

## **CV (2018)**

### **Professor Dr. Yawooz Abdullah Kettanah**

Professor of Economic Geology (Mineralogy and Geochemistry), Faculty of Spatial Planning & Geoscience, Department of Applied Geoscience, Duhok University, Iraq.

Mobile: +964 750 3859008; Email: [yawooz.kettanah@uod.ac](mailto:yawooz.kettanah@uod.ac)

Adjunct Professor, Department of Earth Sciences and Faculty of Graduate Studies, Dalhousie University, Halifax, Nova Scotia, B3H 3J5, Canada

Phone: +1(902) 404 5488 (Canada); Email: [kettanah@dal.ca](mailto:kettanah@dal.ca)

### **BIOGRAPHY AND KEY SKILLS**

- Ph.D. in economic geology (mineralogy and geochemistry), 1978 (Southampton University, U.K.).
- Professor at the Department of Applied Geosciences, Faculty of Spatial Planning and Applied Sciences, Duhok University, Kurdistan - Iraq (2017-still).
- Assistant Professor at the Department of Geology, Salahaddin University, Kurdistan - Iraq (2011-2017).
- Assistant Professor, Visiting Scholar, Research Associate at the Department of Earth Sciences, Dalhousie University, Halifax, Canada (2003-still)
- Associate Professor, Member of the Board of Directors and Head, Geological Engineering Departments at Erciyes University, Turkey (1996-2003)
- Assistant Professor and Deputy Chair, Department of Earth Sciences, Baghdad University, Baghdad, Iraq (1978-1995)
- Ph.D. student and Teaching Assistant at Southampton University, England. 1974-1978. Thesis title "Mineralization, paragenesis and geochemistry of Mount Wellington Mine, Cornwall".
- Geologist at the Iraqi Atomic Energy Commission, Department of Nuclear Geology, 1971-1974.
- Trainee Student at Basrah Petroleum Company, Basrah, Iraq, 1968
- Supervised three Ph.D. students and thirteen M.Sc. students thesis in mineralogy, petrology, geochemistry, hydrochemistry and petroleum geology.
- Published >50 papers and abstracts in scientific journals.
- Wrote >20 scientific reports in various aspects of geology for oil companies, geological survey organizations and universities in Canada and Iraq.
- Expert in mineralogy, petrology and geochemistry of ore deposits and all rock types.
- Expert in the geology of Iraq.
- Expert in reservoir characterization studies (core description, cuttings analysis, petrography, tectonic provenance, heavy minerals provenance, porosity, diagenesis).
- Expert in studying aqueous and petroleum fluid inclusions in rock salts and other rocks and minerals.
- Expert in microscopic studies (transmitted, reflected and fluorescence) of all rock types (sedimentary, igneous and metamorphic as well as ore deposits).
- Expert and/or user of most of the analytical techniques in geology (XRD, XRF, SEM, EPMA, AA, Raman Spectroscopy, Heavy minerals and clay separations).
- Attended >10 training courses and workshops in different aspects of geology.
- Participated in more than 30 local and international conferences in Iraq, Turkey, England, and Canada.
- Fluent in Arabic, English, Turkish and Kurdish
- Citizenship: Dual citizenship - Iraqi and Canadian

## ACADEMIC BACKGROUND

Degree	Year	Field	University and Faculty / Country
B.Sc.	1969	General Geology	Baghdad University, College of Science, Iraq
Ph.D.	1978	Economic Geology	Southampton University, Faculty of Science, United Kingdom

## PROFESSIONAL EXPERIENCE

Position Held	Department / Faculty / University	Country	Period
Professor	Department of Applied Geosciences, Faculty of Spatial Planning and Applied Science, Duhok University, Duhok	Iraq	2017- still
Assistant Professor	Department of Geology, Faculty of Science, Salahaddin University, Erbil	Iraq	2010- 2017
Adjunct Professor	Department of Earth Sciences, Faculty of Science, Dalhousie University, Halifax, Nova Scotia	Canada	2002- Still
Head of Department (Associate Professor)	Department of Geological Engineering, Yozgat Faculty of Engineering & Architecture, Erciyes University, Yozgat	Turkey	1996- 2002
Assistant Professor	Department of Earth Sciences, College of Science, Baghdad University, Baghdad	Iraq	1978- 1996
Ph.D. Student (Teaching Assistant)	Department of Geology, College of Science, Southampton University, Southampton	England	1975- 1978
Geologist	Department of Nuclear Geology, Nuclear Research Institute, Iraqi Atomic Energy Commission (IAEC), Baghdad	Iraq	1971- 1975

## SCIENTIFIC WORK

### PUBLISHED PAPERS AND ABSTRACTS

1. **Yawooz A. Kettanah** and Cortland F. Eble, 2017. Petrology, mineralogy and geochemistry of Hemrin Coal Seam, Hemrin South Mountain, Northern Iraq. *International Journal of Coal Geology*, 181, 39-59. <https://doi.org/10.1016/j.coal.2017.08.001>. Impact Factor 4.783; 5-Year Impact Factor 5.427.
2. **Yawooz A. Kettanah** and Sabah A. Ismail, 2016. Heavy mineral concentrations in the sandstones of Amij Formation with particular emphasis on the mineral chemistry and petrographic characteristics of monazite, western desert of Iraq. *Journal of African Earth Sciences*, 123, 350-369. *Impact Factor 1.403; 5-Year Impact Factor 1.755*.
3. **Yawooz Kettanah**, Marcos Zentilli, Jacob Hanley, and Fergus Tweedale, 2016. Geological setting and fluid inclusion characteristics of a lead-copper-barium occurrence hosted in a Neoproterozoic mafic sill at Kiatak, Northumberland Island, Northwestern Greenland. *Ore Geology Reviews*, 79, 268-287. doi:10.1016/j.oregeorev.2016.05.027. *Impact Factor 3.829; 5-Year Impact Factor 4.484*.
4. Mayssaa Al-Bidry, **Yawooz Kettanah**, Kamal Haji Karim, 2015. Mineralogy and Geochemistry of Asnawa Iron Ore, NE- Iraq. *LAP LAMBERT Academic Publishing*. ISBN-13: 978-3-659-79438-4, ISBN-10: 3659794384, EAN: 9783659794384. <https://www.lap-publishing.com/>, 252p. (Book language: English)
5. **Y.A. Kettanah**, A.J. Mory, G.D. Wach and M.T.D. Wingate, 2015. Provenance of the Ordovician – lower Silurian Tumblagooda Sandstone,

