at least two penetrative deformation events. D_1 involved development of a moderately to steeply inclined, north-trending planar tectonic fabric (S_1), defined by high-grade mineral alignment and/or compositional layering. S_1 was highly modified during D_2 into tight, recumbent, west-trending, south-vergent F_2 folds that occur in metre-scale panels bound by relatively straight zones of gently inclined west-striking S_1+S_2 transposition foliation. Locally, broad, open, northeast-trending upright folds (F_3) of the transposition foliation highlight a non-penetrative, near-horizontal component of shortening (D_3).

Two main structural breaks appear to transect the bedrock geology of Southampton Island, both of which may link to Paleoproterozoic structures to the west. Across the north part of the island, an east-striking, steeply dipping, subhorizontally lineated shear zone may be the along-strike continuation of the ca. 1.8 Ga Wager Bay shear zone. To the south, an inlier of Precambrian basement surrounded by Paleozoic strata lacks felsic plutonic rocks that are ubiquitous elsewhere across the island, and exposes high-grade mafic granulites cut by a blue quartz porphyry, which is not seen elsewhere. These observations point to the potential for a structural break in southern Southampton Island that may correlate with the ca. 1.9 Ga Snowbird tectonic zone.

WHITHER THE KIMBERLITE INDICATOR AND DIAMOND DATABASE (KIDD) AND KIMBERLITE INDICATOR MINERAL CHEMISTRY DATABASE (KIMC): INTEGRATION INTO GOMAP FOR ON-LINE QUERIES

Sandeman, H.A. and Udell, A. - Northwest Territories Geoscience Office, Yellowknife, Northwest Territories

The Kimberlite Indicator Diamond Database (KIDD) and Kimberlite Indicator Mineral chemistry Database (KIMc) were last updated in 2004. These databases incorporate relevant data from publicly available diamond exploration, industry assessment reports and were previously released as separate CD/DVD compilations. These releases are currently managed as a series of Excel spreadsheets that are released as a publication, to either supercede or update earlier publication versions. The current process for construction of these databases is tedious, time consuming and highly inefficient.

In managing our growing collection of research and publication documents and data, NTGO is moving towards a data warehouse approach - creating the higher-level repository of information that will drive the business decision-making process into the future. As a result of this process, NTGO is currently engaged with a contractor in developing a mechanism to incorporate KIDD and KIMC spreadsheets into the data warehouse – the Diamond Database, a relational Oracle database. Our clients will have Internet access to this data repository via our NT GoMap web-based application. This will eliminate the arduous process of data compilation and production of NTGO publications, will allow rapid and timely updating of the databases and, will thus facilitate public distribution and dissemination of these data via our NT GoMap web portal. The new application will allow clients to discover, query, and download KIDD/KIMc Shapefiles and associated NORMIN Reference data.

Stage 1 of this process has now been implemented. We have incorporated the published KIDD and KIMc data releases distributed by NTGO, largely covering diamond exploration in the Slave craton and environs. An additional 112 assessment reports and their contained KIDD and KIMc data have been added to the databases. These new relational databases incorporate newly released as well as older data from the entirety of the Northwest Territories and Nunavut.

TAMERLANE VENTURES INC.: UPDATE ON THE PINE POINT PROJECT

Schleiss, W.A., Swisher, D. and Burns, R. - Tamerlane Ventures Inc., Blaine, WA

The first claims at Pine Point were staked in 1898 on oxidized sulfide outcrops. From 1929 to 1955, several companies, including Cominco Ltd, conducted extensive exploration in the area which culminated in full scale mining and milling operations by Cominco from 1964 to 1987. Mining by Cominco ceased in 1987 due to high energy costs associated predominantly with dewatering and low metal prices. During the time frame 1964-1987, Cominco mined 68 million tonnes of ore with an average grade of 3.1% Pb and 7.0% Zn valued at $20 billion ($0.64/lb Pb and $1.60/lb Zn). Currently, a total of 35 delineated deposits remain un-

mined, including several deposits defined by Westmin Resources. These deposits are the focus of work currently being carried out by Tamerlane Ventures Inc.

Geologically and genetically, mineralization at Pine Point is typical of Mississippi Valley Type (MVT) deposits. Mineralization is primarily hosted within the middle Devonian Pine Point Formation, an east-west striking barrier reef complex that separated a restricted evaporite basin to the south and open ocean to the north. Structurally, the reef complex lies on or is in close proximity to the McDonald fault, a continental scale dextral strike-slip fault which separates the Slave and Churchill Provinces.

Mineralization at Pine Point is restricted to paleo-karst caverns, collapse structures and underground channels formed during sub-aerial exposure of the barrier reef complex. Three NE-SW trending zones of mineralization have been identified. These zones lie along the major axis of the barrier reef complex and consist of the North, Main and South trends. The North and Main trends are well defined, with the South trend being more erratic. Alteration consists of pre-mineral stage coarse grained dolomitization, locally called Presquilization. This alteration style is similar to that found in other MVT deposits and also in many oil and gas fields. Karst structures which presently host Pb-Zn mineralization are thought to have been oil traps at one time since large amounts of bitumen are often found near the top of the ore. Genetically, Pb-Zn mineralization is thought to have formed by the mixing of metal rich brines derived from dewatering of shales along the north flank of the reef complex and sulfur rich waters derived from evaporites along the south flank of the reef.

Historically high lead and zinc prices coupled with low inventories of these metals has created renewed interest in the deposits at Pine Point. Tamerlane Ventures Inc. recently completed an NI 43-101 and feasibility study on the R-190 deposit defining a proven reserve of 1,000,027 MT grading 16.5% combined zinc-lead in addition to 10.9 million tonnes of indicated resources grading 4.91% zinc and 2.52% lead.

Mining of this deposit will utilize current and proven technologies that are necessary to mine the remaining deposits underground. These include underground long-hole stope mining utilizing a 6.7 metre that will encompass a men and materials cage and a vertical conveyor for hoisting ore. Using proven freezing techniques, a frozen wall of ice will be generated around the entire perimeter of the ore body including all underground infra-structure. The freeze ring perimeter will control ground water influx into the mine. Dense media separation and conventional flotation without the use of cyanide will be used to up-grade the ore to a direct shippable concentrate. All waste materials generated will be reused either in the on-site shotcrete or backfilling plant facilities.

Tamerlane anticipates receiving the land and water permits by the end of 2007, which will allow Tamerlane to immediately commence work on the freeze ring drilling and shaft sinking construction. This will allow Tamerlane 12-15 months of construction through 2008 with anticipated production of 2,800 tonnes per day within the first quarter of 2009.

COMMUNITY MAPPING PROJECT 2007: LUTSEL K'E, NWT

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[1] Northwest Territories Geoscience Office, Yellowknife, Northwest Territories
[2] Lutsel K'e, Northwest Territories

The Northwest Territories Geoscience Office (NTGO) works together with communities to run an annual field-based geological education program. In 2007 this Community Mapping Project took place in and around Lutsel K'e, NWT. After consultations with the Band office, four students and two guides were hired by the community to work on the project with NTGO's Outreach Geologist. The goal of the project was to map the geology around the community and to highlight areas of interest in a poster. The poster will describe the geology, landforms and cultural areas and will be used as an educational tool by schools, for general knowledge and as a tourism aid. Skills learned by the students and guides included basic geological mapping, rock and mineral identification, compass traversing, sample collection, GPS usage, digital photography, and landform and glacial feature identification.

