

CURRICULUM VITAE

Personal Details

Name: **Paul G. SPRY**

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Citizenship: U.S. and Australian

Education

Ph.D. 1984 University of Toronto, Canada

M.S. 1979 University of Adelaide, South Australia

B.S. (Hons.) 1977 University of Adelaide, South Australia

B.S. 1976 University of Adelaide, South Australia

Professional Positions

2019 (Spring) Visiting Professor, School of Geography, Geology, and the Environment, Keele University, United Kingdom

2012 (Spring, 2012) Visiting Professor, Dipartimento per lo Studio del Territorio e delle sue Risorse, Università degli Studi di Genova, Italy

2012 (June, 2012) Visiting Professor, Department of Botany, Ecology, and Geology, University of Sassari, Italy

1997-2001 Chair, Department of Geological and Atmospheric Sciences, Iowa State University

1995-present Professor, Iowa State University

1995-1997 & 2001-2002 Associate Chair, Department of Geological and Atmospheric Sciences, Iowa State University

1993-1995 Associate Director, Iowa State Mining and Mineral Resources Research Institute, Iowa State University

1995-1996 Associate Director, Center for Coal and the Environment, Iowa State University

1988-1995 Associate Professor, Iowa State University

1983-1988 Assistant Professor, Iowa State University

1978-1982 Teaching Assistant, University of Toronto

1982 (summer) Geologist, Pan Ocean Oil Ltd., Canada

1981 (summer) Geologist, Rio Tinto Canadian Exploration Ltd., Canada

1980 (summer) Geologist, Falconbridge Nickel Mines Ltd., Canada

1977-1978 Laboratory Instructor, University of Adelaide

1975 (summer) Geologist, South Australian Department of Mines

1974 (summer) Geologist, Renison Limited, Australia

Technical Advisor for Mining Companies

First Tellurium, Vancouver, Canada, 2023-present
Zephyr Minerals, Halifax, Canada, 2018-present
Wildcat Exploration, Winnipeg, Canada, 2012-2015

Scholarships and Academic Awards

2016 Outstanding Achievement in Research, College of Liberal Arts and Sciences, Iowa State University
Mineral “Spryte” ($\text{Ag}_8(\text{As}^{3+}_{0.5}\text{As}^{5+}_{0.5})\text{S}_6$) named in my honor in March 2016 (as cited in Bindi, L., Keutsch, F.N. and Zaccarini, F. (2016) Spryte, IMA 2015-116. CNMNC Newsletter No. 30, April 2016, page 412; *Mineralogical Magazine*, **80**, 407–413).
Thayer Lindsley Visiting Lecturer 2012, Society of Economic Geologists
University of Toronto Bursary, 1983
Ontario Graduate Scholarships, University of Toronto, 1980-1982
H. V. Ellsworth Scholarship, University of Toronto, 1979-1980
Connaught Scholarship, University of Toronto, 1978-1979
George Murray Travel Grant, University of Adelaide, 1978
Commonwealth Postgraduate Research Award, University of Adelaide, 1977-1978
Tate Memorial Medal, University of Adelaide, 1977
James Barrans Scholarship, University of Adelaide, 1976
Utah Development Company Scholarship, University of Adelaide, 1975-1976
Western Mining Corporation Scholarship, University of Adelaide, 1975-1976
Australian Institute Mining and Metallurgy Bursaries, University of Adelaide, 1973-1976
Commonwealth University Scholarship, University of Adelaide, 1973-1975

Professional Affiliations

Society of Economic Geologists (Fellow)
Geological Society of America (Member)
Maine Mineralogical and Geological Society (Member)
Maine Mineral and Gem Museum (Member)

Publications

Books (3)

1. **Spry, P.G.**, Marshall, B., and Vokes, F.M., 2000, Metamorphosed and metamorphogenic ore deposits. *Reviews in Economic Geology*, Volume 11. El-Paso, Economic Geology Publishing Company, 310 p (editor).
2. **Spry, P.G.**, and Bryndzia, L.T., 1990, Regional metamorphism of ore deposits and genetic implications: VSP, Utrecht, The Netherlands, 243 p (editor).
3. **Spry, P.G.**, and Gedlinske, B.L., 1987, Tables for the determination of opaque minerals: Economic Geology Publishing Company, 52 p. (in English and Arabic). Reprinted in English as a CD in 2004.

Book Chapters (6)

1. Corriveau, L., and **Spry, P.G.**, 2014, Metamorphosed hydrothermal ore deposits, *in* Scott, S.D., ed., *Geochemistry of Mineral Resources, Treatise on Geochemistry 2nd Edition*, Elsevier, New York, v. 13, p. 175-194.
2. Lee, H., Cody, R.D., **Spry, P.G.**, and Cody, A.M., 2001, Mechanisms involving expansive mineral growth causing Iowa highway concrete deterioration, *in* Hagni, R.D., ed., *Studies on Ore Deposits, Mineral Economics, and Applied Mineralogy: With Emphasis on Mississippi Valley-Type Base Metal and Carbonatite-Related Ore Deposits*: University of Missouri-Rolla Press, Rolla, p. 384-396.
3. Zhang, X., and **Spry, P.G.**, 1991, Mineralogical and fluid inclusion characteristics of the epithermal Gies gold-silver telluride deposit, Judith Mountains, Fergus County, Montana: A preliminary study, *in* Baker, D.W., and Berg, R.B., eds., *Guidebook of the central Montana alkalic belt*, Montana Bureau of Mines and Geology Special Publication 100, p. 63-76.
4. Ludvigson, G.A., and **Spry, P.G.**, 1990, Tectonics and paleohydrologic significance of carbonate veinlets in the Keweenaw sedimentary rocks of the Amoco M.G. Eischeid #1 drillhole, *in* Anderson, R.R., ed., *The Amoco M.G. Eischeid #1 deep petroleum test, Carroll County, Iowa: Preliminary Investigations*: Iowa Department of Natural Resources, Special Report Series No. 2, p. 153-168.
5. **Spry, P.G.**, 1990, The genetic relationship between coticles and metamorphosed massive sulfide deposits, *in* Spry P.G. and Bryndzia L.T., eds., *Regional metamorphism of ore deposits and genetic implications*, VSP, Utrecht, The Netherlands, p. 49-75.
6. **Spry, P.G.**, and Kutz, K.B., 1988, A fluid inclusion and stable isotope study of minor Upper Mississippi Valley-type sulfide mineralization in Iowa, Wisconsin and Illinois, *in* Ludvigson G.A. and Bunker, B.J., eds., *New perspectives on the Paleozoic history of the Upper Mississippi Valley: An examination of the Plum River Fault Zone*: Iowa Department of Natural Resources, Geological Survey Bureau Guidebook No. 8, p. 145-160.

Refereed Journal Articles (133)

1. Voudouris, P., Alfieris, D., Papavassiliou, K., Schaarschmidt, A., Klemd, R., Melfos, V., Kanellopoulos, C., Mavrogonatos, K., **Spry, P.G.**, Xydous, S., Stouraiti, I., Soukis, K., 2023, Silver mineralogy and physicochemical conditions of formation for the shallow submarine epithermal intermediate-sulfidation mineralization at western Milos Island, Greece. *Geological Magazine*, in review.
2. Voudouris, P., Melfos, V., Melfou, M., Papadopoulou, L., Tarantola, A., Scheffer, C., Vanderhaeghe, O., Reisberg, L., Frenzel, M., Photiadis, A., Mavrogonatos, C., **Spry, P.G.**, Stourairi, C., and Soukis, K., 2023, Re-Os geochronology, mineralogy, and conditions of formation of the potassic and sodic-calcic alteration associated with of the Plaka porphyry Mo system Lavrion, Greece. *Minerals*, in review.
3. **Spry, P.G.**, Berke, E.H., Layton-Matthews, D., Voinot, A., Heimann, A., Teale, G.S., and von der Handt, A. (2023) Amphibole, magnetite, and ilmenite as potential exploration guides to metamorphosed Proterozoic Cu-Zn±Pb±Au±Ag volcanogenic massive sulfide deposits in Colorado. *Mineralogical Magazine*, in press.
4. Berke, E.H., **Spry, P.G.**, Heimann, A., Teale, G.S., Johnson, B., von der Handt, A., Alers, B., and Shallow, J.M., 2023, The genesis of metamorphosed Paleoproterozoic massive sulfide occurrences in central Colorado: geological, mineralogical and sulfur isotope constraints. *Geological Magazine*, <https://doi.org/10.1017/S0016756823000407>.
5. Cawood, T.-K., Rozendaal, A., and **Spry, P.G.**, 2023. Discussion: Syn-metamorphic sulfidation of the Gamsberg zinc deposit, South Africa. *Mineralogy and Petrology*, 10.1007.
6. **Spry, P.G.**, Mathur, R.D., Teale, G.S., and Godfrey, L.V., 2022, Zinc, sulfur and cadmium isotopes