- Western Australia. *Australian Journal of Earth Sciences*, 62, 817-830, <http://dx.doi.org/10.1080/08120099.2015.1117020>. Impact Factor 1.575.
6. G.D. Wach, R.L. Silva, C.H. Dickson, L. Eliuk, N. Morrison, N. Plummer, C. Wong, D. O'Connor, T. Campbell, T. Kelly and **Y. Kettanah**, 2014. Integrated Assessment of Risks Associated with Exploration Offshore Eastern Canada. Extended abstract, **76th EAGE Conference and Exhibition 2014**; DOI: 10.3997/2214-4609.20141357
  7. Sabah A. Ismail, **Yawooz A. Kettanah**, Sawsan N. Chalabi, Ahmed H. Ahmed, Shoji Arai, 2014. Corrigendum to the paper titled: Petrogenesis and PGE distribution in the Al- and Cr-rich chromitites of the Qalander Ophiolite, northeastern Iraq: Implications for the tectonic environment of the Iraqi Zagros Suture Zone. *Lithos*, 202-203, 21-3
  8. Sabah A. Ismail, **Yawooz A. Kettanah**, Sawsan N. Chalabi, Ahmed H. Ahmed, Shoji Arai, 2014. Petrogenesis and PGE distribution in the Al- and Cr-rich chromitites of the Qalander Ophiolite, northeastern Iraq: Implications for the tectonic environment of the Iraqi Zagros Suture Zone. *Lithos*, 202-203, 21-36, <http://dx.doi.org/10.1016/j.lithos.2014.05.013>. Impact Factor: 3.779; 5-Year Impact Factor: 4.246.
  9. Faraj H. Tobia, **Yawooz A. Kettanah**, Mazin M. Mustafa, 2014. Petrography and geochemistry of Ga'ara sedimentary ironstones, Western Desert of Iraq. *Journal of African Earth Sciences*, 97,261-272, <http://dx.doi.org/10.1016/j.jafrearsci.2014.04.030> Impact Factor 1.229.
  10. Hasley Vincent, Grant Wach, **Yawooz Ketannah**, 2014. Heavy mineral record of Andean uplift and changing sediment sources across the northeastern margin of South America; a case study from Trinidad and Barbados. *Geological Society, London, Special Publications 2014: Sediment Provenance Studies in Hydrocarbon Exploration & Production*, 386, 217-241. First published on February 6, 2014; doi:10.1144/SP386.19. Impact Factor 2.583.
  11. **Yawooz A. Kettanah**, Muhammad Y. Kettanah and Grant D. Wach, 2014. Provenance, diagenesis and reservoir quality of the Upper Triassic Wolfville Formation, Bay of Fundy, Nova Scotia., Canada. *Geological Society, London, Special Publications 2014: Sediment Provenance Studies in Hydrocarbon Exploration & Production*, 386, 75-110; first published on October 24, 2013, doi:10.1144/SP386.18. Impact Factor 2.583.
  12. Farhad A. Muhammad, **Yawooz A. Kettanah** and Sirwa Q. Smail, 2013. Environmental Significance of Major and Trace Elements in the Soils of Selected Areas in Erbil City, Kurdistan Region, Northern Iraq. *Iraqi National Journal of Earth Sciences*, 13(2), 15-32.
  13. **Kettanah, Yawooz, A**, 2013. Hydrocarbon Fluid Inclusions in the Argo Salt, Offshore Canadian Atlantic Margin. *Canadian Journal of Earth Sciences*, 50 (6): 607-635 (2013) [dx.doi.org/10.1139/cjes-2012-0040](http://dx.doi.org/10.1139/cjes-2012-0040). Impact Factor 1.366
  14. Imbarek, Omar, Wach, Grant and **Kettanah, Yawooz**, 2011. Facies Analysis and Depositional Environments of the Eocene Carbonate Sediments, NE Libya. AAPG Search and Discovery Article #90137©AAPG *European Region's 2nd International Conference* held in Marrakech, Morocco, 5-7 October 2011. Abstract
  15. Piper, D.J.W., Pe-Piper, G. and **Kettanah, Y**, 2010. Sedimentology, detrital petrology and regional linkages of the Lower Cretaceous Bjarni Formation,