A new twist to this annual program was that the mapping crew participated in a spiritual retreat in the Fort Reliance area at the east end of Great Slave Lake. Camping with approximately 200 people from Lutsel K'e gave people the opportunity to see what we were working on, look at the maps and suggest further areas of interest. While the weather kept us confined to camp, it allowed us to spend more time on the cultural aspects of the retreat and visit areas of interest that were within walking distance.

The poster will be distributed to the community and a presentation is to be given at a community open house and at the school. The poster and information on the mapping program will be posted on both the NWT Geoscience Office and Lutsel K'e's web sites. Community mapping posters are available free to the public and to schools through or by emailing ntgo@gov.nt.ca.

OVERVIEW OF THE EARTH SCIENCES SECTOR'S GAS HYDRATES PROGRAM: FACILITATING THE DEVELOPMENT OF A SECURE, ALTERNATIVE SUPPLY OF CLEAN NATURAL GAS

Scott, D.J. - Earth Sciences Sector, Natural Resources Canada, Ottawa, Ontario

Much progress has been made in the past twenty years in understanding the potential for natural gas production from methane clathrate (gas hydrate). Initially identified as a potential hazard and impediment to transport of hydrocarbon liquids in pipelines, gas hydrates are now the focus of international efforts to determine the conditions under which economic production of methane can be achieved from solid hydrate. Whereas much of the international effort is focused on marine occurrences (India, Japan, Korea, Taiwan, USA), Canadian research is directed at terrestrial deposits (such as those in the Mackenzie Delta, exemplified by the Mallik site) as well as the offshore on all three coasts.

The Earth Science Sector's Gas Hydrates Program builds on the series of successful investigations at Mallik, as well as in the marine environment; much of this research has been accomplished in close collaboration with university-based researchers, as well as government agencies, from around the world. The current program will continue our efforts to understand the technical feasibility of *in situ* natural gas production from gas hydrates, as well as increase our efforts to create improved knowledge of Canada's gas hydrate resources through the development and application of new methods to identify characterize, and understand deposits. In order to ensure that this work delivers maximum positive impact, we will strive to increase the awareness of the exploration community, as well as regulators, policy-makers, and northern communities, of the potential for gas hydrates to provide an alternative, secure supply of clean natural gas for Canada.

MIRAMAR HOPE BAY LTD., PROGRESS REPORT 2007: DEVELOPMENT OF HOPE BAY PROJECT, NUNAVUT

Sherlock, R., Lindsay, D., Wakeford, J. and Smith, D. - Miramar Mining Corp., North Vancouver, British Columbia.

The Hope Bay project is 100% controlled by Miramar, and includes over 1,000 sq. km. of the most prospective undeveloped greenstone belts in Canada. The belt contains a number of significant gold deposits including the Doris, Madrid and Boston geologic systems. Collectively these deposits contain a resource of over 10 million ounces of gold.

Miramar embarked on the 2007 Hope Bay exploration campaign with the objectives of: i) advancing a feasibility study around development options for the Hope Bay belt beyond the planned Doris North mine, which includes infill and expansion drilling and supporting technical and metallurgical studies for the Madrid and Boston geologic systems; ii) conducting exploration drilling proximal to the existing deposits, and; iii) testing of priority exploration targets for new discoveries in settings similar to the existing resource areas.

The 2007 Exploration Program was initiated March 17 and completed in mid-October. Significant results include expansion of the Suluk and Rand deposits of the Madrid system, expansion of the Boston BN deposit demonstrating it's possible link with the existing Boston deposit, and completion of a significant regional exploration program testing the highly prospective geology of the Madrid trend.

Some of the better results from Suluk and Rand are from areas that previously were poorly drilled and include:

- Suluk Hole 07PMD549 intersects 7.0 g/t gold over 48 metres

- Rand Hole 07PMD542 intersection of 8.4 g/t over 54 metres

In mid-September the Nunavut Water Board recommended to the Minister of Indian and Northern Affairs Canada (INAC) that a 6 year Type A water license be issued to Miramar for use in the construction, operation and ultimate reclamation of the Doris North Project. Miramar has taken a phased approach to production at Hope Bay, with the targeted Phase I, the Doris North Mine to commence milling operations in

late 2008. Site preparation and earthworks are scheduled to be completed over the 2007/2008 winter season to allow for construction of the mill and associated facilities in the summer of 2008. The marine jetty and associated lay down area at Roberts Bay was constructed in the summer of 2007 and is being used to offload construction equipment and materials. The camp and mill building have been mobilized to on the 2007 sealift. It is anticipated that the Doris North project will be expanded to include other zones in the Doris system with a view to extending the first phase of production for Miramar. This will allow for the preparation, permitting, development and construction of what is planned to be a much larger Phase II of production on the belt.

APPLICATION AND BENEFITS OF A SEISMIC SHOTHOLE LITHOLOG DATABASE AND GIS FOR THE NORTHWEST TERRITORIES AND NORTHERN YUKON

Smith, I.R. - Geological Survey of Canada, Calgary, Alberta

The sparseness of basic geoscience data in much of the Northwest Territories and Yukon represents a practical limitation to development and resource management. The recently published Seismic Shothole Litholog Database and GIS (Geological Survey of Canada Open File 5465) is designed to address aspects of this, by providing a digital and spatial rendering of 76 000 shothole drillers' records, spanning 49 NTS 1:250 000 map sheets. This publication provides baseline, shallow (<20 m) lithostratigraphic and geoscience information on surficial and bedrock geology, hydrogeology, geohazards, granular aggregate resources (gravel), massive ground ice, and permafrost distribution. It is anticipated to be of benefit to a wide variety of users and applications (e.g., seismic exploration, pipeline and resource infrastructure development, drift prospecting, environmental consulting, aboriginal groups and local communities).

In addition to the database, which can be easily queried and sorted by the user, considerable effort has been put into developing a GIS that can be integrated into existing programs, or run as a stand-alone feature using a free version of ArcReader. The GIS contains several interactive layers of information that have been extracted from the database, including: drift isopach (thickness of unconsolidated materials overlying bedrock), granular aggregate (surface and subsurface gravel and sand deposits), geohazards (e.g., water, flowing holes, gas, ice), permafrost (presence of ice/frozen materials), and muskeg thickness. In some areas where the density of records is considered high enough, attempts are being made to construct 3D models of the surficial geology.

Originally designed to digitally enable an archive of file card records stored at the GSC since 1975, the shothole database project has over this past year and a half undertaken the retrieval and input of >140 000 additional shothole drillers records from 10 petroleum companies' archives, including those of Chevron and Imperial Oil. This new data is presently being checked and will subsequently be integrated into an updated GIS and Open File release. Access to additional archival and recent shothole records is still being sought/welcome from other companies. Though typically disregarded by companies themselves, the practical application of shothole drillers' records used to locate buried aggregate deposits in northeastern British Columbia highlights their potential usefulness. It is also the case that whereas the quality of individual, or shothole drillers' record in general, may be questionable, their integration into a GIS along with other data sources (i.e., surficial geology maps, geotechnical borehole databases) provides a tremendous basic geoscience resource and tool for guiding further field exploration.