- and Zn/Cd ratios as indicators of the origin of the supergiant Broken Hill Pb-Zn-Ag deposit and other Broken Hill-type deposits, New South Wales, Australia. *Geological Magazine* 159, 1787-1808.
7. Frank, K.S., **Spry, P.G.**, O'Brien, J.J., Koenig, A., Allen, R.L., and Jansson, N.F., 2022. Magnetite as a provenance and exploration tool to metamorphosed base metal sulfide deposits in the Stollberg ore field, Bergslagen, Sweden. *Mineralogical Magazine*, 86, 373-396.
 8. **Spry, P.G.**, McFadden, S., Teale, G.S., Alers, B., Shallow, J.M., and Glenn, J.M., 2022. Nodular sillimanite rocks as field indicators to metamorphosed massive sulfide deposits. *Ore Geology Reviews*, 141, 104632.
 9. Stergiou, C.L., Melfos, V., Voudouris, P., Papadopoulou, L., **Spry, P.G.**, Peytcheva, I., Dimitrova, D., and Stefanova, E., 2022. A fluid inclusion and critical/rare metal study of epithermal quartz-stibnite veins associated with the Gerakario porphyry deposit, northern Greece. *Applied Geoscience*, 12, 909. <https://doi.org/10.3390/app12020909>
 10. Voudouris, P., Repstock, A., **Spry, P.G.**, Frenzel, M., Mavrogonatos, C., Keith, M., Tarantola, A., Melfos, V., Tombros, S., Zhai, D., Cook, N.J., Ciobanu, C.L., Schaarschmidt, A., Rieck, B., Kollitsch, U., and Falkenberg, J., 2022. Physicochemical constraints on indium-, tin-, germanium-, gallium-, gold- and tellurium-bearing mineralizations in the Pefka and St Philippos polymetallic vein- and breccia deposits: new insights into the critical element potential of Greece. *Ore Geology Reviews*, 140, 10438.
 11. **Spry, P.G.**, and Teale, G.S., 2021. A classification of Broken Hill-type deposits: A critical review. *Ore Geology Reviews*, 139, 103935.
 12. Roberts, J.A., Groat, L.A., **Spry, P.G.**, and Cempírek, J., 2021. Telluride mineralogy at the Deer Horn Au-Ag-Te-(Bi-Pb-W) deposit, British Columbia: Implications for the generation of tellurides. *Canadian Mineralogist*, DOI: 10.3749/canmin.1900103, 23 p.
 13. Stergiou, C.L., Melfos, V., Voudouris, P., Papadopoulou, L., **Spry, P.G.**, Peytcheva, I., Dimitrova, D., Stefanova, E., and Giouri, K., 2021. Rare and critical metals in pyrite, chalcopyrite, magnetite, and titanite from the Vathi porphyry Cu-Au±Mo deposit, northern Greece. *Minerals*, 11 (6), 630, DOI: 10.3390/min11060630
 14. Voudouris, P., Melfos, V., Mavrogonatos, C., Photiades, A., Moraiti, E., Rieck, B., Kolitsch, U., Tarantola, A., Scheffer, C., Morin, D., Vanderhaeghe, O., **Spry, P.G.**, Ross, J., Soukis, K., Vaxevanopoulos, M., Zaimis, S., Magganas, A., Kati, M., and Katerinopoulos, A., 2021. The Lavrion mines: a unique site of geological and mineralogical heritage. *Minerals*, 11, 76. <https://doi.org/10.3390/min11010076>, 22 p.
 15. Stergiou, C.L., Melfos, V., Voudouris, P., **Spry, P.G.**, Papadopoulou, L., Chatzipetros, A., Mavrogonatos, C., Filippidis, A., 2021. The geology, geochemistry and origin of the porphyry Cu-Au-(Mo) system at Vathi, Serbo-Macedonian Massif, Greece. *Applied Sciences*, 11, 479, 39 pages.
 16. Kadel-Harder, I.M., **Spry, P.G.**, Layton-Mathews, D., Voinot, A., von der Handt, McCombs, A.L., 2020. Paragenetic relationships between low and high-grade gold mineralization in the Cripple Creek Au-Te deposit, Colorado: trace element studies of pyrite. *Ore Geology Reviews*, 103847, doi.org/10.1016/j.oregeorev.2020.103847, 24 p.
 17. Kadel-Harder, I.M., **Spry, P.G.**, McCombs, A.L., and Zhang, H., 2021, Identifying pathfinder elements for gold in bulk-rock geochemical data from the the Cripple Creek Au-Te deposit, Colorado: A statistical approach. *Geochemistry: Exploration, Environment, Analysis*, 21, 1 geochem2020-048.
 18. Kelley, K.D., **Spry, P.G.**, McLemore, V.T., Fey, D.L., and Anderson, E.D. 2020. Alkalic-type epithermal gold deposit model. U.S. Geological Survey Scientific Investigations Report, 2010-5070-R, 74 p.
 19. Mavrogonatos, C., Voudouris, P., Zaccarini, F., Klemme, S., Berndt, J., Tarantola, A., Melfos, V., and **Spry, P.G.**, 2020, Multi-stage introduction of precious and critical metals in pyrite: A case study from the Kponos Hill and Pagoni Rachi porphyry/epithermal prospects, NE Greece. *Minerals* 10, 784:

- doi103390/min10090784.
20. Melfos, V., Voudouris, P., Melfou, M., Chansez, M., Papadopoulou, L., Filippidis, A., **Spry, P.G.**, Schaarschmidt, A., Klemm, R., Haase, K.M., Tarantola, A., Chelle-Misou, C., Mavrogonatos, C., 2020, Mineralogical constraints of the potassic/sodic-calcic hydrothermal alteration at the porphyry Cu-Mo±Re±Au mineralization in Maronia, NE Greece. *Minerals*, v. 10 (182), doi:10.3390/min10020182.
 21. Mavrogonatos, C., Voudouris, P., Berndt, J., Klemme, S., Zaccarini, F., **Spry, P.G.**, Melfos, V., Tarantola, A., Keith, M., Klemm, R., and Haase, K., 2019, Trace elements in magnetite from the Pagoni Rachi porphyry prospect, NE Greece: Implications for ore genesis and exploration. *Minerals*, v. 9 (12), 725, doi: 10.3390/min9120725.
 22. Conn, C.D., **Spry, P.G.**, Matthews, D.-L., Voinot, A., and Koenig, A., 2019, The effects of amphibolite facies metamorphism on the trace element composition of pyrite and pyrrhotite in the Cambrian Nairne Pyrite Member, Kanmantoo Group, South Australia. *Ore Geology Reviews*, v. 115, 22 p.
 23. Fornadel, A.P., **Spry, P.G.**, Jackson, S.E., 2019, Geological controls on the stable tellurium isotope variation in tellurides and native tellurium from epithermal and orogenic gold deposits: application to the Emperor gold-telluride deposit, Fiji. *Ore Geology Reviews*, v. 113, 9 p.
 24. Voudouris, P., Melfos, V., Mavrogonatos, C., **Spry, P.G.**, Alfieris, D., Periferakis, A., Kolodziejczyk, J., Maggans, A., and Soukis, K., 2019, The geology and mineralogy of the Stypsi porphyry Cu-Mo±Au deposit, Lesbos Island, Aegean Sea, Greece. *Ore Geology Reviews*, v. 112, <https://doi.org/10.1016/j.oregeorev.2019.103023>, 26 p.
 25. Scheffer, C., Tarantola, A., Vanderhaeghe, O., Voudouris, P., Rigaudier, T., **Spry, P.G.**, and Photiades, A., 2019, Magmatic to meteoric fluid reservoirs during exhumation of the Cyclades: the Lavrion Pb-Zn-Fe-Cu-Ag district (Attica, Greece). *Economic Geology*, v. 114, p. 1415-1442.
 26. Frank, K.S., **Spry, P.G.**, Raat, H., Allen, R.L., Jansson, N.F., and Ripa, M., 2019, Variability in the geological, mineralogical, and geochemical characteristics of base metal sulfide deposits in the Stollberg ore field, Bergslagen, Sweden: *Economic Geology*, v. 114, p. 473-452.
 27. Li, H.-Z., Liang, J., Zhai, M.-G., Zhang, L.-C., Voudouris, P.C., Yang, Z.-J., Zhou, Y.-Z., He, J.-G., and **Spry, P.G.**, 2019, The mineralogy, mineral chemistry, and origin of the Wuyang banded iron formations, North China Craton. *Precambrian Research*, v. 328, p. 111-128.
 28. Voudouris, P., Mavrogonatos, C., **Spry, P.G.**, Melfos, V., Klemm, R., Haase, K., Repstock, A., Djiba, A., Bismayer, U., Tarantola, A., Scheffer, C., Moritz, R., Kouzmanov, K., Alfieris, D., Schaarschmidt, A., Galanopoulos, E., Galanos, E., Kolodziejczyk, J., Papavassiliou, K., Stergiou, C., Melfou, M., 2019, Porphyry and epithermal deposits in Greece: an overview, new discoveries, and mineralogical constraints on their genesis. *Ore Geology Reviews*, v. 107, p. 654-691.
 29. Tott, K.A., **Spry, P.G.**, Pollock, M.V., Koenig, A., Both, R.A., and Ogierman, J.A., 2019, Ferromagnesian silicates and oxides as vectors to metamorphosed sediment-hosted Pb-Zn-Ag-(Cu-Au) deposits in the Cambrian Kanmantoo Group, South Australia. *Journal of Geochemical Exploration*, v. 200, p. 112-138.
 30. Forsythe, N.A., **Spry, P.G.**, and Thompson, M.L., 2019, Petrological and mineralogical aspects of epithermal low-sulfidation Au- and porphyry Cu-style mineralization, Navilawa caldera, Fiji. *Geosciences*, v. 9, (42); doi:10.3390/geosciences9010042.
 31. Galanopoulos, E., Voudouris, P., Mavrogonatos, C., **Spry, P.G.**, Hart, C., Melfos, V., Zaccarini, F., and Alfieris, D., 2018, A new porphyry Mo mineralization at Aisymi-Leptokarya, south-eastern Rhodope, north-east Greece: Geological and mineralogical constraints. *Geosciences*, v. 8 (435); doi:10.3390/geosciences8120435.
 32. Voudouris, P., Mavrogonatos, C., Rieck, B., Kolitsch, U., Scheffer, C., Tarantola, A., **Spry, P.G.**, Galanos, E., Melfos, V., Zaimis, S., Soukis, K., and Galanopoulos, E., 2018. The gersdorffite-