- Labrador Shelf. *Atlantic Geoscience Society Meeting*, February 2010, Greenwich, N.S. Abstract, p35
16. Sinha, R., **Kettanah, Y.**, M.R. Gibling, Tandon, S.K., Jain, M., Bhattacharjee, P.S., Dasgupta, A.S., and Ghazanfari, P., 2009. Craton-derived alluvium as a major sediment source in the Himalayan Foreland Basin of India. *The Geological Society of America Bulletin*, v. 121; no. 11/12; p. 1596–1610. Impact Factor 4.212; Five Year Impact Factor 4.556
  17. **Kettanah, Yawooz**, Kettanah, Muhammad, and Wach, Grant, D., 2008. Reservoir Quality, Diagenetic History and Provenance of the Late Triassic Sandstones of the Wolfville Formation, Bay of Fundy, Nova Scotia, Canada. *Conjugate Margin Conference*, Halifax, Canada. Extended abstract, 12p.
  18. Zentilli, Marcos, Wielens, Hans; Grist, A.M. Sandy; **Kettanah, Yawooz**; Negulic, Eric and Brown, Evan T., 2008. Thermal effects of salt on the petroleum system: evidence from Fission track thermochronology, fluid inclusions and basin Modeling. *Conjugate Margin Conference*, Halifax, Canada. Extended abstract.
  19. Awadh, Salih Muhammad and **Kettanah, Yawooz**, 2008. Petrology, geochemistry and tectonic environment of the Shalair Metamorphic Rock Group and Katar Rash Volcanic Group, Shalair Valley Area, Northeastern Iraq. *Iraqi Journal of Science*, Vol.49, No.1, 2008, PP. 149-158
  20. Sinha, R., **Kettanah, Y.**, M.R. Gibling, Tandon, S.K., Jain, M., Bhattacharjee, P.S., Dasgupta, A.S., and Ghazanfari, P., 2008. Sediment sourcing in the Gangetic alluvium, Himalayan Foreland Basin – competition between Himalayan and cratonic hinterland. *Himalayan Journal of Sciences*, vol. 5, issue 7 (special issue), p.140.
  21. **Kettanah, Y.A.** and Wach, G.D., 2006. The Provenance of Heavy Minerals in the Mesozoic and Tertiary Formations, Venture B-13 Borehole, Offshore Nova Scotia, Canada, Poster presentation and extended abstract, AAPG 2006 AAPG 2006 Annual Convention, April 9-12, 2006. George R. Brown Convention Center, Houston, USA
  22. Mazin Yousif Tamar-Agha, Yawooz Abdullah **Kettanah** and Sabah Ahmed Ismail (2005). Preliminary assessment of zircon and rutile concentrations from Ga'ara sandstone (Permocarboniferous), western Iraq (in Arabic with English abstract). *Iraqi Journal of Geology and Mining*, Vol.1, No.1, p37-55
  23. **Y. Kettanah**, M. Zentilli, H. Wielens and G. Wach; 2005. Types and Significance of Fluid Inclusions in Rock Salts from Offshore Grand Banks, Newfoundland and Onshore Nova Scotia. GAC-MAC–CSPG-CSSS meeting, Halifax May 2005
  24. **Yawooz Kettanah** and Grant Wach, 2005. Reservoir Provenance in Venture B-13 and Arcadia J-16 boreholes, Offshore Nova Scotia. GAC-MAC–CSPG-CSSS meeting, Halifax May 2005
  25. **Y.A. Kettanah**, M.R.Gibling and R. Sinha, 2005. Provenance of recent sediments from Ganges River system and its tributaries, India. GAC-MAC–CSPG-CSSS meeting, Halifax May 2005
  26. **Y.A. Kettanah**, M.R.Gibling, and R. Sinha, 2005. Provenance of Quaternary sands from the Ganga River system and its tributaries, Himalayan Foreland Basin, India. GAC-MAC–CSPG-CSSS meeting, Halifax, May 2005
  27. **Yawooz Kettanah** and Grant Wach, 2005. Mineralogical and Petrographic Characteristics of the Cenozoic and Upper Mesozoic Reservoirs in Venture B-13 and Arcadia J-16 Wells, Offshore Nova Scotia. *The Atlantic Geoscience*