PERMAFROST THERMAL RESPONSE TO CHANGING AIR TEMPERATURES

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Permafrost is defined as a thermal condition in which the temperature of earth materials remains continuously below 0°C for two years or more. The thermal regime of the ground and therefore the distribution of permafrost depend on the energy balance at the earth's surface and the geothermal heat flow from the earth's interior. Since permafrost is a thermal condition, climate is the main factor determining the occurrence of permafrost. Permafrost conditions therefore, vary to some extent with latitude, with permafrost being only a few metres thick and at temperatures close to 0°C in the southern discontinuous zone to several hundred metres thick with temperatures of -15°C in the high Arctic. There is a complex relationship between air temperature and ground temperature which depends on a number of site specific conditions that determine the transfer of heat between the ground and the air, such as slope, aspect, vegetation, snow cover, surficial materials, the presence or absence of an organic layer, soil moisture (or ice) content and drainage. Alterations

of these local conditions related to for example, surface disturbance caused by natural factors or human activity, or changes in atmospheric climate can result in changes to the ground surface temperature and, and hence the ground thermal regime and the permafrost conditions. Changes in permafrost temperatures can alter the mechanical properties of the ground and this may have implications for engineering design and infrastructure performance.

Since the response of the ground thermal regime to changes in air temperature that accompany climate warming depends on a number of buffer factors, changes in air temperature do not necessarily translate into a similar change in ground temperature. The response of permafrost to changes in air temperature therefore, shows a great deal of spatial variation. Not all permafrost is in equilibrium with the current climate conditions because it may take several decades or centuries or longer for changes in surface temperature to propagate to depths of 100 m or more. Permafrost temperatures therefore are a product of past changes in surface temperature.

Results from the Geological Survey of Canada's permafrost monitoring network indicate a general warming of shallow permafrost across the Canadian Arctic but the magnitude and timing of the warming varies regionally. Warming of shallow permafrost of 0.3 to 0.6°C per decade has occurred since the mid to late 1980s in the central and northern Mackenzie region. In the southern Mackenzie where permafrost temperatures are close to 0°C, there has been little change in permafrost temperature. Warming of 1°C per decade or more has occurred in shallow cold permafrost (temperatures of -8 to -15°C) of the eastern and high Arctic, but this occurred mainly in the late 1990s. These regional trends in permafrost temperature are consistent with trends in regional air temperature observed since the 1970s but local conditions are also an important factor.

CONTRASTING KIMBERLITE TYPES AND DISPERSION TRAINS AT THE CHURCHILL DIAMOND PROJECT, KIVALLIQ REGION, NUNAVUT

Strand, P.[1], Banas, A.[2] and Burgess, J.[3]

[1] Shear Minerals Ltd. Edmonton, Alberta
[2] APEX Geoscience Ltd. Edmonton, Alberta
[3] Burgess Diamonds

The 2.0-million acre Churchill Diamond Project is a continuously expanding kimberlite district that was discovered in 2003 by Shear Minerals Ltd., and partners Stornoway Diamond Corp. and BHP Billiton Diamonds Inc. A total of 79 kimberlites including 23 kimberlite outcrops have been discovered over a 60km by 60km area on the Churchill and Churchill West projects. Currently the focus is on evaluation of four significantly diamond-bearing, vertically-emplaced kimberlite dykes (up to 4m in width) that have returned sample grades up to 2.18 carats per tonne.

Geographically the project is located near Rankin Inlet in the Kivalliq region of Nunavut, Canada where exploration is facilitated using barge and rail access. Geologically the project is located within the Churchill Geologic Province cratonic rocks and is underlain by rocks of the metamorphosed Archean Rankin Inlet group and surrounding Archean metaplutonic rocks of the Churchill Structural Province.

Two unique types of kimberlite exist on the project, however a few kimberlites of hybrid intermediary type have been recognized this past field season. The main kimberlite types have the following characteristics:

1: Strong magnetic signatures, fine grained, dominantly magmatic textures with large olivine phenocysts, low indicator mineral abundances dominated by ilmenite with rare garnet; poor mineral chemistry; a warm geotherm; emplacement ages of between 170-242 Ma, and low diamond carrying capacity. 71 discovered to date.

2: Subtle magnetic signatures, medium to coarse grained, two generations of olivine including macrocrysts, high indicator mineral abundances with high garnet counts and low ilmenite counts with good mineral chemistry; cool geotherm, and moderate to high diamond carrying capacity. Eight examples discovered to date including PST003, Jigsaw, Notch, Kahuna and Meeka. A preliminary age date from the Notch kimberlite is 232 Ma.

Abundant indicator minerals have been recovered from the >10,000 till samples collected on the Property. Recovered indicator minerals include pyrope garnet, eclogitic garnet, chrome diopside, chromite, picro-ilmenite and olivine. The presence of abundant (~27%) high interest pyropes – subcalcic G10 pyropes - has driven exploration in the area and resulted in the recognition of two main corridors of interest: the Josephine River ('JR') and Sedna corridors. In these areas, high density follow-up till sampling contributed to the prospecting and drilling discoveries of the high interest diamondiferous kimberlite dykes. In the northern part of the property (i.e. north of JR) a third corridor with abundant indicator minerals exists however the indicators are dominated by G9 pyrope garnets. To date, only widely spaced till samples have been collected in this corridor. All three corridors have unique Quaternary geology. Indicator mineral dispersal trains with distinctive characteristics have been recognized for the two kimberlite types and in each corridor.

The 2007 the joint venture partners completed a $7 million exploration program with a dual focus: on better understanding the diamond content of our known kimberlite dykes and on continued exploration to discover new kimberlites. A 400 tonne mini bulk sample was collected from the Kahuna kimberlite from which of 93.54 carats have been recovered from the processing of the first 106.6 dry tones with the three largest diamonds weighing 1.39, 1.19 and 0.73 carats. A total of 31 new kimberlites were discovered in 2007, 15 through drilling and 16 through prospecting.

PRAIRIE CREEK MINE UPDATE

Taylor, A. - Canadian Zinc Corp., Vancouver, British Columbia

The Prairie Creek Mine, located in the Mackenzie Mountains 200 kilometres west of Fort Simpson in the Northwest Territories, is 100% owned by Canadian Zinc Corporation. A 43-101 compliant mineral resource has recently been completed which defines an overall Measured and Indicated resource within the vein and stratabound now totalling 5.2 million tonnes grading 10.8% Pb, 11.3% Zn, 175 g/t Ag and 0.4% Cu. In addition to this well defined resource there is an open-ended inferred resource of 5.5 million tonnes grading 11.4% Pb, 13.5% Zn, 215 g/t Ag and 0.5% Cu.

Based on a positive 1980 Feasibility Study new mine infrastructure, which included a 1,000 tpd mill, workshops, accommodations and facilities, was set up by Cadillac Exploration financially backed by the Hunt Brothers of Texas. The collapse of the silver price in 1982 caused the development to enter into bankruptcy three months prior to scheduled production. At that time the mine had received all operating permits for production.

At Prairie Creek mine high grade base metal mineralization occurs in two types of geological settings, Vein and Stratabound type. The high grade Vein is located within a steeply dipping fault zone cross-cutting the Ordovician to Silurian age sedimentary sequence, which includes the Whittaker and Road River Formations, along the axial plane of a doubly plunging regional antiform. Stratabound base metal mineralization has also been drill located adjacent to the vein within the same stratigraphy.

A multi-million dollar underground program, consisting of over 400 metres of decline tunnel and 8,200 metres of core drilling over 41 holes, was recently completed this year. This program was carried out in order to compile a NI43-101 compliant mineral resource estimation. This report has now been completed and has estimated a significant increase in Measured and Indicated resource, adequate to maintain a minimum 10 year mine life which will form the basis to determine mine economics. Supplemental to this detailed resource is a large 5 million tonne open-ended inferred resource along with excellent mineral potential elsewhere on the +10,000 ha property.

Further underground exploration is presently underway involving extension of the decline ramp to establish additional drilling stations. The company also recently received a LUP from the MVLWB to re-establish the Winter Road connecting the minesite to the Liard Highway. With this in hand and a solid mineral resource being defined, an application for a Class A water license to support production will be submitted in the near future.