- bismuthinite-native gold association and a new skarn-porphyry style mineralization at Kamariza mining district, Lavrion, Greece. *Minerals*, v. 8 (531); doi:10.3390/min1810531.
33. Mavrogonatos, C., Voudouris, P., **Spry, P.G.**, Melfos, V., Klemme, S., Berndt, J., Baker T., Moritz, R., Bissig, T., Monecke, T., Zaccarini, F., Galanopoulos, E., and Kanellopoulos, C., 2018, Mineralogical study of advanced-argillic alteration assemblages from the Konos Hill Mo-Re-Cu-Au porphyry system, NE Greece. *Minerals*, v. 8 (479), 1-18; doi:10.3390/min8110479.
 34. Pollock, M.V., **Spry, P.G.**, Tott, K.A., Koenig, A., Both, R.A., and Ogierman, J.A., 2018, The origin of the sediment-hosted Kanmantoo Cu-Au deposit, South Australia: Mineralogical considerations. *Ore Geology Reviews*, v. 95, p. 94-117.
 35. Jansson, N.F., Sädbom, S., Allen, R.L., Billström, K., and **Spry, P.G.**, 2018, The Lovisa stratiform Zn-Pb deposit, Bergslagen, Sweden – Structure, stratigraphy and ore genesis: *Economic Geology*, v. 113, p. 699-739.
 36. Saintilan, N.J., Creaser, R.A., **Spry, P.G.**, and Hnatysin, D., 2017, Re-Os systematics of löllingite and arsenopyrite in granulite facies garnet rocks: Insights into the thermal evolution of the Broken Hill block during the Early Mesoproterozoic (New South Wales, Australia). *Canadian Mineralogist*, v. 55, p. 29-44.
 37. Fornadel, A.P., **Spry, P.G.**, Schauble, E.A., Hagneghadar, M.A., Jackson, S.E., and Mills, S.J., 2017, Theoretical and measured stable Te isotope fractionation in tellurium-bearing minerals in precious metal hydrothermal ore deposits. *Geochimica et Cosmochimica Acta*, v. 202, p. 215-230.
 38. Kelley, K.D., and **Spry, P.G.**, 2016, Critical metals associated with alkaline-rock related epithermal gold deposits. *Reviews in Economic Geology*, v. 18, 195-216.
 39. O'Brien, J.J., **Spry, P.G.**, Teale, G.S., Jackson, S.E., and Koenig, A.E., 2015, Gahnite composition as a means to fingerprint metamorphosed base metal deposits. *Journal of Geochemical Exploration*, v. 159, p. 48-61.
 40. Bindi, L., Stanley, C.J., and **Spry, P.G.**, 2015, New structural data reveal benleonardite as a member of the pearceite-polybasite group. *Mineralogical Magazine*, v. 79, p. 1217-1227.
 41. Bindi, L., Stanley, C.J., and **Spry, P.G.**, 2015, Cerveleite, Ag₄TeS: solution and description of the crystal structure. *Mineralogy and Petrology*, v. 109, p. 413-419.
 42. Steadman, J.A., and **Spry, P.G.**, 2015, Metamorphosed Proterozoic Zn-Pb-Ag mineralization in the Foster River area, northern Saskatchewan, Canada. *Economic Geology*, v. 110, p. 1193-1214.
 43. O'Brien, J.J., **Spry, P.G.**, Teale, G.S., Jackson, S.E., and Rogers, D., 2015, Major and trace element chemistry of gahnite as an exploration guide to Broken Hill-type Pb-Zn-Ag mineralization in the Broken Hill domain, New South Wales, Australia. *Economic Geology*, v. 110, p. 1027-1057.
 44. O'Brien, J.J., **Spry, P.G.**, Nettleton, D., Ruo, X., Teale, G.S., Jackson, S.E., and Rogers, D., 2015, Random forests as a statistical method for distinguishing gahnite compositions as an exploration guide to Broken Hill-type Pb-Zn-Ag deposits in the Broken Hill domain, Australia. *Journal of Geochemical Exploration*, v. 149, p. 74-86.
 45. Bristol, S.K., **Spry, P.G.**, Voudouris, P., Melfos, V., Mathur, R.D., Fornadel, A.P., Sakellaris, G.-A. 2015, Geochemical and geochronological constraints on the formation of shear-zone hosted Cu-Au-Bi-Te mineralization in the Stanos area, Chalkidiki, northern Greece. *Ore Geology Reviews*, v. 66, p. 266-282.
 46. **Spry, P.G.**, Mathur, R.D., Bonsall, T.A., Voudouris, P., C., and Melfos, V., 2014, Re-Os evidence for mixed source components in carbonate-replacement Pb-Zn-Ag deposits in the Lavrion district, Attica, Greece. *Mineralogy and Petrology*, v. 108, p. 503-513.
 47. Bindi, L., Bonazzi, P., Zoppi, M., and **Spry, P.G.**, 2014, Chemical variability in wakabayashilite: a real feature or an analytical artifact? *Mineralogical Magazine*, v. 78, p. 693-702.
 48. Fornadel, A.P., **Spry, P.G.**, Mathur, R.D., Jackson, S.E., Chapman, J.B., and Girard, I., 2014, Methods for the determination of Te isotopes of minerals in the system Au-Ag-Te by MC-ICP-MS. *Journal of*

