Stewart Greenhalgh – an initial member of ASEG

Stewart joined ASEG in 1972 and in the early 1980s he was Secretary (1980-1981) and then Second Vice President (1982) of the ASEG Federal Executive. For a number of years he served on the FedEx Education Committee (1991 -2002, later as Chairman), the Research Foundation (1998 – 2006) and the Honours and Awards Committee (2007 – 2014), as well as being on the SA State Branch Committee for much of the 1980s. Stewart was a recipient in 1993 of ASEG's Laric Hawkins Award for Technical Innovation and was Technical Papers Chairman of the 2003 conference in Adelaide.. From our sister society, the European Association of Geoscientists and Engineers (EAGE), he received the prestigious Ludger Mintrop Award in 2013 and the Conrad Schlumberger Award in 2016 for distinguished contributions to geophysics.

From 1969 to 1972 Stewart attended the University of Sydney as a full-time student, studying physics, mathematics and geophysics. He graduated B.Sc. with First Class Honours in 1973. His most inspiring lecturers of that time were the famous seismologist, Professor Keith Bullen, FRS, Head of the Applied Mathematics Department and Professor Robert May, FRS (later Lord May of Oxford), Professor of Theoretical Physics.

He then studied part-time for his M.Sc. degree in theoretical seismology at the University of Sydney (supervised by Dr David King and Dr Don Emerson), whilst working as an engineering geophysicist for 3 years with the N.S.W. State Government. The degree was awarded in late 1976. In September of that same year he commenced his PhD degree in Geophysics/Mathematics/Physics at the University of Minnesota, Minneapolis, under a Fulbright Fellowship award. His research supervisor and mentor was the late Professor Harold (Hal) Mooney. As a matter of possible interest to ASEG members, earlier in Hal's geophysics program within the Department of Physics at U of M, around 1950, was a young physics major named Keeva Vozoff (prominent former ASEG member) who proceeded, following Hal's encouragement, to do his PhD in Geophysics at MIT.

Stewart completed the doctorate in just 2.5 years (with a GPA of 4 on a scale of 4) and in May 1979 he returned to the University of Sydney as a postdoctoral research fellow, conducting research with Dr David King on seismic reflection and in-seam (channel wave) seismology for imaging faults and other coal seam disruptions. Eighteen years later, in 1997,

Stewart was a awarded a higher doctorate (D.Sc. degree) from the University of Sydney based on his first 100 published papers.

Dr Greenahlgh's work as an academic began in earnest in 1981 when he was offered a Lectureship in Seismic Geophysics at the Flinders University of South Australia. His two geophysical colleagues already there were Dr Francois Chamalaun, and Dr Antony White. Dr Chamalaun's primary research interest was palaeomagnetism and rock magnetism whereas Dr White's interests were in geo-electromagnetics and marine geophysics.

At Flinders, Stewart built a highly successful research program in coal and hard rock mining geophysics (with Iain Mason from Oxford University) as well as in earthquake seismology. He quickly rose through the ranks of Senior Lecturer (1984), Reader/Associate Professor (1987), Full Professor (Personal Chair, 1993) and Dean of School (1996).

{For more on the geophysics teaching at Flinders, see the ASEG History website}

Underground at Hunt mine, Kambalda, circa 1992, in the crib room taking a lunch break whilst conducting novel radar and seismic reflection imaging experiments to delineate Ni mineralization.
From left to right in the photo: Iain Mason (Oxford Univ.), Stewart Greenhalgh (Flinders Univ.), Peter Fullagar (WMC) and Trevor McGrath (Flinders Univ.)

In late 1997 Professor Greenhalgh accepted the Douglas Mawson Chair at the University of Adelaide, as Head of the Department of Geology and Geophysics. He continued in both the teaching and research of seismic and electrical/electromagnetic geophysics as well as serving on numerous university committees plus the CRC LEME Board. He acted as member of the Review Panels for the CRC for Mining Technology and Equipment and the Department of Geology and Geophysics, University of Western Australia, as well as being a member for 5 years of the Advisory Board of the ANU Research School of Earth Sciences. In addition, during this period he was co-opted as an external member of several professorial appointment committees at other Australian universities.

Following major re-organisation of the structure of the Faculty of Sciences at Adelaide University in around 2003, whereby Geosciences was to be combined with Biological Sciences into a new school, Professor Greenhalgh opted to transfer permanently to the Department of Physics, where students would be better prepared for advanced study in geophysics. There he taught physics courses and supervised PhD students in the area of Geophysics.

