

## **RUDOLF (RALPH) STEA Ph. D; P. Geo.**

851 Herring Cove Road, Halifax, Nova Scotia, Canada, B3R 1Z1: (H) (902) 479-3748; (W) (902) 497-5094; E-Mail: RALPHSTEA@ eastlink.ca

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### **HIGHLIGHTS OF QUALIFICATIONS**

- **Planned, conducted and managed regional, reconnaissance and detailed multi-element rock, soil, stream and till geochemical surveys in glaciated terrain across Canada and developed models of glacial dispersal of diamonds, gold and other ores and placer gold formation.**
  - **Specialist in surficial/terrain geological mapping of mineral properties.**
  - **Supervised diamond drill and RC drill exploration programs across Canada**
  - **Part of multidisciplinary teams evaluating kaolin, silica sand and other industrial minerals, and surficial deposits for groundwater resources in Nova Scotia**
  - **Strong field geology background and report writing ability. Expert in air photo interpretation and other remote sensing methods. Utilize GIS in all aspects of project planning and implementation. Author of several NI-43-101 reports on mineral properties in Nova Scotia and New Brunswick.**
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### **WORK EXPERIENCE AND RELEVANT SKILLS**

1. As senior geologist, (1980-2005) for the Nova Scotia Department of Natural Resources, planned and conducted regional geological mapping and multi-element soil and till geochemical surveys. Completed a series of 1:100,000 and 1:50,000 scale colour surficial and till geochemistry maps for the province of Nova Scotia in addition to a summary provincial glacial geological map at 1:500,000. for the province. Nova Scotia mapping involved high altitude air photograph and DEM interpretation, interpretation of LANDSAT 7 satellite imagery and high altitude air photographs. Senior geologist in charge of mapping unconsolidated Cretaceous sediments in lowland regions of Nova Scotia involving diamond drilling, in conjunction with shallow seismic reflection/refraction surveys. Identified kaolin and silica sand deposits within these basins and evaluated these deposits for potential industrial uses. Discovery sparked a 20 million dollar exploration program in NS by Kaoclay Resources Ltd. Research activities in NSDNR included studies of glacial dispersal of rocks, minerals and trace elements from ore sources, groundwater studies in Carboniferous basins.

Carried out near shore (inner continental shelf) mapping off the Atlantic coast of Nova Scotia utilizing high resolution, single channel reflection profiling, sidescan sonar, multibeam bathymetry, piston coring and grab sampling. The seismic data was interpreted using sequence stratigraphic techniques integrated with surface mapping for an overall zonal characterization of the shelf and models of shelf glaciation. This geological framework was used to develop models of offshore and onshore placer gold formation and along with these studies the candidate developed processing techniques for gold analysis. (1990-1995).

Conducted detailed studies of till provenance and Quaternary stratigraphy and sedimentology with an emphasis on glacial history and the empirical reconstructions of former glaciers and ice sheets. Research interests include; glacial dispersal of rocks, minerals and trace elements from bedrock sources, interpretation of palimpsest glaciated terrains and the effects of multiple glaciations on dispersal of mineralized debris from ore sources (1995-2006).