- Analytical and Atomic Spectroscopy, v. 29, p. 623-647.
49. Grundler, P.V., Brugger, J., Etschmann, B., Helm, L., Liu, W., **Spry, P.G.**, Tian, Y., Testemale, D., and Pring, A., 2013, Speciation of aqueous tellurium (IV) in hydrothermal solutions and vapors and the role of oxidized tellurium species in gold metallogenesis. *Geochimica et Cosmochimica Acta*, v. 120, p. 298-325.
 50. Heimann, A., **Spry, P.G.**, Teale, G.S., Leyh, W. R., Conor, C.H.H., Mora, G., and O'Brien, J.J. 2013, Geochemistry and genesis of low-grade metasediment-hosted Zn-Pb-Ag mineralization, southern Proterozoic Curnamona Province, Australia. *Journal of Geochemical Exploration*, v. 128, p. 97-116.
 51. Alfieris, D., Voudouris, P., and **Spry, P.G.**, 2013, High-intermediate sulfidation epithermal Pb-Zn-Cu-Au-Ag-Te mineralization at western Milos island, Greece: Mineralogical and geological constraints on ore formation in a shallow submarine setting. *Ore Geology Reviews*, v. 53, p. 159-180.
 52. Voudouris, P., Melfos, V., **Spry, P. G.**, Bindi, L., Moritz, R., Ortelli, M., and Kartal, T., 2013, Extremely Re-rich molybdenite from porphyry Cu-Au and Mo-Au deposits in northeastern Greece: mode of occurrence, causes of enrichment, and implications for gold exploration. *Minerals*, v. 3, p. 165-191.
 53. Voudouris, P., Melfos, V., **Spry, P. G.**, Kartal, T., Schleicher, Arikas, K., Moritz, R., and Ortelli, M., 2013, The Pagoni Rachi-Kirki Mo-Re-Cu-Au-Ag-Te deposit, northern Greece: Mineralogical and fluid inclusion constraints on the evolution of a telescoped porphyry-epithermal system. *Canadian Mineralogist*, v. 51, p. 253-284.
 54. Voudouris, P., **Spry, P.G.**, Sakellaris, G.-A., Mavrogonatos, C.G., Bristol, S., Melfos, V., and Fornadel, A.P., 2013, Bismuthinite derivatives, lillianite homologues and bismuth sulfotellurides as indicators for gold mineralization at the Stanos shear-zone-related prospect, Chalkidiki, northern Greece. *Canadian Mineralogist*, v. 51, 119-142.
 55. Bindi, L., **Spry, P.G.**, Bonazzi, P., Makovicky, E., Balić-Žunić, T., 2013, Quadrantite, AgCdAsS_3 : Chemical composition, crystal structure and OD character. *American Mineralogist*, v. 77, p. 242-247.
 56. Bindi, L., Voudouris, P. Ch., **Spry, P.G.**, and Menchetti, S., 2013, Structural role of tellurium in the minerals of the pearceite-polybasite group. *Mineralogical Magazine*, v. 77, p. 419-428.
 57. Fornadel, A.P., Voudouris, P. Ch., **Spry, P.G.**, Melfos, V., 2012, Mineralogical, stable isotope, and fluid inclusion studies of spatially related porphyry Cu-Mo and epithermal Au-Te mineralization, Fakos Peninsula, Limnos Island, Greece. *Mineralogy and Petrology*, v. 102, p. 85-111.
 58. Bindi, R.T., Downs, R.T., **Spry, P.G.**, Pinch, W.W., and Menchetti, S., 2012, A chemical and structural re-examination of fettelite samples from the type locality, Odenwald, south-western Germany. *Mineralogical Magazine*, v. 76, p. 551-566.
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149. McGowan, K.I., and **Spry, P.G.**, 1990, Rare earth element constraints on the evolution of the southern end of the Wind River greenstone belt: *Journal of the Iowa Academy of Science*, v. 97, p. A33.
150. Fuhrmann, G.D., and **Spry, P.G.**, 1990, A regional fluid inclusion study of the Illinois-Kentucky fluorspar district: *Journal of the Iowa Academy of Science*, v. 97, p. A34.
151. Jones, H.D., **Spry, P.G.**, and Richardson, C.K., 1990, Stable isotope systematics of the Illinois-Kentucky fluorspar district: *Geological Society of America Abstracts with Programs*, v. 23, p. A222.
152. **Spry, P.G.**, McGowan, K.I., and Liu, P., 1990, A fluid inclusion and stable isotope study of Archean lode gold mineralization in the Wyoming Province, U.S.A.: 8th Symposium International Association on the Geology of Ore Deposits, Ottawa, Canada. Program with Abstracts, p. A86-87.
153. **Spry, P.G.**, and McGowan, K.I., 1989, The origin of Archean lode gold mineralization at Atlantic City-South Pass, Wyoming, U.S.A.: A fluid inclusion and stable isotope study: 28th International Geological Congress Abstracts, Washington D.C., v. 3, p. 163.
154. McGowan, K.I., and **Spry, P.G.**, 1989, Basinal brine fluid source for Archean lode gold deposits, Atlantic City-South Pass district, Wyoming: *Iowa Academy of Science Program Abstracts*, v. 96, p. A23.
155. **Spry, P.G.**, 1989, Coticules and their genetic relationship to metamorphosed base metal sulfide deposits: *Geological Society of America Abstracts with Programs*, v. 22, p. A149.
156. **Spry, P.G.**, 1988, The geochemistry of manganese-rich garnet-bearing rocks associated with the Aggeneys Cu-Pb-Zn-Ag-Au deposits, Namaqualand, South Africa: *Iowa Academy of Science Program Abstracts*, v. 95, p. A40.
157. McGowan, K.I., and **Spry, P.G.**, 1988, Geological setting of Archean lode gold deposits of the Atlantic City-South Pass district, Wind River Range, Wyoming: *Geological Society of America Abstracts with Programs*, v. 20, no. 3, p. 213.
158. McGowan, K.I., and **Spry, P.G.**, 1988, Regional geology of Archean lode gold deposits, Atlantic City-South Pass district, Wyoming: *Iowa Academy of Science Program Abstracts*, v. 95, p. A40.
159. Kutz, B.L., and **Spry, P.G.**, 1988, The geology and geochemistry of barite vein deposits, northern Ontario, Canada: *Iowa Academy of Science Program Abstracts*, v. 95, p. A40.
160. **Spry, P.G.**, 1988, Manganese anomalies as a guide in the exploration for metamorphosed massive sulfide deposits: the Aggeneys example: *Geological Society of America Abstracts with programs*, v. 21, p. A300.
161. Troop, D.G., and **Spry, P.G.**, 1988, Systematics of an Archean lode gold deposit: the Ross mine, Abitibi greenstone belt, Ontario, Canada: *Geological Society of America Abstracts with Programs*, v. 21, p. A301.
162. **Spry, P.G.**, and Petersen, E.U., 1987, Zincian h gbomite and its potential as an exploration guide for metamorphosed massive sulfide deposits: *Geological Society of America Abstracts with Programs*, v. 19, p. 247.

163. **Spry, P.G.**, Schiller, J.C., and Both, R.A., 1987, Structure and metamorphic setting of base metal mineralization in the Kanmantoo Group, South Australia: Geological Society America of Abstracts with Programs, v. 19, p. 247.
164. Wonder, J.D., **Spry, P.G.**, and Windom, K.E., 1987, The genetic relationship of cotecule, banded iron formation, and tourmalinite to metamorphosed massive sulfide and gold deposits, western Georgia piedmont: Geological Society of America Abstracts with Programs, v. 19, p. 253.
165. **Spry, P.G.**, 1987, Zincian spinel and its association to metamorphosed massive sulphide deposits: Ore Deposits in Metamorphosed Terrains Conference, Montreal, Canada, Abstracts, p. 6-7.
166. Kutz, K.B., and **Spry, P.G.**, 1987, Geochemical aspects of outlying Upper Mississippi Valley (UMV)-type mineralization in Iowa, Illinois and Wisconsin: Iowa Academy of Science Program Abstracts, v. 94, no. 139.
167. Koellner, M.S., **Spry, P.G.**, and Richardson, C.K., 1987, Chemical and thermal changes in the ore fluid during deposition at the Denton mine, Cave-in-Rock fluorspar district, Illinois: Geological Society of America Abstracts with Programs, v. 20, p. 371.
168. Kutz, K.B., and **Spry, P.G.**, 1987, A stable isotope and fluid inclusion study of Upper Mississippi Valley (UMV)-type base metal occurrences: Geological Society of America Abstracts with Programs, v. 20, p. 736.
169. **Spry, P.G.**, 1986, Geological, fluid inclusion, and sulfur isotopic studies of Au-Ag-Pb-Zn-Cu breccia pipe deposits, Central City, Colorado: Geological Society of America Abstracts with Programs, v. 18, no. 6, p. 325.
170. **Spry, P.G.**, 1986, A sulfur isotopic study of the Broken Hill Pb-Zn-Ag deposit, New South Wales, Australia: Geological Society of America Abstracts with Programs, v. 18, p. 325.
171. **Spry, P.G.**, 1986, Compositional zoning in zincian spinels. Geological Society of America Abstracts with Programs, v. 18, p. 325.
172. **Spry, P.G.**, 1986, The composition of zincian spinel as a guide to metamorphosed ore deposits: the Aggeneys example, Namaqualand, South Africa: Geological Society of America Abstracts with Programs, v. 18, p. 760.
173. Wonder, J.D., and **Spry, P.G.**, 1986, Fractionation of iron and manganese during the formation of submarine exhalative massive sulfide deposits: Geological Society of America Abstracts with Programs, v. 18, p. 794.
174. Scott, S.D., and **Spry, P.G.**, 1984, Zincian spinels in Proterozoic metamorphosed massive sulphide deposits: Middle to Late Proterozoic Lithosphere Evolution Conference, Cape Town, South Africa, Abstracts, p. 55.
175. Scott, S.D., and **Spry, P.G.**, 1984, Petrography, metamorphism and origin of Broken Hill, Australia: a comparison with "Aggeneys-type" ore deposits: Middle to Late Proterozoic Lithosphere Evolution Conference, Cape Town, South Africa, Abstracts, p. 59.
176. **Spry, P.G.**, and Scott, S.D., 1983, The stability of zincian spinels in metamorphosed massive sulfide deposits. Geological Society of America Abstracts with Programs, v. 15, no. 6, p. 694.
177. **Spry, P.G.**, and Scott, S.D., 1983, Zincian spinels in the Appalachian-Caledonide orogen. International Geological Correlation Program, Project 60, Correlation of Caledonian Stratabound Sulphides, Ottawa, Canada, Programme and Abstracts, p. 26.
178. Scott, S.D., **Spry, P.G.**, and Hutchison, M.N., 1983, Petrography and metamorphic history of the Broken Hill orebody, New South Wales, Australia. 112th American Institute of Mining Engineers, Program with Abstracts, p. 19.
179. **Spry, P.G.**, and Scott, S.D., 1982, Zincian spinels as guides to metamorphosed massive sulfide deposits: Geological Association of Canada/Mineralogical Association of Canada Programme with Abstracts, v. 7, p. 72.
180. **Spry, P.G.**, and Both, R.A., 1980, The origin of garnet-rich rocks associated with the Broken Hill

orebody: 4th Australian Geological Convention Abstracts, Hobart, p. 47.