{For more on the geophysics teaching at University of Adelaide see the ASEG History website}

From 2007 to 2009 Professor Greenhalgh took leave of absence to work at ETH Zurich, Switzerland as Research Professor but returning to Adelaide three times per year for periods of 6 weeks each to give lectures and to interact with his postdoc and PhD students, who also visited ETH several times. In 2009 he resigned from the University of Adelaide to work full time at ETH Zurich, where he remained until retirement in August 2016. He did some teaching at ETH but his primary duties were research and postgraduate supervision across a wide spectrum of projects, which included helping to build a unique Wave Propagation Laboratory for immersive experimentation. The other major thrusts of his research program were full waveform modelling and inversion of seismic and radar data, geophysical monitoring of buried nuclear waste, multi-component wavefield gradiometry, resistivity modeling and inversion in anisotropic media, and 3D electromagnetic modeling for radiofrequency MT and surface NMR surveys. Stewart fondly remembers his time in Switzerland as a most enjoyable and scientifically fruitful period, working at the world's number 1 ranked university in Geophysics.

Stewart at the Thur River hydrogeophysical test site in Switzerland in 2010, preparing to deploy a multi-electrode cable for an 18 borehole 3D time-lapse electrical resistivity tomography experiment. The experiment was designed to map electrical resistivity fluctuations induced by infiltrating fresh river water into a saline gravel aquifer. The experiment ran for over one year and yielded travel times and groundwater flow patterns.

Over the course of his career Professor Greenhalgh has published 286 journal articles and book chapters on a wide variety of topics in both theoretical and experimental geophysics, exploration as well as solid earth. He has also given 196 conference presentations, many with expanded abstracts, and over 100 invited talks at numerous universities and other research organisations. In addition, he has authored over 100 major technical consulting reports and 3 provisional patents. His journal publications have been in leading journals such as Geophysics, Geophysical Prospecting, Geophysical Journal International, Journal of Applied Geophysics, etc., and 41 have appeared in the ASEG journal Exploration Geophysics.

For 10 years he was an Editor of Pure and Applied Geophysics and the Journal of Geophysics and Engineering. As well as editing, he was a regular paper reviewer for numerous other journals.

For his research contributions, Professor Greenhalgh has received many awards and prizes, including the EAGE and ASEG awards mentioned above. He was elected a Fellow of the Australian Academy of Technological Sciences and Engineering (2000) and the UK Institute of Physics (2005). He received the Centennial Medal from the Governor General of Australia (2002) for service to Geophysics. He has won Best Paper awards from Near Surface Geophysics (2012, 2014) and the Journal of Geophysics and Engineering (2014). He was also

part of the AUG team at ETH Zurich which received SEG's Distinguished Achievement Award in 2015.

Professor Greenhalgh has spent periods of sabbatical leave at: Oxford University, UK, Department of Engineering Science (1987); University of Minnesota, USA, Department of Electrical Engineering (1989); Western Mining Corporation, Australia (1994); University of Toronto, Canada, Department of Physics (2001); ETH Zurich, Switzerland, Institute of Geophysics (2005).

He has also been engaged as a consultant in Australia by various mining and petroleum companies, geophysical service organisations and government agencies.

Stewart has supervised 16 postdocs and been the thesis supervisor of 38 Ph.D. students, 29 M.Sc. students and 30 B.Sc. Honours students. In addition, he has served as an external thesis examiner for 3 D.Sc. candidates, 26 Ph.D. candidates and 17 M.Sc. candidates at other universities, He considers advising and interacting with bright research students as one of the main pleasures of being an academic

Stewart receiving the Conrad Schlumberger award from the EAGE President at the annual international meeting in Vienna, June 2016.
The award is given "to a member of EAGE who has made an outstanding contribution over a period of time to the scientific and technical advancement of geophysics".

After retiring from ETH Zurich, Stewart joined the new Aramco-funded College of Petroleum Engineering and Geosciences (CPG) at KFUPM in Saudi Arabia as the Saudi-Aramco Chair Professor in Geophysics. There he established over a period of 3 years a geophysics group of 10 professors, 3 research scientists and 2 electronics technicians, as well as excellent experimental and computational facilities. The group has been highly productive in research and is engaged in formal partnerships (funded by CPG) with MIT and the company Seismik s.r.o. in Prague, Czech Republic.

Stewart Greenhalgh finally retired in December 2019 after a long and productive career working both in Australia and abroad.