

2019 Technical Excellence Award



Dr. Norman M. Halden, P. Geo.

Dr. Norman M. Halden, P. Geo., obtained his B.Sc. (Hons.) and Ph.D. degrees in the discipline of Geology from Glasgow University, Scotland in 1979 and 1983 respectively. He is a professor of Geology and Dean of the Clayton H. Riddle Faculty of Environment, Earth, and Resources at the University of Manitoba. Norman taught petrology and geochemistry and most recently Instrumental Techniques in Geology. Norman is primarily a geochemist and has focused his research on trace elements as a predictor of geological and environmental processes. His

numerous technical presentations and publications include disciplines of geochemistry, proton induced X-ray emission (PIXE), LA-ICP-MS, and otolith microchemistry.

The main thrust of Norman's research has been to characterize and quantify the distribution of trace elements in zoned minerals in a way that the patterns of their distribution can be related to environments of mineral growth. He has worked on large scale CAMIRO field projects in the Thompson Nickel Belt to microbeam analytical projects on zoned minerals. He was the one to quantify trace element oscillatory zoning in minerals using a combination of PIXE, image analysis and fractal geometry. For several years he worked with PIXE and scanning proton microprobe (SPM) for mineralogical analysis. Norman showed that using image and numerical analysis, it is possible to determine Lyapounov exponents and fractal dimensions for trace-elements oscillatory zoning in minerals. Calculated Lyapounov exponents of micron scale zoning allows comparisons of growth environments. More recently his LA-ICP-MS work has allowed the understanding of wider suite of elements to better characterize different environments and growth histories.

Norman has also used his research of trace element mapping in minerals to understand variety of otolith microchemistry problems. His Sr (Strontium) otolith microchemistry research has led to the first unambiguous discrimination of migratory Arctic char. This altered fisheries management in Arctic Parks, and established natal origins of char along Arctic north slope. Sr analysis by LA-ICP-MS now answers many fisheries management and environmental questions. His work on zoned Zn, Pb, Cd and Se in otoliths is used in environmental effects monitoring to assess exposure to tailings.

Norman served the Mineralogical Association of Canada (MAC) for 18 years in various capacities including Finance Chair, Vice-President, President and Past-President. He received the Berry Medal for his services to MAC. He has also served the Geological Association of Canada (GAC) as Membership Chair and as a local coordinator of GAC

activities. His instrumental and analytical expertise led him to chair several NSREC committees and the Major Facilities Access Committee.

Norman has received the University of Manitoba Rh Award for Research in Natural Sciences, University Outreach Award and is three-time winner of UTS Teacher Recognition Award. He played a key role in the design and development of the Northern Manitoba Mining Academy. He has also served on the Premier's Economic Advisory Council and is currently the presiding member of the Manitoba Mines Board.

In recognition of his contributions to the field of geoscience, Engineers Geoscientists Manitoba is pleased to present the 2019 Technical Excellence Award to Dr. Norman M. Halden.