DIAVIK'S ABORIGINAL LEADERSHIP DEVELOPMENT PROGRAM

Tees, J. - Diavik Diamond Mines

The Aboriginal Leadership Development Program is an innovative program, various aspects including nominations, assessment and curriculum. The program uses a mentorship approach with guest speakers from within the company to develop its Aboriginal employees and those of its contractors.

The program is a Partnership with SAIT Polytechnic of Calgary and is working towards development of a broadened program that will include Aurora College and Industry to develop innovative Northern leadership solutions to the challenges of development in the North.

The program was developed by Diavik in keeping with its commitments to develop sustainable mining practices in the North.

AN INTRODUCTION TO CRETACEOUS CLASTIC MARINE DEPOSITS IN THE PEEL PLATEAU REGION, NWT: BIOSTRATIGRAPHY AND SEDIMENTOLOGY

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The Cretaceous succession in the Peel Plateau region of the Northwest Territories consists of the Martin House, Arctic Red, and Trevor formations. Type sections providing lithostratigraphy and biostratigraphy (foraminifera and macrofossils) were established along the Peel and Snake rivers by Mountjoy and Chamney (1969). Mapping by Yorath and Cook (1981) extended the stratigraphy further west including the Hume River. This study, based on extensive field work, revisits the Hume River section and takes a detailed lithological and micropaleontological approach in collaboration with the NTGO's Peel Plateau Petroleum Geoscience Project.

Cretaceous (Albian) strata exposed along the Hume River and tributaries provide a continuous two kilometre thick section that includes the interval from the base of the Martin House Formation to the Trevor Formation. The Martin House Formation is a transgressive marine sandstone which sits unconformably on the Devonian Imperial Formation. It is 15 metres thick and is characterized by a basal pebbly sandstone conglomerate, followed by interbedded medium to fine grained sandstone and mudstone with common horizontal and vertical burrows, ripple cross stratification, and hummocky cross stratification (HCS). The Arctic Red Formation is a marine mudstone that is over a kilometre thick, silty in part, and has thin bentonite beds and concretions in the lower part. The largely monotonous shale package includes conspicuous horizons that will allow correlations to well logs, integration into a sequence and biostratigraphic framework, and paleoenvironmental interpretations. The Arctic Red Formation grades into the 700 metre thick Trevor Formation, which is a succession of wave-dominated prograding shoreface sandstones interbedded with mudstone and siltstone. Within Trevor Formation eighteen fine grained sandstone units were measured, each ranging from 1 to 20 metres thick. They are characterized by HCS, upper flow regime plane beds, ripple cross stratification, and swaley cross stratification. Some were topped by pebble beds indicating reworked upper shoreface deposits.

This summer, micropaleontological samples were collected along the entire Hume River section at approximately 20 metre intervals. Foraminifera are useful biostratigraphic indicators and in their response to sea-level change become paleoenvironmental proxies for this northern region of the Cretaceous Western Interior Sea. The detailed biostratigraphic framework will allow for: (1) establishment of a sequence stratigraphic framework for the basin, (2) attainment of better age constraints, in particular for the Trevor Formation, not well described previously and (3) regional correlations to equivalent strata in the Western Canadian Sedimentary Basin further to the south and north. The Hume River section has the potential for a valuable reference section for demonstration of the complex Albian high-frequency sea-level history.

LITHOSTRATIGRAPHY OF THE EARLY NEOPROTEROZOIC GYPSUM FORMATION (LITTLE DAL GROUP; MACKENZIE MOUNTAINS SUPERGROUP), NORTHWEST TERRITORIES

Turner, E. - Department of Earth Sciences, Laurentian University, Sudbury, Ontario

The Gypsum formation (informal) marks the stratigraphic middle of the Little Dal Group but is well exposed in few locations. Many of its known exposures are in the hangingwall of the Plateau Thrust and are both truncated and deformed. No measured sections were hitherto available. The formation's distribution and content are important because it acts as a décollement surface for the Plateau Thrust, the leading structure of the main fold-thrust belt of the Mackenzies. It has also been suggested as a possible source of sulphur for sulphides at Gayna River and other parts of the Mackenzie Mountains Zinc District.

Two nearly complete stratigraphic sections through the formation [Fugue Creek near Gayna River (FC); total thickness 377m; no lower contact; Stone Knife River (SKR); total thickness 483 m; erosionally truncated] separated by 55 km parallel to the strike of the paleo-basin margin contain 9 recognisable stratigraphic units. The uppermost unit of the Grainstone fm., consisting of ~70 m of rippled, desiccation-cracked, quartz-silty dolomudstone, is sharply overlain by as much as 500 m or more of generally white-weathering, intermittently and multi-directionally cross-laminated gypsum with local chicken-wire and enterolithic fabrics. Stratigraphic subdivisions within the gypsum are defined primarily by two red-coloured clay-bearing units, and local, minor amounts of carbonate interbedded with the gypsum. Near the top of the evaporite is a sharply defined, conspicuous carbonate marker unit (~10-15 m) consisting of nodular dolomitic lime mudstone with sparse molar-tooth structure. The contact with dolostone of the overlying Rusty Shale fm. appears to be abrupt but conformable. The stratigraphic members of the lower part of the succession are also present another 125 km along strike to the southeast in the footwall of the Plateau Thrust at Keele River.

The rippled evaporite and rare interlayered carbonate record subaqueous deposition in a restricted basin at a water depth that was at least intermittently above storm wave-base. Ripple cross-lamination indicates movement and redeposition of the gypsum as particles. Molar-tooth lime mudstone in the carbonate marker unit records an abrupt, temporary return to normal-marine, subtidal shelf conditions, likely caused by tectonic activity rather than eustatic sea-level change.

The lateral persistence of its stratigraphic subdivisions indicates that the formation had a geographically extensive, uniform depositional environment at any given time. Thickness differences in the expression of each unit at the two sections, however, suggest that subsidence rate and/or amount varied with location. Non-uniform subsidence is also suggested by the abrupt appearance and disappearance of the carbonate marker. δ^{34}Scdt for the sulphates at SKR averages 15.5‰ (range 14.9-16.2; n=11), which is typical for the early Neoproterozoic.

TECTONOSTRATIGRAPHIC DYNAMICS OF THE SOCIETY CLIFFS DOLOSTONE, MESOPROTEROZOIC BORDEN BASIN, NUNAVUT

Turner, E. - Department of Earth Sciences, Laurentian University, Sudbury, Ontario

The Society Cliffs dolostone hosts the Nanisivik Zn-Pb deposit and numerous base-metal showings in the Milne Inlet Graben (Mesoproterozoic Borden Basin, NU). Understanding the formation's architecture and tectonostratigraphic history is essential to identifying controls on the spatial distribution of base metals in this district. The thick, laterally extensive Society Cliffs dolostone is stratigraphically enclosed by shales of the underlying Arctic Bay Formation and overlying Victor Bay Formation. The contact with the lower shale is conformable but complex, whereas that with the overlying shale is irregularly erosional. The dolostone between these shales consists of four thick, geographically distinct but laterally extensive carbonate bodies belonging to two temporally distinct but stratigraphically conformable depositional systems. The lower system records: (1) a southeastern peritidal carbonate ramp (= lower Society Cliffs Fm.) that passes northwestward through a distally steepened ramp into deep-water shale (upper Arctic Bay Fm.) with (2) local, enormous deep-water mounds (= Society Cliffs Fm. type section). The upper system consists of (3) a southeastern peritidal platform with tepee-oolite rim (=upper Society Cliffs Fm.), which is laterally equivalent to (4) millimetrically laminated, sub-storm-wave-base dolostone in the northwest (=host rock at Nanisivik). Stratigraphic and spatial relations among these units and associated shales, and especially between the western and eastern parts of the Milne Inlet Graben, are difficult to decipher because (a) southeastern and northwestern successions are so dissimilar; (b) relationships between shallow- and deep-water facies in the transitional area are complicated by the presence of a carbonate mound (kms long, 100s m thick); and (c) the transitional area spans empty space (Tremblay Sound). The dolostone laminite that hosts most of the known base-metal showings is an unusual and hitherto undescribed lithofacies, making interpreting the nature and evolution of the basin difficult.