- Society (AGS) 31<sup>st</sup> Colloquium & Annual General Meeting, Saint John, Feb.4-6, 2005. Program with Abstracts, page25-26
28. M. Zentilli, M-C. Williamson, P. Budkewitch, W. Pollard, C.W. Hamilton, A. Mosher, S.A. Lyon, A.M. Grist, **Y. Kettanah**, A.B.O. Jensen and W.M. Schwerdtner, 2005. Evaporite diapirs in Axel Heiberg Island, Nunavut: gauging their past and present growth rate and their geothermal energy potential. The Atlantic Geoscience Society (AGS) 31<sup>st</sup> Colloquium & Annual General Meeting, Saint John, Feb.4-6, 2005. Program with Abstracts, page 47.
  29. **Kettanah**, Yawooz, Wack, Grant, Zentilli, Marcos and Wielens, Hans, 2004. The nature and behaviour of fluids within rock salt: Are salt domes suitable repositories for hydrocarbons? 1st Annual Dalhousie University Environmental Research Symposium held at Dalhousie University at 9<sup>th</sup> Nov.2004
  30. **Kettanah**, **Y.** and Zentilli, M. and Wielens, H., 2004. Characteristics of petroleum fluid inclusions in rock salts [Examples from Osprey Salt (H-84 Well-Carson Sub-basin, Grand Banks, Newfoundland) & Pugwash Salt Deposit (Northeastern Cumberland)]. (Poster) Abstract submitted to Research & Development FORUM 2004, (13-14 May 2004) Antigonish, Canada.
  31. **Y.Kettanah**, M. Zentilli and H. Wielens, 2004. Pilot study on fluid inclusions in salt (halite) from the Osprey H-84 well, Carson Sub-basin, Grand Banks, Newfoundland. The Atlantic Geoscience Society (AGS) 31<sup>st</sup> Colloquium & Annual General Meeting, Moncton, Jan.30-31, 2004; Program with Abstracts, page 18-19.
  32. Zentilli, M., **Kettanah**, **Y.**, Grist, A.M., 2003. A Galena-Barite Occurrence in Kap Henson, Northumberland Island, Greenland. Abstract submitted to ICAM Meeting, November 2003, Dartmouth, Nova Scotia.
  33. **Kettaneh**. **Y.A.H.**, Al-Khafaji, S.J. and Al-Jobori.S.M., 1994. Major, trace and rare-earth elements geochemistry of the Ga'ara kaolinite deposit, western Iraq (abstract). Abstract book of the 11<sup>th</sup> Iraqi Geological Congress, Baghdad (1994), p11-13 to 11-14.
  34. **Kettaneh**, **Y.A.**, Al-Jobori, S.M. & Ubaid, M.J., 1993. Neutron activation analysis of major, trace and rare- earth elements in the Shalair Valley Granitoids, Northeastern Iraq. Iraqi Journal of Science, Vol.34, No.1-2, p.105-125.
  35. **Kettaneh**, **Y.A.**, Al-Amiri, J.A.H. and Al-Atia, M.J., 1992. Mineralogical characteristics of zircon in Amij Formation, western Iraq (abstract). Abstract book of the 10<sup>th</sup> Iraqi Geological Congress, Baghdad (1992), p.11-12
  36. Tamar-Agha, M.Y., Sadiq, A.J. & **Kettaneh**, **Y.A.**, 1992. Clay mineralogy of Upper Silurian - Lower Permian mudrocks in the Ga'ara depression, western desert, Iraq. Iraqi Journal of Science, Vol.33, No. 1-2, p.81-96.
  37. Al-Jobori.S.M., **Kettaneh**. **Y.A.H.**, Saad, A., Al-Jaleel, H.S. & Shihab, K.M., 1992. Application of the instrumental neutron activation technique for the analysis of major and trace elements in phosphorite rocks. Jour. Math. Phys. (Iraqi Society of Physics & Mathematics), Vol.13, No.1, p.151-166.
  38. Abdullah, Q.A., Zwain, J.A., **Kettaneh**, **Y.A.**, Saleh, S.A. & Majeed, T.A., 1991. Spectral reflectance of economically important rock formations in the western desert of Iraq. Iraqi Journal of Science., Vol.32, No. 4, p.897-912.
  39. Al-Badri, A.S., Al-Baidari, A.P. & **Kettaneh**, **Y.A.**, 1991. Genesis and geochemistry of Al-Tuwaila-Bugharis Saltern at Badiyet Al-Jazira, Iraq (in Arabic) .Jour. Geol. Soc. Iraq.Vol.24, p26-41.

40. **Kettaneh, Y.A.**, Al-Baidari, A.P. & Al-Badri, A.S., 1990. Mineralogy and geochemistry of subsurface rock-salt deposits of Dhibban-Anhydrite and Lower Fars (Fatha) Formation, North Iraq (abstract). Proc.9th Iraqi Geological Congress, Baghdad, 1990, p.59.
41. Mahmoud, M.M., Al-Shakiry, A.J. & **Kettaneh, Y.A.**, 1989. X-Ray study of an anthophyllite from schist in NE-Iraq. Iraqi Jour. of Science, Vol.30, No.2, p.305-316.
42. **Kettaneh, Y.A.H.** & Sadik, A.J., 1989. Mineralogy and geochemistry of Shiranish Formation North Iraq. Jour.Geol.Soc.Iraq, Vol.22, No.1, p.98-111.
43. Al-Jobori, S.N. & **Kettaneh, Y.A.H.**, 1989. Determination of rare-earth elements in Phosphorites by Neutron Activation Analysis. Jour. Radioanalytical & Nuclear Chemistry, Articles.Vol.129, No.2, p.327-334.
44. Al-Jobori, S.N., **Kettaneh, Y.A.** & Mustafa, J.A., 1988. Multi-element determination in silicate rocks by instrumental neutron activation analysis.Jour. Radjoanalytical & Nuclear Chemistry, Articles.V.120, Nol, p.3-12.
45. Al-Jobori, S.N., **Kettaneh, Y.A.** & Mustafa, J.A., 1987. Determination of Si, Al, Ti, Fe & Zr in glass-sand samples by 14MeV Neutron Activation Analysis. Jour. Radjoanalytical & Nuclear Chemistry. Vol.110, No.1, p.11-16.
46. Al-Bassam. K.S., Al-Jaleel, H.S. & **Kettaneh, Y.A.**, 1986. Mineralogy and geochemistry of the Ethna Phosphorite Deposit (Eocene), Western Iraq (abstract). Proc.7<sup>th</sup> Iraqi Geol. Congress, Baghdad, 1986, p.61.
47. **Kettaneh, Y.A.**, Al-Jaleel, H.S. & Al-Bassam, K.S., 1986. Petrographic classification and genesis of the Ethna Phosphorite Deposit (Eocene), Western Desert, Iraq.Jour. Geol. Soc. Iraq, Vol.19, No.3, p.191-223.
48. **Kettaneh, Y.A.**, Tobia, F.H. & Zainal, Y.M., 1986. Geochemistry of Ga'ara iron ore, western desert of Iraq (Abstract). Proc.7th Iraqi Geological Congress, Baghdad, 1986, p.129.
49. Mahmoud, M.M., Al-Shakiry, A.J. & **Kettaneh, Y.A.**, 1986. Mineralogy of amphiboles in schists of Hero area, NE Iraq (abstract). Proc.7th Iraqi Geol. Congress, Baghdad, 1986, p128
50. Mahmoud, M.M., Al-Shakiry, A.J. & **Kettaneh, Y.A.**, 1986. X-Ray crystallography of richterite in schists of Hero area, NE Iraq. Jour. Geol. Soc. Iraq, Vol.19, No.2, p.241-256.
51. **Kettaneh, Y.A.**, 1984. Decomposition of various geological materials by sodium peroxide for their analysis by atomic absorption spectrophotometry. Jour. Geol. Soc. Iraq, Vol.17, p.184-198.
52. **Kettaneh, Y.A.** & Badham, J.P.N. (1978). Mineralization and paragenesis at the Mount Wellington Mine, Cornwall. Economic Geology, Vol.73, p.486-495.
53. **Kettaneh. Y.A.H.**, 1978. Mineralization, paragenesis and geochemistry of the Mount Wellington Mine, Cornwall. Unpubl. Ph.D. thesis, Southampton Univ., United Kingdom (Its abstract is published at the Trans.Inst.Min.Metall., London, Vol.87, p.B156, 1978).
54. **Kettaneh, Y.A.**, 1977. Mineralization at the Mount Wellington Tin Mine, Cornwall (abstract).Geological Society Newsletter, London;Vol.6, No.2, p.12-13
55. **Kettaneh, Y.A.** and Badham, J.P.N., 1977. Mineralogy and paragenesis at the Mount Wellington Mine. Proceedings of Ussher Society, Vol.4, p.5-6.