2. As a consulting geologist, (2005-present) worked in eastern Canada, the Canadian Shield and the Cordilleran region. For the past several years working for Scratch Mining and Exploration Corp (2006-2011) managed exploration activities for **vein-type Au** in Nova Scotia, involving geological mapping and prospecting, rock, soil and till sampling, diamond drilling and ground magnetic surveys. Produced surficial maps and reports in Nunavut for Tahera Diamond Corp (2005) as a guide to regional exploration for **diamonds**. Led an exploration team working claims in the Salmo Mining District, B.C., for **Pb, Zn, Ag** (2006) using stream and soil geochemical surveys and geological mapping. Compiled historical drilling and historical resource estimates for the Jackpot **Pb-Zn** deposit, Salmo, B.C. Mapped ice flow trends and **U** boulder dispersal in Northern Manitoba for CanAlaska Uranium Ltd (2006). Completed a property evaluation for United Reef Corp. (2007) on a group of claims in northern Nova Scotia including NI-43101 report on placer **Au** and **Pb-Zn** mineralization. Conducted reconnaissance exploration, and diamond drilling for VMS deposits (**Cu, Pb, Zn, Ag, Au**) in the Buchans area, Newfoundland for Paragon Resources Corp. (2007). Conducted a program of geological mapping and reconnaissance till sampling for **Au** in the vicinity of the Hammond Reef deposit, northern Ontario for Osisko Mining Corp (2009-2012). Pilot geochemical studies for **REE** exploration using stream, till and soil till sampling in the Athabasca Basin and Labrador (Great Western Minerals Corp.). **U** exploration in the Athabasca Basin (CanAlaska) managing an RC drilling program (2010-2011). Completed a comprehensive report on **Au** exploration in the Hope Bay Volcanic Belt, Nunavut for Newmont Mining Corp. (2011). Completed a surficial mapping and till sampling project (**KIMs**) near lac De Gras for Harry Winston Diamond Corp. (2011). Trenching and rock, till and soil sampling program for **Au** and **Li-Pegmatites** in southern Nova Scotia (Greenlight Resources (2011). Consulting on glacial geology, glacial dispersal of **gold** and exploration methods in Nunavut for Prosperity Goldfields Corp. (2012). Consulting on glacial geology, exploration methods for **Pt, Pd** for North American Palladium Ltd. (2012). Consulting on glacial geology and **uranium** exploration in Labrador for Paladin Energy Ltd. (2013). Completed several projects involving aggregate mapping and economic evaluation in northern Nova Scotia (2010-2013). Completed NI-43101 reports on Cretaceous **silica sand** and **kaolin** resources in central Nova Scotia for AlNova Mininc Inc. and Sibley Road Mining Inc. Presently consulting for Orbite Aluminae Inc in the evaluation of **alumina** resources in the Cretaceous basins of central Nova Scotia. Worked as a consultant for the Confederacy of Mainland Mi'kmaq NS, on resource evaluation of tribal areas (2006-2013). Air photo interpretation and production of surficial maps in Nunavut (GSC-2012)

3. Skilled in using a GIS platform (ARCVIEW) for exploration planning, sampling design, target identification, and geological map preparation. Experienced in remote sensing technology, air photo interpretation. Author of several NI-43-101 reports on mineral properties in Nova Scotia and New Brunswick. Proven ability in report writing and audiovisual presentation of results to varied audiences. Research into land use issues as they pertain to mining for the Mining Association of Nova Scotia. Familiarity with provincial mining regulations, workplace safety requirements including emergency response planning, hazard analysis, first aid level 1; WHIMIS etc.

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## EDUCATION

B Sc. (Acadia University).

M Sc. (Dalhousie University) 1982. (advisor-Dr. H. B. S. Cooke)

Dissertation title: The properties, correlation and interpretation of Pleistocene sediments in central Nova Scotia.

Ph. D. (Dalhousie University) 1995. (advisors-Drs. R. Boyd, D. J. W. Piper and D. B. Scott-external-Dr. Geoffrey Boulton, Edinburgh)

Dissertation title: Late Quaternary glaciation and sea level change along the Atlantic Coast of Nova Scotia: Correlation of land and sea records

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## PROFESSIONAL HISTORY AND HONOURS

1980 to 2005 -Geologist (Quaternary), Nova Scotia Department of Natural Resources.

1991-1994- special Leave for PhD studies at the Centre of Marine Geology, Dalhousie University, Halifax.