A >1 km thick, structurally disjointed but stratigraphically complete section through the Arctic Bay to Victor Bay interval on the west side of Tremblay Sound provides insight into relations between the economically important deep-water laminite and southeastern shallow-water facies. The lower part of the

section consists of shale sparsely interlayered with dolostone similar to southeastern, shallow-water lithologies. The upper part of the section consists of tepee-cycles of the upper Society Cliffs platform rim. The thin transition interval between the two contains laminite cyclically interlayered with shallower-water lithofacies, providing: (a) a physical and temporal link between southeast and northwest, and (b) an idea of paleobathymetric conditions in the northwestern laminite basin. Although the basin-floor environment was completely different from the adjacent tepee rim that prograded over it, it was only tens of metres deeper. Storm wave-base in the basin was, therefore, very shallow, indicating limited fetch and no significant connection between the Milne Inlet Graben and the open ocean. This contradicts previous interpretations of the basin as a being open to the global ocean. The abrupt inception of laminite deposition and upper Society Cliffs deposition in the southeast suggests graben-wide adjustment of the basin-floor caused by tectonic events.

DISPLACEMENT HISTORY OF SYNDEPOSITIONAL FAULTS IN THE MACKENZIE MOUNTAINS SUPERGROUP

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Parts of the Neoproterozoic Mackenzie Mountains Supergroup show distinct thickness and facies patterns that are not readily explained by uniform subsidence along a post-rift passive margin. These patterns may reflect the syndepositional influence of normal, listric and transfer faults that segmented and compartmentalised the rifted continental margin into individual depocentres and paleo-highs during extension. Isopach maps for the seven formation-scale members of the Katherine Group and for parts of the Little Dal Group loosely constrain the possible locations of these faults. Some of the inferred fault locations correspond to structures proposed by previous authors for major, basement-rooted structures. Some correspond spatially to faults whose synsedimentary activity has been documented in the Paleozoic. Individual faults cannot easily be identified in outcrops or from geologic maps.

Some of these repeatedly reactivated, basement-rooted structures may have acted as conduits for metalliferous fluids associated with the Mackenzie Mountains zinc district. Because of this, locating the faults and characterising the magnitude, timing and sense of displacement is critical for constructing a holistic model of the structural and metallogenic evolution of the area. Combined sequence stratigraphic and lithostratigraphic correlation perpendicular to the trends of suspected faults may help to locate them spatially and determine their movement history. Although sparse, preliminary data suggest that several faults or fault zones are present, with each fault showing evidence of changing sense of displacement combined with variable amounts of vertical movement at different times. This is consistent with differential subsidence of individual segments of a rift margin that was compartmentalised by spaced transfer faults perpendicular to the craton margin.

TURBIDITE FACIES OF THE UPPER DEVONIAN IMPERIAL FORMATION, NORTHWEST TERRITORIES

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The tectonic setting of the lower Paleozoic began with extensional tectonism followed by passive margin thermal subsidence. The upper Devonian assemblage (Frasnian to Famennian in age) within the Peel Plateau and Plain consists of a thin bedded and thick bedded turbidite succession approximately 700 to 800 metres thick deposited in a foreland basin as a clastic wedge during the Ellesmerian orogeny, within the convergent margin of North America. The sediment supply is craton derived as illustrated by paleoflow directions from east to west, and by the east-to-west progradation of clinoforms that can be observed on seismic lines. Lateral changes of facies show transitions from shoreface and shallow marine systems in the east to offshore and basin floor deposits in the west. The observed lithofacies suggest a shoreface environment in the east as swaley cross-stratifed glauconitic sandstones and proximal corals are present. Offshore and basin plain deposits in the west include waning pulses of ripple cross-laminated fine-grained sandstones interbedded with pelagic mudstones. Massive sandstones are also present showing traditional thick bedded turbidites followed by intervals of silty mudstones in a submarine fan depositional model. The ichnology and grain size supports these depositional environmental interpretations with Neireites

ichnofacies, very fine to fine grained sandstones, and pelagic muds.

NT GOMAP – ONLINE ACCESS TO NWT GEOSCIENCE DATA AND PUBLICATIONS

Udell, A. - Northwest Territories Geoscience Office, Yellowknife, Northwest Territories

The Northwest Territories Geoscience Office (NTGO) strives to advance:

"…the geoscience knowledge of the Northwest Territories for the benefit of all northerners, through delivery of geoscience research, analysis of mineral and petroleum resources, excellence in data management, and effective collaboration with partners."

To meet this objective, NTGO is improving Internet delivery of NWT geoscience information with the launch of NT GoMap, a powerful web-based geoportal which allows users to search, display, and download information from our large collection of geoscience-related data quickly and easily. NT GoMap and our existing online research tool, Gateway, compliment each other at www.nwtgeoscience.ca. Together they offer a comprehensive online solution to access NWT spatial and publication-based geoscience data, free of charge.

Geoscience information currently available in NT GoMap includes regional and detailed geology maps, NORMIN mineral showings, NORMIN references (including those with digital geophysical and geochemical data), and diamond sample data. Our research data is collected and compiled from field observations, and analysis, and organized into themed collections within NT GoMap. Users of NT GoMap can perform complex queries by using the combination of spatial and geoscience query options, which provide excellent search capabilities to meet the diverse needs of NTGO's clients. For example, users can locate all Showings or References that are within a geological province or are within 100 kilometres of a community. Results from such queries are fully downloadable in the form of ESRI shapefiles.

NT GoMap is tightly integrated with Gateway, allowing users to query and download publications derived from spatial or geographic constraints. Gateway is our online application to download and order scanned and digital versions of our publications. Gateway provides a shopping cart for saving individual or multiple selected reports (or files within reports). You can go back to your cart days or weeks later to review, modify, download, or order what is saved there.

Our NORMIN References database has been enabled for searching via the Canadian Geographic Data Infrastruture (CGDI) framework. CGDI-compliant web gateways such and GeoConnections and the Canadian Geological Knowledge Network (CGKN) are capable of searching and retrieving detailed citations of NTGO's published reports over the web. Not needed?

A future development will ensure that all geoscience layers presented in NT GoMap are also accessible via WMS (Web Managed Services). This means users of ArcGIS, Google Earth, Dapple, Worldwind, and other popular WMS-enabled viewers can add and view our layers.

THE FISH FAUNA OF GREAT BEAR LAKE: EXPEDITION ON A FRESHWATER INLAND SEA

Vecsei, P.[1], Blackie, C.[2] and Muir, A.[3]

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Great Bear Lake is situated in the Northwest Territories on the Arctic Circle and is the fourth largest lake in North America. On average, the lake is over 115 m deep with areas exceeding 380 m in depth. Great Bear Lake is extremely oligotrophic and water temperatures rarely rise above maximum density (~4 ºC). The fish fauna consists of cold water species (eg: Salmonidae and Cottidae) adapted for living in a relatively unproductive environment. Allopatric and sympatric speciation has allowed lake charr (*Salvelinus namaycush*) to radiate into a multitude of locally adapted forms. During our expedition on the lake, we documented this fantastic range of variation in a species otherwise not known for its morphological plasticity. Other components of the Great Bear fish fauna were also encountered and documented.