181. **Spry, P.G.**, 1979, Manganese anomalies associated with volcanic exhalative sulfide deposits: the Broken Hill example: Geological Association of Canada/Mineralogical Association of Canada Programme with Abstracts, v. 4, p. 80.

Short Courses/Workshop Presentations (9)

Tellurium mineralization in Fiji

Tellurium and selenium: Geological concentration, industrial recovery and future supplies. Conference, Keystone, Colorado, September 21, 2018

Applications of tellurium isotopes

Tellurium and selenium: Geological concentration, industrial recovery and future supplies. Conference, Keystone, Colorado, September 21, 2018

Metamorphism of massive sulfide deposits

2018 Australian Institute of Geoscientists (South Australian Branch), Adelaide, Australia (April 5-6, 2018)

Trace element chemistry of indicator silicates and oxides as vectors to metamorphosed sediment-hosted Pb-Zn-Ag and Cu-Au deposits in the Cambrian Kanmantoo Group, South Australia.

Exploration '17, Workshop 5: Application of Indicator Mineral methods to Bedrock and Sediments, Toronto, October 22, 2017.

Metamorphism of massive sulfide deposits

2013 Australian Institute of Geoscientists (South Australian Branch), Adelaide, Australia (November 14, 2013)

Major and trace element compositions of gahnite in metamorphosed massive sulfide deposits:

Discrimination diagrams to determine provenance

2013 International Association of Applied Geochemists: Workshop SC07, Application of indicator minerals to mineral exploration, Rotorua, New Zealand (November 17, 2013)

Geology and geochemistry of hydrothermal ore deposits

Course to Ph.D. students and research faculty in the Dipartimento per lo Studio del Territorio e delle sue Risorse, Università degli Studi di Genova, Facoltà di Scienze Matematiche Fisiche e Naturali; 18 hour course (March-April, 2012)

Broken Hill-type deposits

Modular Short Course 2011 Hydrothermal Ore Deposits: Ores in Sediments, University of Ottawa and the Mineral Exploration Research Centre at Laurentian University, University of Ottawa (February, 2011)

Gahnite composition as a guide in the search for metamorphosed massive sulfide deposits.

2009 International Association of Applied Geochemists: Indicator Mineral Workshop B, Fredericton, New Brunswick (May 2009)

Invited Seminars (79)

The geology and origin of the Broken Hill Pb-Zn-Ag deposit, New South Wales, Australia

Impact Minerals, Australia, April 19, 2023.

Geology and mineralogy of the Proterozoic Dawson-El Plomo-Green Mountain deposits, central Colorado.

Denver Regional Exploration Geologists' Society (DREGS), December 6, 2021.

Application of SEM, EMPA, and LA-ICP-MS techniques in exploring for gold and metamorphosed massive sulfide deposits

School of Geography, Geology, and the Environment, Keele University, UK, March 14, 2019.

Mineralogical anomalies as guides in exploring for metamorphosed massive sulfide deposits.

Department of Geology (Society of Economic Geology Student Chapter), University of Leicester, UK, February 4, 2019

The connection between Au and Te in gold-telluride deposits.

School of Geography, Geology, and the Environment, Keele University, UK, January 20, 2019.

The trace element composition of silicates and oxides as guides in the exploration for metamorphosed massive sulfide deposits

Department of Earth and Environmental Sciences, University of Illinois-Chicago (October 1, 2015)

Department of Earth Sciences, University of Adelaide, Adelaide, South Australia (April 4, 2018)

The composition of silicates and oxides as guides in the exploration for metamorphosed massive sulfide deposits: Implications for base metal sulfide occurrences in the Kanmantoo Group, South Australia

Geological Survey of South Australia, Adelaide, Australia (July 28, 2015)

Gahnite chemistry as an exploration guide to metamorphosed massive sulfide deposits.

Australian Institute of Geoscientists - South Australian Branch, Adelaide, Australia (November 12, 2013)

The geology, geochemistry, and mineralogy of the Stollberg ore field

Boliden Minerals AB, Garpenberg, Sweden (July, 12 and 16, 2013)

The connection between Au and Te in hydrothermal gold telluride deposits

Department of Geosciences, Northern Illinois University (November 11, 2017)

Department of Earth and Ocean Sciences, University of British Columbia (January 25, 2013)

Department of Geosciences, University of Arizona (January 7, 2013)

Department of Geological Sciences, East Carolina University (September 28, 2012)

Department of Mineralogy, Petrology and Economic Geology, Aristotle University of Thessaloniki, Greece (May 10, 2012)

Department of Mineralogy-Petrology, University of Athens, Greece (May 8, 2012)

Swiss Institute of Technology – ETH, Switzerland (April 28, 2012)

Département de Minéralogie, Université de Genève, Switzerland (March 29, 2012)

Montanuniversität, Leoben, Austria (March 27, 2012)

Stockholm University, Sweden (March 23, 2012)

The utilization of mineralogical anomalies in the exploration for metamorphosed massive sulfide deposits

Department of Earth and Ocean Sciences, University of British Columbia (January 25, 2013)

Department of Earth Sciences, Memorial University of Newfoundland, Canada (October 5, 2012)

Department of Botany, Ecology and Geology, University of Sassari, Italy (June 19, 2012)

Department of Mineralogy-Petrology, University of Athens, Greece (May 8, 2012)

Montanuniversität, Leoben, Austria (March 26, 2012)

Uppsala University/Swedish Geological Survey (March 22, 2012)

Boliden Minerals AB, Garpenberg, Sweden (March 20, 2012)

The Stanos Au-Cu-Bi-Te deposit, northern Greece

Eldorado Gold Corporation, Vancouver, British Columbia, Canada (January 25, 2013)

Broken Hill-type Pb-Zn-Ag deposits: genesis and classification

Arizona Geological Society, Tucson, Arizona (January 7, 2013)

Department of Earth Sciences, Memorial University of Newfoundland, Canada (October 4, 2012)

Department of Mineralogy, Petrology and Economic Geology, Aristotle University of Thessaloniki, Greece (May 10, 2012)

Département de Minéralogie, Université de Genève, Switzerland (March 28, 2012)
The chemistry of gold and tellurium and the formation of gold-telluride deposits
University of Iowa (December, 2011)
The genetic relationship of aluminous minerals to Proterozoic Cu-Zn deposits, Colorado, and their potential as exploration guides to ore.
Department of Geology and Geological Engineering, Colorado School of Mines (March, 2010)
The effects of metamorphism on the supergiant Broken Hill Pb-Zn-Ag deposit, Australia: Has the orebody partially melted?
Department of Geology and Geological Engineering, Colorado School of Mines (March, 2010)
Department of Geosciences, University of Wisconsin-Oshkosh (October, 2008)
Department of Geology and Geography, Northwestern Missouri State University (September, 2008)
Broken Hill-type deposits: Are they sedimentary exhalative deposits or a separate class of metamorphosed ore deposit?
Department of Geological Sciences, University of Minnesota-Duluth (November, 2010)
The geology, mineralogy, and origin of the giant Broken Hill Pb-Zn-Ag deposit, Australia: The largest base metal sulfide deposit on Earth
Central Iowa Mineralogical Society, Drake University, Iowa (November 2010)
The geology and geochemistry of base metal mineralization in the Foster River area, northern Saskatchewan.
Wildcat Exploration Annual General Meeting and Special Meeting, Winnipeg, Manitoba (September 21, 2007)
The Foster River Pb-Zn occurrence, northern Saskatchewan: Is it a Broken Hill-type deposit?
Prospectors and Developers Association of Canada Convention, Toronto, Canada (four presentations given on behalf of Wildcat Exploration Limited) (March, 2007)
Garnet-rich rocks and their genetic relationship to the Broken Hill lead-zinc-silver deposit, New South Wales, Australia.
Primary Industries and Resources South Australia, Adelaide, Australia (June, 2004)
Gahnite as an exploration guide in the Curnamona Province, Australia
Primary Industries and Resources South Australia, Adelaide, Australia (June, 2004)
The origin of alkaline igneous rock related gold-silver telluride deposits
Department of Geology, Cukurova University, Adana, Turkey (October, 2003)
General Directorate of Mineral Research and Exploration, Ankara, Turkey (September, 2003)
Anglogold Corporation, Cripple Creek & Victor Company, Cripple Creek, Colorado (September, 2002)
Department of Earth and Atmospheric Sciences, University of Alberta, Canada (March, 2002)
Unusual rock types as guides to metamorphosed massive sulfide deposits
Department of Geology, Cukurova University, Adana, Turkey (October, 2003)
General Directorate of Mineral Research and Exploration, Ankara, Turkey (September, 2003)
Department of Earth and Atmospheric Sciences, University of Alberta, Canada (March, 2002)
The effects of deicing salts and anti-icing agents on the deterioration of Iowa highway concretes
Deicing Salt Technical Panel of State Departments of Transportation, Sioux Falls, South Dakota (April, 2002)
Gold-silver telluride deposits - Where they form and why they form
Doe Run Mining Company, Viburnum, Missouri (September, 2001)
The origin of alkalic igneous rock-related gold-silver telluride deposits: the Golden Sunlight example, Montana
Department of Geology, University of Iowa, U.S.A. (October, 2000)
Department of Geology and Geophysics, University of Adelaide, Australia (December, 1999)