## PAPERS SUBMITTED FOR PUBLICATION

1. **Yawooz A. Kettanah** and Sabah. A. Ismail, (under review 2017). Mineral chemistry, petrography and geochemistry of major, trace, REE and PGE+Au elements of Alta'meem chondritic meteorite, Iraq. *Journal of African Earth Sciences*, *Impact Factor* 1.403; 5-Year Impact Factor 1.755.

## BOOKS (REVIEWS AND TRANSLATIONS):

1. Mayssaa Al-Bidry, **Yawooz Kettanah**, Kamal Haji Karim, 2015. Mineralogy and Geochemistry of Asnawa Iron Ore NE- Iraq. LAP LAMBERT Academic Publishing. ISBN-13: 978-3-659-79438-4, ISBN-10: 3659794384, EAN: 9783659794384. <https://www.lap-publishing.com/>, 252p. (Book language: English).
2. **Kettanah, Y.A.** and Islam, M.R., 2003; Book Review on "Petroleum Geology of the Caspian Basin. L.A. Buryakovsky, G.V. Chilingar and Aminzadeh, Gulf Publishing, 2001. Energy Sources, vol .25, no.11, 1113-1117.
3. **Kettanah, Y.A.** and Islam, M.R., 2003; Book Review on "Origin and Prediction of Abnormal Formation Pressures". G.V. Chilingar, V.A. Serebryakov, J.O. Robertson (eds.), Elsevier, 2002. Energy Sources, vol. 25, no.11, 1119-1124.
4. **Kettanah, Y.A.** An introduction to the methods of optical crystallography. By: F.D. BLOSS (1961), New York: Holt, Reinholt and Winston, 294p. Translated from English to Arabic for Baghdad University in 1985. Printed by: The Technical Selma Press, Baghdad, Iraq, 626p.

## SCIENTIFIC UNPUBLISHED REPORTS

1. **Yawooz Kettanah**, 2010. Hydrocarbon Fluid Inclusion Study in the Argo Salt of Glooscap-C63 and Weymouth-A45 Wells, Offshore Scotian Margin. A confidential report prepared for the Offshore Energy Technical Research Association (OETR-A), Energy Department, Halifax, Canada, 23 August 2010, 128p.
2. **Yawooz Kettanah**, 2010. Hydrocarbon fluid inclusion study in the cementing material of reservoir rocks of certain wells, Offshore Scotian Margin. A confidential report prepared for the Offshore Energy Technical Research Association (OETR-A), Energy Department, Halifax, Canada, 15 November 2010, 73p.
3. **Yawooz Kettanah**, 2010. Provenance, porosity and bitumen content of the Hiram Brook Member Sandstones (Horton Group) at McCully Field, New Brunswick. A consultant contract work conducted for Corridor Resources Company, Halifax, Canada.
4. Leslie Eliuk, **Yawooz Kettanah** and Grant Wach, 2009. Wyandot chalk properties- Eagle D-21 Core. Prepared for Ammonite Nova Scotia Corporation, 183p.

5. **Yawooz Kettanah** and Grant Wach, 2008. Petrographical and mineralogical analysis of Hibiscus-4 and Eastern Hibiscus-A wells, Hibiscus Field, Offshore Trinidad and Tobago. A report prepared for BG Trinidad and Tobago Limited (BG T&T), 145p.
6. **Yawooz Kettanah** and Grant Wach, 2008. Clay Mineral Analysis of the Tertiary Succession- Scotian Margin. A report submitted to Petroleum Research Atlantic Canada (PRAC), 71p.
7. **Yawooz Kettanah** and Martin Gibling, 2007. Fluid inclusions study of salt samples from Argo F-38, Kittiwake P-11 and Hermine E-94 wells for GSC-A, Dartmouth, Nova Scotia. A Report prepared for the Geological Survey of Canada – Atlantic, 30 March 2007, 89 p.
8. **Kettanah, Y.A.** and Zentilli, M., 2004. Fluid Inclusions Studies In Halite of Osprey Evaporites Formation, Osprey H-84 Well, Grand Banks, Newfoundland .A confidential report, 58p, March 31, 2004: Prepared for the Geological Survey of Canada-Atlantic.Order No.23420-03A300-0011-HAL (Hans Wielens).
9. **Kettanah, Y.A.** and Zentilli, M., 2003. Pilot study on fluid inclusions in salt (halite) from the Osprey Evaporites Formation, Osprey H-84 well, Carson Subbasin, Grandbanks, Newfoundland. A confidential report prepared for the Geological Survey of Canada-Atlantic, No. ATL002R211, 62p.
10. **Kettanah, Y.A.**, 1993. Petrology and mineralization of the copper-bearing volcanic rocks at Mawat Igneous Complex, northeastern Iraq (A case study on bore-hole WZ-1). Unpublished Report prepared for the benefit of the Establishment of Geological Survey and Mining in Iraq.
11. **Kettanah, Y.A.** and Tobia, F.H., 1984. Discovery of gold in the sandstones of Ga'ara area, western desert, Iraq. Unpublished Confidential Report No.1 submitted to the Dept. Earth Sciences, College of Science, Baghdad University, Baghdad, Iraq. 53p
12. Al-Hermizi, H.M., **Kettanah, Y.A.**, Al-Kassap, A., Al-Kazzaz, H., Jassim. M. M. & Zair, I., 1976. Geology, radiometric survey and petrographic studies of Qala-Dizeh area. Unpublished Internal Report No.NGD-53, SOM Library, Baghdad, Iraq.
13. Al-Noor, W.A., Jassim, M.M. & **Kettanah, Y.A.**, 1973. Geologic and radiometric prospecting in Al-Qaim area, Part 1: Wadi Jurwa-Wadi Abu Rubai.Unpubl. Int.Rep.No.NOD-6, SOM Library, Baghdad, Iraq.
14. Al-Shible, T.A. and **Kettanah, Y.A.**, 1972. Reconnaissance radiometric and geologic survey in NE Penjwin (Shalair Valley), Iraq. Unpublished Internal Report No. NGD-7, IAEC & SOM Libraries, Baghdad, Iraq.