1995- Adjunct Professor-Dalhousie University

1997- Assistant Professor (part time), (Introductory geology) Department of Mining and Metallurgy, Dalhousie University

1998 –Appointed Senior Geologist, Nova Scotia Department of Natural Resources

1999-Assistant Professor (part time), St Mary's University (Sedimentary Environments)

2002-Assistant Professor (part time), (Introductory geology) Department of Mining and Metallurgy, Dalhousie University

2003-Vice President –CANQUA-Canadian Quaternary Association

2005-Emeritus Scientist-Nova Scotia Department of Natural Resources

2006- Member, Professional Association of Geoscientists, Nova Scotia

2007 Member, Professional Association of Geoscientists, British Columbia

2010 Elected to the board of the Mining Association of Nova Scotia

2012 Awarded Nova Scotia Prospector of the Year by the Nova Scotia Prospectors Association .

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## SELECTED JOURNAL/VOLUME RESEARCH PUBLICATIONS/REPORTS/INVITED LECTURES

Invited Speaker “Exploring through Cover” Vancouver Roundup short course 2013. Talk entitled Exploring in complex glacial terrain - examples from across Canada

Stea, R.R., Johnson, M., and Hanchar, D., (2010). The geometry of kimberlite dispersal trains in Nunavut, Canada; GAC-MAC Yellowknife, short course publication,

Keynote Address: Deciphering ore dispersal in complex glaciated terrain; in. Application of till and stream sediment heavy mineral and geochemical methods to mineral exploration in western and northern Canada-GAC Yellowknife 2007 short course

Stea, R.R., 2008 Exploration Activities on the Hants County Property, Nova Scotia, NI 43-101 Technical Report for United Reef LTD. Toronto; 58p.

Stea, R. R., 2007 Assessment Report of the Chocolate Lake Claims Groups (Exploration Licenses 06480, 06442 Nova Scotia Department of Natural Resources Mineral Assessment Report ME 2007-025, 43p.

Stea, R.R., Feetham, M., Pullan, S.E., Ostrom W., Baechler, L and. Ryan, R. J, 2006. Geology and Economic Potential of the Glacial Clay and Sand Deposits of Inverness County, Southwest Cape Breton Island, Nova Scotia Department of Natural Resources, Economic Geology Series 2006-1, 110p.

Stea, R. R., Mills, R. F., Smith, P. K. and Goodwin, T. A. 2005. Can Glacial Till be Mined for Gold in Nova Scotia? Nova Scotia Department of Natural Resources, Report ME 2005-1,p. 101-115.

Stea, R.R and Feetham, M., 2003. Surficial Geology Map of the Whycomomagh area (NTS 11F/14), Inverness County, Nova Scotia, Nova Scotia Department of Natural Resources, Open File Map ME-2003-1; scale 1:50 000.

Stea, R. R., and Pullan, S. E. 2001: Hidden Cretaceous Basins in Nova Scotia; Canadian Journal of Earth Sciences: v. 38, p. 1335-1354.

Stea R. R., and Finck, P. W. 2001: An evolutionary model of glacial dispersal and till genesis in Maritime Canada. *in* B. McClenaghan, M. B. Bobrowski, P. T. Hall, and Cook, S. J., (eds) Drift Exploration in Glaciated Terrain: Geological Society of London Special Publications 185: 237-265.  
Stea, R. R., and Pe-Piper, G. 1999: Using whole-rock geochemistry to locate the source of igneous erratics from drumlins on the Atlantic coast of Nova Scotia; Boreas, v. 28, p. 308-325.

Lewis, C.F.M, Taylor, B.B., Stea, R.R., Fader, G.B.J., Horne, R.J. MacNeil, S.G. and Moore, J.G., 1999: Earth science and engineering: urban development in the metropolitan Halifax region: In Urban geology of Canadian Cities: ed P. F. Karrow; Geological Association of Canada, Special Paper, vol. 42, pages 409-444.

Stea ,R.R. Day, T.E. and Ryan, R.J. 1986: Till and Bedrock Cu-Pb-Zn geochemistry in northern Nova Scotia and its metallogenic implications, *in* W. J. Phillips and R. Salminen, (eds), Prospecting in areas of Glaciated Terrain, 1986, The Institution of Mining and Metallurgy, pp. 241-160.

Stea, R.R., Conley, H and Brown, Y. (compilers) 1992: Surficial geology of the province of Nova Scotia; Nova Scotia Department of Natural Resources, Map 92-3, Scale 1:500,000.

(As a Nova Scotia government scientist and consultant I have published over 300 scientific papers, bulletins, maps and open file reports; conference abstracts; papers in refereed journals. Will provide a pdf copy of any publications on request)