

SEG Foundation Student Field Trip 12
MAJOR COPPER-MOLYBDENUM PORPHYRY SYSTEMS, SOUTHWESTERN USA
SELECTED REFERENCES

General References, Southwestern U.S. Porphyry Copper Systems

- Candela, P.A. and Piccoli, P.M., 2005, Magmatic processes in the development of porphyry-type ore systems: Economic Geology 100th Anniversary Volume, p. 25-37.
- Gilmour, P., et al, 1995, Porphyry copper deposits: History, recent developments, exploration, economics, *in* Pierce, F.W., and Bolm, J.G., eds., Porphyry copper deposits of the American Cordillera: Arizona Geological Society Digest 20, p. 128-155.
- Leveille, R.A., and Stegen, R.J., 2012, The southwestern North America porphyry province, *in* Hedenquist, J.W., Harris, M., and Camus, F., Geology and genesis of major copper deposits and districts of the world; a tribute to Richard Sillitoe: Society Economic Geologists Special Publication 16, p. 361-402.
- Seedorff, E., et al, 2005, Porphyry deposits—characteristics and origin of hypogene features: Economic Geology 100th Anniversary Volume, p. 251-298.
- Sillitoe, R.H., 2010, Porphyry copper systems: Economic Geology, v. 105, p. 3-41.
- Titley, S.R., 1981, Geologic and geotectonic setting of porphyry copper deposits in the southern Cordillera, *in* Dickenson, W.R., and Payne, W.D., eds., Relation of tectonics to ore deposits in the southern Cordillera: Tucson, Arizona Geological Society Digest 14, p. 79-98.
- _____, 1982a, Geologic setting of porphyry copper deposits, southeastern Arizona, *in* Titley, S.R., ed., Advances in geology of porphyry copper deposits, southwestern North America: Tucson, Univ. Arizona Press, p. 37-58.
- _____, 1982b, The style and progress of mineralization and alteration in porphyry copper systems, American southwest, *in* Titley, S.R., ed., Advances in geology of porphyry copper deposits, southwestern North America: Tucson, Univ. Arizona Press, p. 93-116.
- _____, 1995, Geological Summary and Perspective of Porphyry Copper Deposits in Southwestern North America, *in* Pierce, F.W., and Bolm, J.G., eds., Porphyry copper deposits of the American Cordillera: Arizona Geological Society Digest 20, p. 6-20.
- Wilkins, J.Jr., and Heidrick, T.L., 1995, Post-Laramide extension and rotation of porphyry copper deposits, southwestern United States, *in* Pierce, F.W., and Bolm, J.G., eds., Porphyry copper deposits of the American Cordillera: Arizona Geological Society Digest 20, p. 109-127.

Skarns

- Einaudi, M.T., 1982a, Descriptions of skarns associated with porphyry copper plutons, southwestern North America, *in* Titley, S.R., ed., Advances in geology of porphyry copper deposits, southwestern North America: Tucson, Univ. Arizona Press, p. 139-183.
- _____, 1982b, General features and origins of skarns associated with porphyry copper plutons, southwestern North America, *in* Titley, S.R., ed., Advances in geology of porphyry copper deposits, southwestern North America: Tucson, Univ. Arizona Press, p. 185-210.
- Meinert, L.D., Dipple, G.M. and Nicolescu, S.M., 2005, World skarn deposits: Economic Geology 100th Anniversary Volume, p. 299-336.

Hydrothermal Processes

- Beane, R.E., 1982, Hydrothermal Alteration in Silicate Rocks: Southwestern North America, *in* S.R. Titley, ed., Advances in geology of the porphyry copper deposits southwestern North America: Tucson, Univ. Arizona Press, p. 117-138.

- Beane, R.E. and Bodnar, R.J., 1995, Hydrothermal fluids and hydrothermal alteration in porphyry copper deposits, *in* F.W. Pierce and J.G. Bolm, eds., *Porphyry copper deposits of the American Cordillera: Arizona Geological Society Digest 20*, p. 83-93.
- Kouzamanov, K., and Pokrovski, G.S., 2012, Hydrothermal controls on metal distribution in porphyry Cu (-Mo-Au) systems, *in* Hedenquist, J.W., Harris, M., and Camus, F., *Geology and genesis of major copper deposits and districts of the world; a tribute to Richard Sillitoe: Society of Economic Geologists Special Publication 16*, p. 573-618.