- The geology and geochemistry of alkaline igneous rock-related epithermal gold-silver telluride mineralization of Montana
 Department of Geology, Utah State University, U.S.A. (December, 1999)
 University of Adelaide, South Australia, Australia (May, 1999)
 Emperor Gold Mining Company, Vatukoula, Fiji (June, 1998)
 Department of Geology, Gustavus Adolphus University, Minnesota, U.S.A. (November, 1996)
 Stoudt Lecture Series, Department of Geology, University of Nebraska, U.S.A. (April, 1996)
- The spatial distribution of tellurides in the Emperor gold-telluride deposit, Fiji
 Emperor Gold Mining Company, Vatukoula, Fiji (May, 1999)
- The origin of epigenetic Precambrian gold deposits of the Wyoming Province, U.S.A.
 Rea Gold Mining Company, Minas de Coralles, Uruguay (February, 1997)
- The fate of gold in concentrate from the Golden Sunlight deposit, Whitehall, Montana
 Golden Sunlight Mines, Inc. (Placer Dome, U.S.A.), Whitehall, Montana (July 1996)
- Techniques used to identify opaque minerals with a reflected light microscope
 Department of Geology, Gustavus Adolphus University, Minnesota, U.S.A. (November, 1996)
- The mineralogy and geology of the Tri-State Mississippi Valley-type deposits
 Oppold Lecture Series, Brunner Gallery, Iowa State University (April, 1992)
- Mineralogical and fluid inclusion characteristics of the epithermal Gies gold-silver telluride deposit, Judith Mountains, Montana
 Tobacco Root Geological Society, Great Falls, Montana, U.S.A. (August, 1991)
- The origin of Archean lode gold deposits
 Department of Geology, Cornell College, U.S.A. (February, 1991)
- Archean lode gold mineralization in the Wyoming Province, U.S.A.
 Department of Geology and Geophysics, University of Minnesota-Minneapolis (November, 1990)
 Department of Geology, University of Missouri-Columbia (April, 1983)
- The origin and exploration significance of manganese anomalies to metamorphosed massive sulfide deposits
 Department of Geology and Geophysics, University of Minnesota-Minneapolis, U.S.A. (November, 1990)
 Department of Geology and Meteoritics, University of New Mexico, U.S.A (September, 1990)
 Department of Geology, University of Queensland, Australia (December, 1989)
 Department of Geology, University of Northern Illinois, U.S.A. (September, 1989)
 Department of Geology, University of Iowa, U.S.A. (Feb., 1989)
- Zincian spinels in metamorphosed massive sulfide deposits
 Graduate College, City University of New York, U.S.A. (March, 1986)
- A sulfur isotope study of base metal mineralization in the Kanmantoo Group, South Australia
 Department of Geology, Queens College, City University of New York, U.S.A. (March, 1986)
- The geology and geochemistry of the Broken Hill orebody, Australia
 Department of Geology, University of Iowa, U.S.A. (October, 1984)
 Department of Geology, University of Ottawa, Canada (April, 1983)
 Department of Earth Sciences, Iowa State University, U.S.A (April, 1983)
- The origin of garnet-rich rocks associated with the Broken Hill deposit, Australia
 Toronto Geological Discussion Group, Engineers Club, Toronto, Canada (April, 1983)
 Department of Geology, University of New South Wales, Broken Hill, Australia (September, 1978)
- Zincian spinels as guides to metamorphosed massive sulfide deposits
 Department of Earth Sciences, Iowa State University, U.S.A. (April, 1983)
- Manganese anomalies associated with volcanic exhalative sulfide deposits: the Broken Hill example
 Department of Geology, University of Western Ontario, Canada (March, 1979)

Teaching Experience

University of Adelaide (1977-1978)

Teaching assistant for first year petrology and third year ore microscopy laboratory classes

University of Toronto (1979-1982)

Teaching assistant for first year petrology, second year crystallography, and second year transmitted light microscopy classes. Continued participation in the internationally known University of Toronto Ore Deposits Workshop. Subject matter Cu-Pb-Zn-Ag-Au (massive sulfide) deposits

Iowa State University (1983-present)

Undergraduate and graduate teaching (see courses given at Iowa State University listed below)

Undergraduate

GEOL 105 Gems and Gemstones (1 credit)

GEOL 311 Mineralogy and Earth Materials (5 credits)

GEOL 316 Optical Mineralogy (2 credits)

GEOL 302 Summer Field Studies, Iowa State University Field Camp, Shell, Wyoming (8 credits)

GEOL 324 Energy and the Environment (3 credits)

GEOL 365 Igneous and Metamorphic Petrology (3 credits)

GEOL 420 Minerals Resources (3 credits)

GEOL 481 Earth Resources (3 credits)

Graduate (M.S. and Ph.D. level)

GEOL 505 Geology of Mineral Resources (3 credits)

GEOL 506 Geology Field Trip (2 credits)

GEOL 507 Midwestern Geology Field Trip (1 credit)

GEOL 579 Metallic Mineral Deposits (3 credits)

GEOL 520 Minerals Resources (3 credits)

GEOL 581 Earth Resources and the Environment (3 credits)

GEOL 582 Economic Geology (3 credits)

GEOL 587 Mineral Equilibria (3 credits)

GEOL 589 Geochemistry of Ore Deposits (3 credits)

GEOL 490 Independent Study; GEOL 590 Special Topics in Economic Geology (1-3 credits)

Undergraduate and Graduate Student Advising

While at Iowa State University, I have been advisor to approximately 100 undergraduate students and have served (or currently serving) as major professor to 33 graduate students (six Ph. D. and twenty seven M.S.). Most graduate students were Iowa State Mining and Mineral Resources Research Institute Research Assistants that have obtained the Mineral Resources minor (except for Jones and Rosenberg who was supported by NSF). The titles of completed and ongoing research projects are listed:

1. Edward Berke – Geology, mineralogy and geochemistry of the Dawson gold and base metal sulfide deposit, Cañon City, Colorado. M.S. Graduated December 2022.
2. Irene Kadel-Harder - Mineralogical and geochemical studies of the Wild Horse Extension pit, Schist Hill, and the Globe Hill area, Cripple Creek Au-Te deposit, Victor, Colorado. M.S. Graduated, May, 2020.
3. Dakota Conn – The regional Cambrian Nairne Pyrite Horizon as a potential source of metals for metamorphosed base sulfide deposits in the Kanmantoo group, South Australia. M.S. Graduated December, 2018.
4. Katherine Tott - The use of mineralogical anomalies as exploration guides to stratiform Pb-Zn-Ag mineralization in the Kanmantoo Group, South Australia. M.S. Graduated, April, 2018.
5. Meaghan MacPherson - The mineralogy and origin of the Kanmantoo Cu deposit, South Australia. Graduated with M.S. degree in 2017.
6. Josh O'Brien - The major and trace element composition of gahnite in the Broken Hill area, New South Wales, Australia, and its use as an exploration fingerprint for metamorphosed massive sulfide deposits. Graduated with Ph.D. degree in 2016.
7. Katherine Frank – The geology and genesis of the Stollberg Cu-Pb-Zn-Au-Ag volcanogenic massive sulfide deposit, Bergslagen district, Sweden. Graduated with M.S. degree in 2015.
8. Andrew Fornadel - Stable tellurium isotopes of gold-silver telluride deposits: A theoretical and experimental approach. Graduated with Ph.D. degree in 2014.
9. Samantha Bristol – Geology and geochemistry of the shear-hosted Stanos Cu-Bi-Au deposit, northern Greece. Graduated with M.S. degree in 2014.
10. Jeff Steadman – Origin of the metamorphosed Proterozoic Foster River Zn-Pb deposit, northern Saskatchewan. Graduated with M.S. degree in 2010.
11. Andrew Fornadel - The geology of magmatic-hydrothermal precious and base metal deposits (Pefka Kavala bismuth-telluride deposit, Kavala, and Fakos porphyry-epithermal system, Limnos Island), northern Greece. Graduated with M.S. degree in 2010.
12. Rory Martin - Carbonates of Iowa. Graduated with M.S. degree in 2009.
13. Todd Bonsall - Fluid inclusion and geochemistry of the Lavrion silver district, Greece. Graduated with M.S. degree in 2007.
14. Adriana Heimann - The genesis of garnet- and gahnite-rich rocks in the Olary Domain, Curnamona Province, South Australia. Graduated with Ph.D. in 2006.
15. Patrick Hook - Experimental studies of organic inhibitors on the growth of delayed ettringite in Iowa highway concrete. Graduated with M.S. degree in 2005.
16. Nancy L. Scherbarth - The mineralogy and stable isotope characteristics of the Tuvatu gold-silver telluride deposit, Fiji. Graduated with M.S. degree in 2002.
17. David Pals - The spatial and temporal distribution of tellurides in the epithermal Emperor gold-silver telluride deposit, Fiji. Graduated with M.S. degree in 2002.
18. Jill Shackleton - The origin and zonation of tellurides in the giant mesothermal Kalgoorlie gold deposit, Kalgoorlie, Western Australia. Graduated with M.S. degree in 2002.
19. Adriana Heimann - The origin and exploration significance of meta-exhalites spatially associated with metamorphosed Proterozoic Cu-Pb-Zn deposits, Colorado. Graduated with M.S. degree in 2002.
20. Sally D. Casey – Mineralogy and stable isotope characteristics of gold-silver telluride mineralization in the Berners Bay district, Alaska. Graduated with M.S. degree in 2000.
21. Hyomin Lee - The destructive ability of the growth of magnesium-rich minerals in highway concretes. Graduated with Ph.D. degree in 1999.
22. Jill L. Rosenberg - The effects of sulfidation and oxidation on the metamorphosed Bleikvassli lead-zinc-copper deposit, Nordland, Norway. Graduated with M.S. degree in 1998.