BAKER CREEK SURVEY: SPRING SPAWNING FISHES IN A REMODELED STREAM CHANNEL

Vecsei, P., Machtans, H. and Smith, P. - Golder Associates Ltd., Yellowknife, Northwest Territories

In 2006, because of potential flooding of the C-1 pit, an emergency program to reroute Baker Creek was undertaken. Baker Creek was rerouted along a 600 m long reach, resulting in the abandonment of the historical channel and pond complexes on the west side of Highway 4. We assessed the species spawning in Baker Creek throughout the spring freshet of 2007. Mark-recapture methods were used in an effort to quantify the numbers of individuals within each species and also to compare densities downstream and upstream of the culvert. We quantified and qualified spawning habitat and documented hydrological conditions during spawning and egg incubation. Only two species were observed spawning in Reach 4 of Baker Creek; the longnose sucker (*Catostomus catostomus*) and Arctic grayling (*Thymallus arcticus*). Adult grayling were usually seen holding in the glides or tailouts, slightly upstream from actual confirmed spawning sites. We documented 13 sites were grayling had deposited eggs. Mean values for bottom velocity, substrate and depth were 0.68 m/sec, 32.7 mm and 41.9 respectively. Upon emergence (June 4-7), young-of-year (YOY) protolarvae were restricted to the lowest velocities, seeking out areas of low velocity (0.17 m/sec) over a fine silt substrate. Shortly thereafter, the YOY became widely dispersed, taking up residency in the entire Reach 4 of Baker Creek.

COOPER MINERALS EXPLORATION FOR IOCG-TYPE DEPOSITS WITHIN THE TERRA PROPERTY, GREAT BEAR MAGMATIC ZONE, NWT.

Walker, E.C. and Rajnovich, L. - Cooper Minerals Inc., Vancouver, British Columbia

Cooper Minerals Inc. Terra Property (175,000 acre) is the largest public company landholding of mining claims in the Great Bear Magmatic Zone, along the east arm of Great Bear Lake, 430 kilometres north of Yellowknife, Northwest Territories. Previous production from high-grade veins in the area between 1930 and 1985 produced over 48 million ounces of silver, 15 million pounds of U3O8 and 14 million pounds of copper. For the past 15 to 20 years, the polymetallic high-grade veins and geology of the Great Bear Magmatic Zone have been reexamined by government and academic researchers and are now considered to be indicative of IOCG-type (Iron-Oxide-Copper-Gold) deposits analogous to BHP Billiton's Olympic Dam deposit, recently reported to be a resource of 7.7 billion tonnes and containing the world's largest resource of uranium, fourth largest resource of copper and the fifth largest resource of gold. Exploration work carried out in 2007 by Cooper Minerals has identified geological, structural and mineralogical characteristics indicative of Olympic Dam and IOCG-type deposits on its Terra Property.

Cooper Minerals has for the first time amalgamated historically separate claims providing an opportunity to examine an underexplored area that is prospective for large world-class IOCG-type deposits. The Terra Property encompasses at least five volcanic, volcaniclastic and sedimentary (supracrustal) formations intruded by two relatively large intermediate units, a number of smaller satellites and a variety of porphyries outcropping over an area more than 30 x 20 kilometres. It also includes at least 20 known mineral occurrences and the past producing Terra, Smallwood and Northrim Mines. Cooper's initial exploration program of airborne geophysics, prospecting, geology and drilling, focused on identifying and sampling areas with geological, structural and alteration characteristics analogous to IOCG-type deposits.

Exploration work completed thus far indicates that the Terra Property includes areas that exhibit key characteristics indicative of IOCG-type deposits, including significant polymetallic mineralization. Extensive hydrothermal alteration (sodic, potassic and iron) and brecciation has been identified in each of the supracrustal units in association with structures that controlled their formation. Well developed hydrothermal alteration and brecciation was also observed within each of the intrusive units typically in association with relatively younger intrusives. Zones of alteration and brecciation were observed to be several hundred metres wide, more than a kilometre long and host to variably characterized complex polymetallic (Cu, U, Ag, Au, Co, Bi, Zn, Ni, Pb) mineralization. The initial assessment of the exploration work completed to-date suggests the potential for IOCG-type economic mineralization to be excellent.

ASSESSMENT OF WATER MANAGEMENT AT MINING SITES IN NUNAVUT

Wan, L. - Nunavut Impact Review Board, Cambridge Bay, Nunavut

The Nunavut Impact Review Board (NIRB) is established to protect and promote the existing and future well-being, as well as ecosystem integrity of the Nunavut Settlement Area in accordance with the Nunavut Land Claim Agreement.

To achieve its goal, NIRB diligently conducts environmental assessments and post-assessment monitoring programs, responding to increased mining development in Nunavut. One of the essential tasks of NIRB is identifying all potential environmental impacts related to the mining developments, and ensuring that management plans are sufficiently developed to mitigate those impacts. Among the impacts to the integrity of fragile arctic ecosystem, the aquatic impacts from mining developments are among the most significant by their nature and consequences.

The objectives of water management at mining sites are to limit adverse effects of mining operations on the regional hydrological cycle, and to ensure that existing hydrological processes do not jeopardize mining operations. Scientific methodologies are the most effective approaches to achieve them. After the identification of the pollution sources at the entire mine site, a water balance is usually applied to assess amounts of water entering, leaving and moving across the mine site. Based on the water balance, a numerical water quality model is explicitly developed to simulate water interaction processes on mine site and to predict the effluent quality and quantity from the mine site. Due to its dynamic nature, the water quality modeling is evolving with the mining development, subject to the supplemental baseline data, special meteorological conditions, and most importantly, the deviation of predictions with actual results from feed-backs of monitoring programs.

Accordingly, NIRB deals with the water issues in its environmental assessment by following the scientific approaches and Inuit traditional ecological knowledge as well where applicable. This presentation will give a systematic review of essential elements associated with the mining water management in Nunavut, and the major concerns when NIRB conducts a screening and reviewing of a project proposal from scientific respective.

RECENT GEOTECHNICAL STUDIES OF LANDSLIDES IN THE MACKENZIE VALLEY

Wang, B., Paudel, B., Li, H. and Lesage, K. - Geological Survey of Canada, Ottawa, Ontario

Landslides are a major natural calamity responsible for environmental destructions in permafrost regions. Landslides are numerous in the Mackenzie valley, Northwest Territories, and most of them occur along shallow slopes. Hundreds or thousands of landslides are active. As the footprint of the slides expands every summer, the slides may remain active for several years. This presentation provides an update on a recent geotechnical project undertaken at the Geological Survey of Canada (GSC). The purpose of the project is to better understand the slope failure mechanisms in permafrost. A number of activities have been engaged such as geotechnical site investigations, laboratory testing, and desktop analysis. Significant progress has been made and several scientific papers have been published. The latest field program includes investigations at 14 landslide sites to evaluate the landslide movement behaviour and to characterize the soil materials. The results indicate that the footprints of some landslides expand faster than others. In general, a range of expansion rates from 5 m to 10 m per year were observed. It was noted that the expansion rates are related to slope geometry, soil moisture content and grain size. Soil samples were taken from the scarps of the landslides at 10 cm intervals from ground surface to about 2.5 m depth at each location. Soil moisture contents, gradations and Atterberg limits were measured at the GSC's Sedimentology Laboratory in Ottawa. The results consistently indicate that soil moisture increases with depth. There is a transient layer between the active layer and the underlying permafrost. The transient layer plays a critical role on slope stability. Also presented is an analysis to investigate the impact of global warming on landslides in fine-grained permafrost soils. Global warming is a slow process. The results indicate that landslides in permafrost are more affected by extreme environmental conditions that cause sudden ground thermal regime change. The permafrost ground is constantly reconditioned by annual weather fluctuations. If a slope can sustain dramatic change of annual weather conditions, it should be able to withstand the very slow increase of air temperature caused by global warming.