## MANUSCRIPTS IN PREPARATION

1. **Yawooz Kettanah** and Adnan Hakeem (2015). Geochemistry, petrogenesis and copper mineralization of a basalt layer within the Gercus Formation of northern Iraq: An abnormally odd and rare occurrence.
2. **Yawooz Kettanah**, Adnan Hakeem and Farhad Ahmed (2015). Major, Trace and Rare-Earth Elements Geochemistry and Provenance of the Red Beds of Gercus Formation, Bekhair Anticline, Northern Iraq.

3. **Yawooz Kettanah** and Alan Salah (2015). Petrogenesis and tectonic implications of the scoriaceous basaltic volcanoes capping the so-called burnt hills of Injana area, Hemrin South Mountain, Northern Iraq
4. **Yawooz A. Kettanah, 2013-**. Petrogenesis and geochemistry of major and trace elements in the amphibolite pods within the serpentinites of Penjwin ophiolite, northeastern Iraq.

## **SUPERVISION ON Ph.D. & M.Sc. THESIS**

1. Mineralogical and geochemical comparison between chromitites from different igneous complexes of northeastern Iraq. Ph.D. thesis (2015- in progress). Department of Geology, College of Sciences, Salahaddin University, Erbil, Iraq. By Idrees Ahmed **NADIR**.
2. Petrogenesis and tectonic implications of the scoriaceous basaltic volcanoes capping the so-called burnt hills of Injana area, Hemrin South Mountain, Northern Iraq. M.Sc. thesis (2013). Department of Geology, College of Sciences, Salahaddin University, Erbil, Iraq. By: Alan Salah **ABDULRAHMAN**.
3. Geochemistry of water and sediments of Dokan Lake and Lesser Zab River, Kurdistan Region–Iraq. Ph.D. thesis (2013), Department of Geology, College of Sciences, Salahaddin University, Erbil, Iraq. By: Awaz Kareem **RASUL**.
4. Evolution of the Eocene-aged carbonate ramp complex, Onshore Cyrenaica Basin, NE Libya. Application to the subsurface carbonated reservoirs, NW Offshore Libya. M.Sc. thesis (2008). Dalhousie Uni., Canada. By: Omar **IMBAREK**.
5. Petrology and geochemistry of the intrusive igneous rocks at Qala'at Dizeh area, northeast Iraq. M.Sc. thesis (1991). Baghdad University, Iraq. By: Ra'ad Jalal **FATHI**.
6. Petrology and geochemistry of the Shalair Metamorphic Rock Group, Shalair Valley area, northeast Iraq. M.Sc. thesis (1991). Baghdad University, Iraq. By: Salih Muhammad **AWADH**.
7. Petrology and geochemistry of volcanic rocks in the thrust zone area, northeastern Iraq. M.Sc. thesis (1990). Baghdad University, Iraq. By: Adnan Jassam Hammadi **AL-SA'ADI**.
8. Mineralogy and mineral chemistry of zircon in selective samples from formations of western Iraq. M.Sc. thesis (1990). Baghdad University, Iraq. By: Shoukr Ali Khalil **AL-SALIHI**.
9. Rare-earth elements geochemistry of the industrial clay deposits in Iraq. M.Sc. thesis (1989). Baghdad University, Iraq. By: Sattar Jabbar Erzaij **AL-KHAFAJI**.
10. Mineralogical-geochemical study of zircon and rutile in the sandstones of Ga'ara Formation, western Iraq. M.Sc. thesis (1989). Baghdad University, Iraq. By: Sabah Ahmed **ISMAIL**.
11. Genesis and geochemistry of some salt deposits in Iraq. M.Sc. thesis (1988). Baghdad University, Iraq. By: Azhar Paulus Yelda **AL-BAIDARI**.
12. Geochemical, mineralogical and petrological comparison between certain glass-sand ore deposits in Iraqi western desert. M.Sc.thesis (1986). Baghdad University, Iraq. By: Jaleel Abed **MUSTAFA**.