23. Michael J. Steenhoek - The petrogenesis of the Archean Lewiston Lakes greenstone belt, Wyoming. Graduated with M.S degree in 1996.
24. Guoliang Gan - The effect of magnesium chloride on concrete deterioration. Graduated with Ph.D. degree in 1996.
25. Gregory D. Fuhrmann - A regional fluid inclusion study of the Illinois-Kentucky fluorspar district. Graduated with M.S. degree in 1994.
26. Maria M. Paredes - A fluid inclusion and multi-element study of the Golden Sunlight epithermal gold-silver telluride deposit, Whitehall, Montana. Graduated with M.S. degree in 1994.
27. Ping Liu - The genetic relationship between Archean lode gold mineralization and banded iron formation at Jardine-Crevasse Mountain, Montana. Graduated with M.S. degree in 1992.
28. Xiaomao Zhang - The origin of gold-telluride mineralization at the Gies mine, Judith Mountains, Montana. Graduated with Ph.D. degree in 1992.
29. Krista I. McGowan - Thermochemical conditions of formation of Archean gold vein mineralization at Atlantic City-South Pass, Wyoming. Graduated 1990 with Ph.D. degree.
30. Mark S. Koellner - A study of the fluid inclusion, stable isotope and mineralogical characteristics of the Denton fluorspar deposit, Cave-in-Rock, Illinois. Graduated 1987 with M.S. degree.
31. Henry D. Jones - Stable isotope systematics of the Illinois-Kentucky fluorspar district. Graduated 1987 with M.S. degree.
32. Keith B. Kutz - A stable isotope and fluid inclusion study of minor Upper Mississippi Valley-type sulfide mineralization in Iowa, Wisconsin and Illinois. Graduated 1987 with M.S. degree.
33. J. David Wonder - The origin of manganese-rich metasedimentary rocks and their relationship to iron formation and base metal deposits, western Georgia piedmont. Graduated 1987 with M.S. degree.

Current Research Projects

1. Mineral compositions as potential exploration guides to ore deposits (Graham Teale - Teale and Associates, Australia; Dan Layton Mathews – Queen’s University; Adriana Heiman – East Carolina University; Josh O’Brien – Devon Energy Corporation).
2. Meta-exhalites and unusual rock types as guides in the exploration for metamorphosed Proterozoic massive sulfide deposits – co-working with Graham Teale (Teale and Associates, Australia) and Ross Both (University of Adelaide).
3. Hydrothermal ore deposits in Greece – co-working with Panos Voudouris (University of Athens) and Vasilios Melfos (University of Thessaloniki).
4. The effects of metamorphism on massive sulfide deposits and their genetic relation to basinal processes co-working with Graham Teale (Teale and Associates), Rod Allen (Boliden Minerals AB, Sweden), and Nils Jansson (Lulea University, Sweden)

Professional Service

National/International

Editorial Boards

1. Editorial Board: Economic Geology - 2009–present, 2000-2007, 1994-1998.
2. Editorial Board: Geological Magazine – 2020 to present
3. Editorial Board: Ore Geology Reviews – 2009-2012.
4. Editorial Board: Mineralogy and Petrology - 2004-2012.

5. Editorial Board: Canadian Mineralogist - 2004-2006.
6. Guest Editor: Hydrothermal Ore Deposits of Greece. Applied Sciences, 2021.
7. Guest Editor: Special Volume on Telluride and Selenide Deposits. Mineralogy and Petrology, 2006.
8. Editor: Proceedings volume (12 papers), International Geological Congress, 1989, Washington, D.C., Regional Metamorphism of Ore Deposits and Genetic Implications (with L.T. Bryndzia).
9. Editor: Annual Newsletter: International Group on Metamorphism of Ore Deposits (International Association of the Geology of Ore Deposits) - 1989-1998.

Professional Committees

1. Member: National Sciences and Engineering Research Council of Canada Site Visit Committee: Collaborative Research and Development Grant (January 2013: Vancouver, British Columbia, Canada)
2. Member: Brian J. Skinner Award Committee (Society of Economic Geologists) - for best annual paper in the journal "Economic Geology"
3. Member: Society of Economic Geologists – Publication Board – 2011-2013.
4. Member: Advisory Board of the Precambrian Research Center – University of Minnesota-Duluth, 2011-present.
5. Member: Technical Advisory Board of Wildcat Exploration, Winnipeg, Manitoba, Canada, 2007-present.
6. Councilor: Society of Geology Applied to Ore Deposits - 2004-2007.
7. Member: Committee on Committees, Society of Economic Geologists, 2004.
8. U.S. Representative of the International Geological Correlations Programme-486 "Telluride and Selenide Deposits" - 2003-2008.
9. Member: Society of Economic Geologists Traveling Lecturers Committee (Thayer Lindsley Lecturer), 2001-2003.
10. Member: Society of Economic Geology International Exchange Lectureship Committee, 2000-2001.
11. Member: Mineralogical Society of America Lecture Program Committee, 1999-2002.
12. Chair: International Working Group on Metamorphism of Ore Deposits-International Association of the Geology of Ore Deposits (1999-2006).
13. Member: Board of Natural Resources: National Association of State Universities and Land-Grant Colleges (NASULGC) (1997-present).
14. Vice-Chair: Geological Society of America, North-Central Section Meeting, Ames, Iowa, 1996 (550 participants).
15. Chair: Thayer Lindsley Visiting Lecturer Committee, Society of Economic Geologists, 1996.
16. Member: Thayer Lindsley Visiting Lecturer Committee, Society of Economic Geologists, 1993-1995.
17. Chair: Committee on Committees, Society of Economic Geologists, 1993, 2003.
18. Secretary: International Working Group on Metamorphism of Ore Deposits-International Association of the Geology of Ore Deposits (1990-1998).
19. Chair: Geology section - Iowa Academy of Sciences Annual Meeting 1990.
20. Member: External Review Board for Department of Geology, University of Nebraska (February, 1990).
21. Vice-chair for geology; Iowa Academy of Sciences Annual Meeting 1989. Reviewer of abstracts for geology section.

Journal Referee

1. Economic Geology
2. Mineralium Deposita
3. Ore Geology Reviews

4. Chemical Geology
5. Geochimica et Cosmochimica Acta
6. Geology
7. Bulletin of the Geological Society of America.
8. American Mineralogist
9. International Geology Reviews
10. Geochemistry: Exploration, Environmental, Analysis
11. Canadian Mineralogist
12. Mineralogical Magazine
13. Mineralogy and Petrology
14. Lithos
15. Sedimentary Geology
16. Journal of Alloys and Compounds
17. Canadian Journal of Earth Sciences
18. Bulletin of the Australasian Institute of Mining and Metallurgy
19. Philosophical Magazine
20. Journal of Geoscience Education
21. Zeitschrift für Kristallographie
22. Periodico di Mineralogia
23. Physics and Chemistry of Minerals
24. Society of Economic Geologists - Field Trip Guide Series
25. International Association of the Geology of Ore Deposits (Proceedings Volume for 8th Quadrennial Meeting held in Ottawa, Canada (August, 1990))
26. Mineralogical Association of Canada - Short Course Volume
27. Geological Society of America - Abstracts Volume
28. Society of Economic Geologists - Special Volume on Mississippi Valley-type deposits.