FREQUENCY AND DISTRIBUTION OF SHALLOW HAZARDS THAT AFFECT THE BEAUFORT SEA POTENTIAL PIPELINE AREA

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A better understanding of seabed morphology in the shallow regions of the Beaufort Sea is essential to provide information on the ice-related geohazards that emerge during freeze-up and break-up, in particular strudel scour and scour by ice keels affecting the areas in which oil and gas industry will take place such as pipeline installation. Repetitive surveys undertaken by the Geological Survey of Canada have focused on the shallow, gently sloping nearshore region of the Mackenzie Delta (>6 m water depth) that extends ~50 km offshore. The potential for significant impacts on subsea pipeline infrastructure is the greatest in this region. High resolution sidescan sonar and multibeam bathymetry systems were used to map the seabed over three consecutive years and show the dominant hazard in the survey area to be the scouring of the seabed by the movement of ice during freeze and break up periods. From the 600 plus ice keel scours that were mapped using 2006/2007 high resolution multibeam data it is clear that there is a progressive increase in ice keel scour density offshore. Scours are predominantly sinuous with a SE-NW orientation. The maximum scour depth measured was 1.2 m in 6 m water depth with an average scour depth of 0.2 m across the dataset. The same scours were visible in repeat surveys indicating that sedimentation is low such that scours are not buried, and little to no new scours did not occur obscuring the older scours. Strudel scours are less common but potentially more destructive to pipeline installations than the ice keel scour. Although common in other small deltas on the Alaska and Yukon coast, these features have never been documented in the Mackenzie Delta area until the past field season when several strudel scour depressions were mapped. A strudel scour is caused during Spring break up when fresh water from flowing rivers collects on top of the ice surface and subsequently rapidly drains through a hole in the ice. The effect of the draining water on the shallow ocean floor below forms a near circular strudel scour depression. Reconnaissance surveys during the 2007 Spring break up identified a number of possible strudel scour locations at the boundary between the bottom fast and floating ice surfaces. A total of three strudel scours were later identified using the high resolution sonar equipment in 1.2 m of water. The largest scour was 20 m wide with a maximum depth of 0.8 m below the surrounding seabed. This discovery has led to a number of questions concerning the frequency, distribution and infill potential of these scours. Future work will look at sediment transport in the area and the effect on the longevity of the strudel scour over months and even years. Although many questions still remain, these data provide a good baseline for assessing the scour hazard potential on future development in the area.

THE MUSKOX INTRUSION; SILVERMET INC. ADDS A CHAPTER TO THE EXPLORATION HISTORY

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The Muskox Intrusion is one of the world's largest layered mafic-ultramafic intrusive complexes. The intrusion hosts disseminated to massive Ni-Cu sulphide mineralization similar to the Noril'sk mining camp in Russia as well as stratiform PGM mineralization and UG2 chromitite horizons similar to the world renowned Bushveld complex in South Africa.

Silvermet Inc. optioned land claims assembled by Prize Mining Corporation between 1994 and 2001 to cover much of the Muskox Intrusion located south of Kuglugtuk, NT.

The objective of the 2007 program was to follow-up the successful soil geochemical survey completed during the summer of 2006. By considering anomalies identified from this survey in combination with extensive historical geophysical and diamond drill data, a 5,000 metre diamond drill program was initiated to test newly discovered exploration targets.

Under contract to Silvermet Inc., Aurora Geosciences Ltd. managed the diamond drill program completing 4130 metres in 26 holes; and expanded the scope of the program to include 433 line kilometres of high-

resolution GPS ground magnetic surveying, and 5.34 line kilometres of Horizontal Loop Electromagnetic surveying, between June 17 and September 28, 2007. A NITON XRF portable analyzer was used in the field to provide preliminary analyses of nickel, copper and platinum group elements.

The drilling was conducted at the Pyrrhotite Lake and Valley Lake areas. Both of these areas show coincident anomalous Ni-Cu soil geochemistry and significant historic drill intersections. Pyrrhotite Lake is host to two historic holes which graded 7.5% to 10.6% copper and 3.2% to 4.7% nickel. The 2007 program was designed to test geochemical anomalies along strike of this intersection at shallow depth. Four holes intersected five to nine metres of fine to coarse grained disseminated sulphides. A deeper hole (SM-07-MX-07) intersected 16 metres of disseminated sulphide mineralization. The Valley Lake area shows a prominent geochemical soil anomaly, which is constrained by spectacular gossans that strike continuously along the intrusion margins located at the western and eastern limits of the valley. Hole SM-07-VL-08, located near the western margin of the intrusion, intersected 17 semi-massive and massive sulphide intervals ranging in width from 0.18 to 1.45 metres from 42.61 to 63.09 metres. NITON XRF analysis on the core indicates interval concentrations ranging from 0.6% to 18% copper and 0.7% to 3% nickel. Most significantly, the similar macroscopic and metalliferous character of this hole confirms the presence of high-grade Pyrrhotite Lake-type mineralization elsewhere on the property. Three holes completed along the eastern margin of the intrusion intersected 0.5 and 3.95 metres of fine-disseminated to massive sulphide mineralization.

The completed holes drilled in the 2007 program have provided new insights into the controls and localization of Ni-Cu-PGM sulphides at Valley Lake and Pyrrhotite Lake. This knowledge is now being integrated with new (2007) detailed ground magnetic surveys. Areas containing enhanced sulphide concentrations discovered in 2007 will be further investigated utilizing detailed gravity and electromagnetic geophysical techniques and continued diamond drilling.

USING BHR FOR PREDICTIVE RESOURCE EVALUATION MODELS

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When the Snap Lake mine goes into full production in early 2008, it will demand 3150 tons of ore per day to be delivered to the plant from the underground development. Long term planners require accurate resource models for mine planning, while short term mine planners require high resolution information on the geological conditions to be expected in a panel to ensure that production calls are met and to smooth the flow of ore to the mill.

Slimline borehole radar (BHR) instruments with a bandwidth of 10 – 125MHz propagate VHF signal through the granitic host and record coherent reflections from the kimberlite contact up to distances of 75m from the borehole. Although the instruments are omnidirectional, reflector location ambiguity can be resolved through careful survey and design. With the integration of a priori geological information, reflectors are accurately located in space and we can construct 3D reflector surfaces associated with the resource.

The predicted resource elevation models from BHR are reconciled with the geological model constructed from the underground excavation face mapping. This establishes that BHR can be used to provide high-resolution information of the geological features to be encountered during mining. Faults, steps, rolls and jogs in the dyke can be mapped to metre resolution and accuracy, providing short term planners with the required information to make on-time adjustments to the development plans.