13. Surface-subsurface , rmineralogical-geochemical study of clays and iron ores of Paleozoic rocks in western desert, Iraq. M.Sc. thesis (1985), Baghdad University, Iraq. By: Ali Ja'afar **SADIQ**.
14. Geochemistry and mineralogy of the Lower Eocene Phosphorite in the western desert area. M. Sc. Thesis (1983), Baghdad University, Iraq. By: Hikmet Safi Mustafa **AL-JALEEL**
15. Geochemistry and mineralogy of the iron ore deposit of Ga'ara Formation in Iraqi western desert. M.Sc.thesis (1983), Baghdad University, Iraq. By: Faraj Habib **TOBIA**

## **TEACHING AND RESEARCH FIELDS**

Economic geology (ore deposits, industrial rocks and minerals, petroleum geology, hydrogeology), geochemistry, mineralogy, optical mineralogy, petrology (igneous, metamorphic, sedimentary), heavy minerals, sedimentology, plate tectonics, exploration geochemistry, geology for engineers, general geology.

These courses were taught at Diploma, B.Sc., High Diploma, M.Sc., M.Eng., and Ph.D. levels at seven local and international universities (Baghdad, Mustansiriyah, Salahaddin and Duhok) in Iraq; Southampton in England; Erciyes in Turkey; and Dalhousie in Canada.

## **OTHER SCIENTIFIC ACTIVITIES (Short Courses, Workshops Attended)**

1. Participated at the Nova Scotia Energy Research and Development Forum 2006. May 24-25, 2006 at St. Francis Xavier University, Antigonish, NS, Canada.
2. Participated at the Atlantic Geoscience Society (AGS) meeting at Acadia University, Wolfville, Nova Scotia with a poster presentation : Y.A. Kettanah, D.B. Scott, G.D. Wach and P. Stoffyn-Egli: The first submarine occurrence of baricite: a rare hydrated Fe-Mg phosphate mineral, Mackenzie Bay, Beaufort Sea, Canada. The Atlantic Geoscience Society 32<sup>rd</sup> Annual Colloquium and Workshops, 3-4 February 2006; The Old Orchard Inn, Wolfville, Nova Scotia
3. Participated in GAC-MAC-CSPG-CSSS HALIFAX 2005 conference, 16-20 May 2005, held in Halifax, NS, Canada with 4 papers (one oral and three poster presentations) titled:
  1. **Y.A. Kettanah** and M.R.Gibling and R. Sinha, 2005. Large rivers from the Indian Craton: A major sediment contribution to the Himalayan Foreland Basin. GAC-MAC-CSPG-CSSS Halifax 2005; Abstract Book, p. 20.
  2. **Y.A. Kettanah**, M.R.Gibling, and R. Sinha, 2005. Provenance of Quaternary sands from the Ganga River system and its tributaries, Himalayan Foreland Basin. GAC-MAC-CSPG-CSSS Halifax 2005; Abstract Book, p.23

3. **Yawooz Kettanah** and Grant Wach, 2005. Reservoir Provenance in Venture B-13 and Arcadia J-16 boreholes, Offshore Nova Scotia. GAC-MAC-CSPG-CSSS Halifax 2005; Abstract Book, p.24
4. **Y. Kettanah**, M. Zentilli, H. Wielens and G. Wach, 2005. Types and Significance of Fluid Inclusions in Rock Salts from Offshore Grand Banks, Newfoundland and Onshore Nova Scotia; Abstract Book, p.16.
4. Participated with a talk titled” Fluid inclusion microscopy in salt and associated rocks” presented at the “Geothermal anomalies associated with salt structures: Applications of thermochronology to petroleum exploration” workshop organized by Dr. Marcos Zentilli, Department of Earth Sciences, Dalhousie University, 22<sup>nd</sup> Feb 2005.
- 5 Participated in the Atlantic Geosciences Society (AGS) 31<sup>st</sup> Colloquium & Annual General Meeting, Saint John, Feb.4-6, 2005 with a paper titled. Mineralogical and Petrographic Characteristics of the Cenozoic and Upper Mesozoic Reservoirs in Venture B-13 and Arcadia J-16 Wells, Offshore Nova Scotia. **Yawooz Kettanah** and Grant Wach, Program with Abstracts, page25-26
- 6 Participated in the Atlantic Geosciences Society (AGS) 31<sup>st</sup> Colloquium & Annual General Meeting, Moncton, Jan.30-31, 2004; with a paper: **Y. Kettanah**, M. Zentilli and H. Wielens (2004). Pilot study on fluid inclusions in salt (halite) from the Osprey H-84 well, Carson Sub-basin, Grand Banks, Newfoundland. Program with Abstracts, page 18-19.
- 7 Participated in 1st Annual Dalhousie University Environmental Research
- 8 Symposium held at Dalhousie University at 9<sup>th</sup> Nov.2004 with a poster presentation titled (The nature and behaviour of fluids within rock salt: Are salt domes suitable repositories for hydrocarbons?) By: **Yawooz Kettanah**, Grant Wach, Marcos Zentilli and Hans Wielens.
- 9 A short course on Raman Spectroscopy held at the Department of Physics, Dalhousie University. 24 June 2004
- 10 Workshop on analytical SEM and FIBM sample preparation techniques, presented by the Institute for Research in Materials held at the Faculty of Engineering / Dalhousie University in 21-22 June 2004.
- 11 Participated at the “Research & Development FORUM 2004 (13-14 May 2004)”-Antigonish with a poster presentation.: **Y. Kettanah, M. Zentilli and H. Wielens (2004)** [Characteristics of petroleum fluid inclusions in rock salts [examples from Osprey Salt (H-84 Well - Carson Sub-basin, Grand Banks, Newfoundland) & Pugwash Salt Deposit (Northeastern Cumberland)]
- 12 Workshop on Cathodoluminescence in the SEM”, MSC/CSZ 2004 Annual Meeting, May 15, 2004, Acadia University, Wolfville, Canada
- 13 Short Course on Fluid Inclusions. Department of Earth Sciences, Dalhousie University, March 18-19, 2004. By Dr. Alan Anderson (St. Francis Xavier University, Antigonish)
- 14 Workshop on Exploration and Mining Geology of the Base Metal Massive Sulphide Deposits of Bathurst, N.B., by William Luff, SEG-Dal-SMU St. Chapter, March 20, 2004
- 15 Workshop on applications of ion microprobe technology in the geosciences, Atlantic Geoscience Society Annual Colloquium, Moncton, New Brunswick, January 30, 2004.