Grant Referee

1. National Science Foundation
2. The Chemical Society (Petroleum Research Fund)
3. Illinois State Mining and Mineral Resources Research Institute
4. Natural Sciences and Engineering Research Council of Canada
5. South African National Research Funding Agency (Foundation for Research Development)
6. United States Department of Agriculture, Cooperative State Research, Education and Extension Service (Small Business Innovative Research Program)
7. Austrian Science Fund

Referee of Papers for International, National, and Local Professional Meetings

1. 9th Quadrennial Symposium of the International Association of the Geology of Ore Deposits, Session on "Ores and Metamorphism", Beijing, P.R.China, August, 1994 (26 papers).
2. Society of Economic Geologists, National Meeting of the Geological Society of America, Boston, MA, Symposium on Metamorphic and Metamorphosed Ore Deposits, October, 1993 (12 papers).
3. Society of Economic Geologists at the National Meeting of the Geological Society of America, Dallas, TX, October, 1990 (90 papers).
4. Iowa Academy of Sciences, Annual Meeting, Storm Lake, IA, Geology papers, April, 1990.
5. 28th International Geological Congress, Washington, D.C., July, 1989, Symposium on Ores and Metamorphism (13 papers).

Coordinator of International, National, and Local Symposia

1. Geological Society of America, North-Central Section Meeting, Ames, Iowa, 2018. "Economic Geology, Igneous and Metamorphic Petrology, Mineralogy" (with Kevin L. Shelton).
2. Geological Association of Canada-Mineralogical Association of Canada (May 2011) "From experimentalist to explorer: a special session honouring the contributions of Steven D. Scott (with Andrew Conly, Mark Hannington, and Jan Peter).
3. 139th Quadrennial Symposium of the International Association of the Geology of Ore Deposits, Symposium on "Ores in the Americas" held in Adelaide, Australia, April, 2010 (with Dave Lentz).
4. Joint Assembly of the American Geophysical Union (AGU), Geological Association of Canada, and Mineralogical Association of Canada (May, 2009) "Volcanology, geochemistry, and petrology: General Contributions" (with Douglas K. Tinkham).
5. Joint Assembly of the American Geophysical Union (AGU), the Canadian Geophysical Union (CGU), and the Society of Exploration Geophysicists (SEG), Montreal, Canada (May, 2004) "Ore deposits and metamorphism: their role in the study of high-grade metamorphic terrane and in the diversification of mineral exploration."
6. Society for Geology Applied to Mineral Deposits and 12th Quadrennial Symposium of the International Association of the Geology of Ore Deposits, "Open Session," Athens, Greece (2003).
7. Geological Society of America, North-Central Meeting, Kansas City, Missouri (March, 2003) "Economic Geology."
8. 16th Australian Geological Convention, Adelaide, South Australia (July, 2002) "Metallogenesis and Ore Discovery - Case Studies."
9. Geological Society of America, North-Central Meeting, Normal, Illinois (April, 2001) "Economic Geology and Structural Geology."
10. Geological Society of America National Meeting, Symposium on Alkalic Gold deposits, Toronto, Ontario, October, 1998.
11. Geological Society of America, Rocky Mountain Section Meeting, Rapid City, South Dakota (April, 1996) "Gold Metallogeny of the Northern Rockies."
12. Third Biennial Society of Geology Applied to Ore Deposits Meeting 1995, "Ores and Metamorphism," Prague, Czech Republic.
13. 9th Quadrennial Symposium of the International Association of the Geology of Ore Deposits, Symposium on "Ores and Metamorphism" held in Beijing, August, 1994.
14. Geological Society of America National Meeting, "Metamorphism, Fluid Flow and Ore Deposits," Boston, Massachusetts, October, 1993.
15. Geological Association of Canada/Mineralogical Association of Canada/Society of Economic Geologists. "Mississippi Valley-type Deposits," Toronto, Canada (May, 1991).
16. Iowa Academy of Sciences Annual Meeting 1990, Geology section.
17. 28th International Geological Congress symposium on "Regional metamorphism of ore deposits and genetic implications" held in Washington D.C., July 1989.
18. Geological Society of America, North-Central Meeting, St. Paul, Minnesota (1987) "Economic Geology and Mineralogy."

Other Professional Activities

1. External examiner" Ph.D., University of Ottawa, August 2023
2. External examiner: M.S. and Ph.D theses from the University of Cape Town, South Africa.
3. "Opponent" on the Ph.D. committee of Nils Jansson (University of Luleå, Sweden) in Luleå, September 2011.
4. Geological Society of America, National Meeting, Denver, October, 2007. Field trip co-leader

“Geology of the Cripple Creek gold telluride deposit.”

5. Judge of student posters/papers: Joint Assembly of the American Geophysical Union (AGU), the Canadian Geophysical Union (CGU), and the Society of Exploration Geophysicists (SEG), Montreal, Canada (May, 2004) – Volcanology, Petrology, and Geochemistry section.

University

1. Member: Dean's Budget Planning Committee, College of Liberal Arts and Sciences, Iowa State University, 2001.
2. Member: Ad-hoc Committee for Role of Teacher Trainers in the College of Liberal Arts and Sciences, 1999.
3. Member: Committee-on-Committees, College of Liberal Arts and Science, 1995-1997.
4. Associate Director: Center for Coal and the Environment, Iowa State University, 1995-1996.
5. Associate Director: Iowa State Mining and Mineral Resources Research Institute, 1993-1995.
6. Chair: Iowa State Mining and Mineral Resources Research Institute Advisory Committee, 1991-1993.
7. Member: Faculty Development Committee, College of Liberal Arts and Sciences, Iowa State University, 1990-1993.
8. Member: Representative Assembly, College of Liberal Arts and Sciences, Iowa State University, 1990.
9. Member: Iowa State Mining and Mineral Resources Research Institute Advisory Committee, 1989-1991.

Departmental Committees at Iowa State University

1. Member: Faculty Evaluation Committee, 2023
2. Chair: Departmental Awards Committee, 2016-2020
3. Member: Morehouse Fund Committee, 2016-2020
4. Editor: The Varve (annual alumni newsletter), 1984, 1989, 1996-2014
5. Chair: Student Awards Committee, 2003-present
6. Member: Curriculum Committee, 2015-2019
7. Mentor: Franek Hasiuk, 2015-2019.
8. Chair: Promotion and Tenure Committee for Alan Wanamaker, 2014
9. Member: Search Committee for Structural Geology Position, 2014
10. Member: Post-tenure Review Committee (Gutowski), 2013
11. Director of Graduate Education (Geology), 1996-2022
12. Member: Faculty Evaluation Committee, 2012-2014, 2006-2007, 1995-1996, 1990-1991
13. Member: Strategic Planning Committee, 2013
14. Member: Post-tenure Review Committee (Simpkins), 2012
15. Member: Search Committee for Sedimentary Geology/Low-Temperature Geochemistry position, 2011
16. Member: Search Committee for Chair of Department of Geological and Atmospheric Sciences, 2010
17. Member: Search Committee for Low-Temperature Geochemistry position, 2009
18. Chair: Search Committee for Low-Temperature Geochemistry position, 2008
19. Member: Post-tenure Review Committee (Chen), 2006
20. Chair: Promotion Committee for Associate Professor (Iverson), 2004
21. Chair: Promotion Committee for Associate Professor (Simpkins), 2003 and 2004
22. Chair: Student Outcomes Committee, 2003
23. Member: Faculty Awards Committee, 2002-2012
24. Member: Search Committee for Scientific Staff Position, 2002

25. Principal Organizer of ISU Geology Alumni Celebration, Shell, WY, 2002
26. Chair: Strategic Planning Committee, 1994-1995
27. Member: Department Executive Committee, 1993-1998
28. Chair: Oppold Mineral Collection, 1992-1993
29. Member: Governance and Promotion and Tenure Committee, 1992-1993
30. Chair: Geology Equipment Committee, 1992-1996
31. Member: Curriculum Committee, 2001-2003 and 1988-1989
32. Advisor: Sigma Gamma Epsilon, 1990-1998
33. Chair: Department Brochures Committee, 1990-1992
34. Member: Geology Equipment Committee, 1990-1992
35. Chair: Ph.D. Document Committee, 1989
36. Member: Search Committee for Hydrogeologist position, 1988
37. Member: Faculty/Staff/Student Relations Committee, 1988
38. Coordinator: Speaker Series in Geology, 1987-1989
39. Advisor: Geology Graduate Student Organization, 1987-1989
40. Member: Water Resources Committee, 1987-1988
41. Member: Strategic Planning Committee, 1987-1988
42. Editor: Graduate Studies in Geology at Iowa State University brochure, 1987
43. Coordinator: Graduate Applications, 1986-1991
44. Member: Undergraduate Enrollment Committee, 1986-1988
45. Member: Graduate Student Enrollment Committee, 1986
46. Member: Search Committee for Laboratory Technician position, 1985