RESERVOIR AND SOURCE ROCK POTENTIAL OF LATE DEVONIAN IMPERIAL FORMATION, SOUTHERN PEEL PLATEAU AND PLAIN, NWT

Zantvoort, W.G. - Northwest Territories Geoscience Office, Yellowknife, Northwest Territories

Late Devonian stratigraphy of the Peel Plateau and Plain is comprised of the upper portion of the Hare Indian Formation, the Canol Formation, and the Imperial Formation. The Imperial Formation is overlain unconformably by the Cretaceous Martin House Formation.

Previous field work has identified units within the Imperial Formation that have reservoir quality porosities. Corresponding permeability values are low. Field work conducted in 2007 consisted of detailed sampling and sedimentology of previously measured sections to better understand reservoir quality units. Work was conducted on Flyaway Creek, a Snake River tributary, an Elbow Creek tributary as well as an Arctic Red River tributary. These sections occur on NTS map sheets 96 E/4, 106 H/5 and H/7, and 106 G/7. Samples were collected from Imperial Formation for analysis of permeability, porosity, palynology, and Rock-Eval/TOC.

Measured sections of the Imperial Formation have provided thicknesses ranging from approximately 300 to 700 m. Locally in the Mackenzie Mountain Front the Imperial Formation is exposed at surface and any potential reservoirs have likely been breached. In the foothills however, and into Peel Plateau and Plain, the potential exists for either fault or fold bounded structural traps. Where the overlying Cretaceous shales have not been eroded they potentially provide an effective seal.

Imperial Formation is interpreted as a turbidite sequence that can be coarsely described as three, thick resistant cliff-forming sandstone units, which are separated by less resistant to recessive thick silty shale packages. The sandstones are very fine to fine-grained and show abundant bioturbation near the base of beds, including both horizontal tracks and traces as well as vertical burrows. Bioturbation decreases up section and sedimentary structures are better preserved. Imperial Formation sandstone is locally fossiliferous containing rugose horn corals, colonial corals, and brachiopods. Sandstone units at the Imperial River section are locally petroliferous. Palynology work indicates marine depositional environment in the more northern localities and terrestrial to near-shore marine in the south (105P and 95M). Thermal Alteration Index (3 – 4) and equivalent vitrinite reflectance (1.4 - 2.0%) indicate postmature dry gas zone.

The sandstone units of Imperial Formation are medium grey, green grey, and olive green in colour. The greyer sandstones occur in the basal sand unit in the two western sections where there is a distinct lack of green sand in the basal member. The western sections also exhibit a notable decrease in coral and shell abundances. This possibly indicates a movement away from a shelf edge bioclastic sediment source, which may correspond to a northern extension of the Jungle Ridge member recognized further south.

The results from 2007 field season yielded a sample (07-WZ-8B) with TOC 4.53%, T_{max} 466°C, S_1 0.51 and S_2 4.87. These Rock-Eval results are well within the oil window and are excellent indicators of potential source rock, and provide direction for future work. Petrographic examinations and porosity permeability results are pending.

INTEGRATION OF MULTIPLE TECHNOLOGIES IN NORTHERN FRONTIER EXPLORATION

Zapfe-Smith, I., Klatzel-Mudry, L. and Hansen, K. - Husky Energy, Calgary, Alberta

Husky Energy and its co-venturers have been involved in two recent discoveries in the Keele-Summit area, Central Mackenzie Valley, NWT. The Summit Creek B-44 well encountered hydrocarbons in the Devonian and the Stewart D-57 well found gas in the Cretaceous. Interest in the area was initially kindled by recognition that circular features on the GSC's hi-resolution aeromagnetic survey could represent closed structural traps. Single fold trade data showed a thrusted structure that encouraged the consortium to acquire lands. The area has limited well control, so exploration efforts progressed by integrating a wide variety of prospecting tools and data sets including satellite imagery, hi-resolution aeromagnetic, gravity, topographic and geomorphologic data (particularly hi-resolution LIDAR), geological field mapping, hydrocarbon micro-seep detection, and reprocessed vintage trade and modern 2D seismic data. Not every technique or data type has proven successful; most notably the micro-seep survey was a disappointment.

Husky's approach has been to manage exploration programs in this high cost frontier environment by using relatively low cost, aerially extensive potential field and remote sensing data to high grade features of interest. Geological field mapping has proven invaluable to ground truthing the structural interpretations and also provides samples for petroleum system analysis. Through this process, expessive new seismic acquisition can be focused on developing drilling prospects. The integration of the new seismic with the other data leads to improved interpretation. In addition to the benefits for prospect generation, the remote sensing data (ie. Lidar) is invaluable for road access, well lease, and field program planning. This presentation summarizes the results of the methodology employed to date.

NEW DISCOVERIES OF ORDOVICIAN OIL SHALE ON SOUTHAMPTON ISLAND, NUNAVUT

Zhang, S. - Canada-Nunavut Geoscience Office, Iqaluit, Nunavut

Southampton Island retains the northern margin of Hudson Bay Basin, one of the largest Paleozoic sedimentary basins in Canada. The Upper Ordovician on the island is divided into the Bad Cache Rapids Group, Churchill River Group and Red Head Rapids Formation, consisting mainly of carbonate, with minor shale.

Over the past four decades there has been considerable debate on whether there are one, two, or three oil shale intervals within the Paleozoic on Southampton Island. In addition, the precise stratigraphic position of the oil shale intervals is somewhat uncertain – are they within the Upper Ordovician, near the Ordovician-Silurian boundary, or in the Lower Silurian? Previous workers have pinned their hopes of knowing the exact number of oil shale intervals and their age on drilling, as the Paleozoic rocks are poorly exposed.

Field studies in 2007 were designed to test the number and stratigraphical positions of the oil shales on Southampton Island. Three oil shale intervals were discovered in the lower Red Head Rapids Formation in spectacular sections in the Cape Donovan area. The Cape Donovan sections not only confirm the number of oil shale intervals (3), but also provide lithostratigraphic and biostratigraphic evidence for the position of "Boas River Shale" and "Sixteen Mile Brook Shale" that were first discovered forty years ago. The first oil shale interval (lower) at Cape Donovan section can be related to "Boas River Shale", whereas the second (middle) or the third (upper) oil shale interval may be relevant to "Sixteen Mile Brook Shale". All three oil shale intervals are within lower Red Head Rapids Formation, Upper Ordovician.

Forty samples were collected from three oil shale intervals in the Cape Donovan area for Rock Eval Pyrolysis. The preliminary data show:

1) The shales from the three intervals are immature Type II marine oil shale.

2) 21 samples from about 1-m-thick of the first oil shale interval (dark brown - black argillaceous limestone with interbeds of black shale) have average and optimum yields of 58.5 kg/tonne and 112.5 kg/tonne, and average and optimum TOC of 9.8% and 17.3%.

3) 8 samples from about 40-cm-thick of the second oil shale interval (black shale with interbeds of argillaceous limestone) have mean and highest yields of 145.9 kg/tonne and 216.1 kg/tonne, and mean and highest TOC of 22.4% and 34.1%.

4) 11 samples from about 45-50-cm-thick of the third oil shale interval (black shale with interbeds of argillaceous limestone) have intermediate and greatest yields of 128.7 kg/tonne and 230.3 kg/tonne, and intermediate and greatest TOC of 18.3% and 31%.

The new discoveries not only establish the stratigraphic position of the oil shale intervals as Upper Ordovician, but also provide extremely high yields. The new data, together with an earlier study by the author that the Lower Paleozoic rocks in the deeper part of Hudson Bay Basin were buried to just within the petroleum generation window, have increased the prospectivity for hydrocarbons within Hudson Bay Basin.