## **PRACTICAL EXPERIENCE**

**During 46 years of my geological career (1971-still), I have used and gained a wide experience in the following analytical equipments:**

- Ore Microscopy (Reflected Light)
- Optical Microscopy (Incident Light)
- Fluorescence Microscopy
- X-Ray Diffraction (XRD)
- X-Ray Fluorescence (XRF)
- Atomic Absorption Spectrometry (AAS)
- Instrumental Neutron Activation Analysis (INAA)
- Heavy Mineral Separation Methods: Isodynamic Magnetic Separator, Heavy Liquids and Centrifuges
- Computer Applications in Geology
- Fluid Inclusions studies
- Electron Probe Micro Analyzer (EPMA)
- Electron Scanning Microscope (ESM)
- Raman Spectroscopy (RS)
- Cathodoluminescence
- Various basic preparation procedures in geology: Thin Sections, Polished Sections, Polished-thin sections, Sieving, Staining, Photographing, etc..

## **FIELD-WORK EXPERIENCE:**

**During 46 years of my geological career, I gained the following field experience:**

### **1. IRAQ (1971 – Nov. 1974)**

Conducted three projects while working at the Iraqi Atomic Energy Commission, Nuclear Research Institute as a geologist in the field of prospecting for radioactive mineral deposits in Iraq. A field work of 2-4 months duration was carried out for each project followed by 1-2 years of experimental and report writing duties.

### **2. ENGLAND (Nov, 1974 – June 1978)**

Few months of field work at the Mount Wellington Tin Mine (Cornwall-England) during my Ph.D. Studies at Southampton University. In addition to this mine, the following mines and mining districts were visited:

- Cligga-Head Sn -W Mine, England.
- Pary's Mountains Cu Mine, Wales
- Tara Pb-Zn-Ag Mine, Ireland
- Silver Pb - Zn - Ag Mine, Ireland
- Tynagh Pb - Zn - Ag Mine, Ireland.
- Avoca Cu - Pyrite Mine, Ireland.
- Magcobar Hg - Cu Mine, Ireland.
- Most of the geologically interesting sites along SW- England coast (Cornwall & Devon).

### **3. IRAQ (Dec. 1978 – Oct. 1995)**

During my academic career at Baghdad University (IRAQ), I visited and conducted research on the following mines and mineral deposits. This was done either on personal basis or as part of my M.Sc. & Ph.D. student's research projects:

- Asnawa Iron deposit, Penjwin, North Iraq.
- Zarloukh Bentonite Open Pits, Kirkuk, North Iraq.
- Akashat Phosphorite Open Pits, Rutba, West Iraq.
- Ethna Phosphorite Deposit, Rutba, West Iraq.
- Hussainiyat Sedimentary Iron Ore, Dolomite / Kaolin- Porcellenite Open Pits and Deposits, West Iraq.
- Ga'ara Iron, Glass-Sand, Kaolin and Phosphorite Open Pits and Deposits, Rutba, West Iraq.
- Rutba (Radhuma) Glass-Sand Open Pits and many other large Glass-Sand Deposits, Rutba, West Iraq.
- Amij Radioactive Heavy Mineral-Rich (Monazite-Zircon-Rutile-Ilmenite) Black-Sandstone Deposits, West Iraq

### **4. TURKEY (Oct. 1996 – Oct. 2002)**

During my academic career at Erciyes University (Turkey), I visited the following mines and mineral deposits:

- Akdagmadeni Pb-Zn Deposit (Mine & Open Pit), Central Turkey.
- Sivas- Divrigi Fe Deposit (Open Pits), Central Turkey.
- Sorgun Coal Deposits (Mine & Open Pits), Central Turkey.
- Celestite- Gypsum- Anhydrite Deposits (Open Pits), Sivas, Central Turkey.
- Travertine Deposits (Open Pits), Sivas, Central Turkey.
- Travertine Deposits of Pamukkale Resort, Western Turkey
- Boğazliyan Geothermal Energy Resources, Central Turkey.
- Many geologically interesting areas in the North Anatolian Fault Zone (active seismic area); Igneous-metamorphic massif complexes at the east; and Taurus Mountain Ranges at the southern parts of Turkey.

### **5. CANADA (Oct. 2002 – Dec. 2010)**

During my academic career at Dalhousie University (Canada), I visited the following mines and mineral deposits:

- Pugwash Salt Mine, Windsor Salt Company, Nova Scotia.
- Sussex Potash Mine, New Brunswick
- Fundy Gypsum Mine, Fundy Gypsum Company, Windsor, Nova Scotia
- Gays River Pb-Zn Mine, Nova Scotia
- Most of the geologically interesting areas in Nova Scotia including the Bay of Fundy

### **6. KURDISTAN – IRAQ (Dec. 2010 – Still)**

During my academic career at Salahaddin and Duhok Universities (Kurdistan - Iraq), I visited and conducted research on the following geologically interesting areas:

- Lesser Zab river including the intervening Dokan Lake and Dam as part of a Ph.D. student project I was supervising
- Volcanic rock remnants within Injana (Upper. Fars) Formation, Hemrin South Mountain as part of an M.Sc. thesis..
- New discovered volcanic rocks within Gercus Formation in near Duhok City
- Igneous complexes at Penjwin and Qala Dizeh area