Supergene Processes

- Anderson, J.A., 1982, Characteristics of leached capping and techniques of appraisal, *in* S.R. Titley, ed., *Advances in geology of the porphyry copper deposits, southwestern North America: Tucson, Univ. Arizona Press*, p. 275-295.
- Chávez, W.X., Jr., 2000, Supergene oxidation of copper deposits: zoning and distribution of copper oxide minerals: *Society of Economic Geologists Newsletter*, no. 41, p. 1-21.
- Titley, S.R. and Marozas, D.C., 1995, Processes and products of supergene copper enrichment, *in* Pierce, F.W., and Bolm, J.G., eds., *Porphyry copper deposits of the American Cordillera: Arizona Geological Society Digest 20*, p. 156-168.
- Gilmour, P., 1995, A field guide to leached capping interpretation, *in* Pierce, F.W., and Bolm, J.G., eds., *Porphyry copper deposits of the American Cordillera: Arizona Geological Society Digest 20*, p. 169-179.
- Sillitoe, R.H., 2005, Supergene oxidized and enriched porphyry copper and related deposits: *Economic Geology 100th Anniversary Volume*, p. 723-768.

For Ray:

- Anon., 2013, Grupo México – Asarco corporate website: www.asarco.com/about-us/our-locations/ray-operations/
- Banks, N.G., 1982, Sulfur and copper in magma and rocks, Ray porphyry copper deposit, Pinal County, Arizona, *in* Titley, S.R., ed., *Advances in geology of porphyry copper deposits, southwestern North America: Tucson, Univ. Arizona Press*, p. 227-257.
- Cornwall, H.R., 1982, Petrology and chemistry of Igneous Rocks, Ray porphyry copper district, Pinal County, Arizona, *in* Titley, S.R., ed., *Advances in geology of porphyry copper deposits, southwestern North America: Tucson, Univ. Arizona Press*, p. 250-273.
- Metz, R.A., and Rose, A. W., 1966, Geology of the Ray copper deposit, Ray, Arizona, *in* Titley, S.R., and Hicks, C.L., eds., *Geology of the porphyry copper deposits southwestern North America: Tucson, Univ. Arizona Press*, p. 176-178.
- Phillips, C.H., Gambell, N.A., and Fountain, D.S., 1974, Hydrothermal mineralization, alteration, and zoning in the Ray deposit: *Economic Geology*, v. 69, p. 1237-1250.

For Copper Creek:

- Anon., 2013, Redhawk Resources, Inc. corporate website: www.redhawkresources.com/Properties/Copper-Creek/
- Guthrie, J.O., and Moore, D.G., 1978, The geology of the Copper Creek area, Bunker Hill mining district, Galiuro Mountains, Arizona: *Arizona Geological Society Digest 11*, p. 25-31.
- Riedell, K.B., et al, 2013, Early halo type porphyry and breccia Cu-Mo mineralization at Copper Creek, Pinal County, Arizona (abstract and e-poster): *Society of Economic Geologists 2013 conference, Whistler, BC, Canada, poster 3.34.*

For Safford:

- Anon., 2013, Freeport McMoRan corporate website: www.fcx.com/operations/USA_Safford.htm

Selected References, continued
SEG Foundation Student Field Trip 12

Gerwe, J.E., Stavast, W.J.A., and Young-Mitchell, M., 2007, Safford district geologic tour guidebook, *in* Titley, S.R., and Stegen, R.J., Leached capping and enrichment of porphyry copper deposits of Arizona and New Mexico: Society of Economic Geologists and Arizona Geological Society, unpublished field trip guidebook, p. 46-69.

Langton, J.M., and Williams, S.A., 1982, Structural, petrological and mineralogical controls for the Dos Pobres orebody, Lone Star mining district, Graham County, Arizona, *in* Titley, S.R., ed., *Advances in geology of porphyry copper deposits, southwestern North America*: Tucson, Univ. Arizona Press, p. 335-352.

Robinson, R.F., and Cook, A., 1966, The Safford copper district, *in* Titley, S.R., and Hicks, C.L., eds., *Geology of the porphyry copper deposits, southwestern North America*: Tucson, Univ. Arizona Press, p. 251-266.

For Mission:

Anon., 2013, Grupo México – Asarco corporate website: <http://www.asarco.com/about-us/our-locations/mission-mine/>

Jansen, L.J., 1982, Stratigraphy and Structure of the Mission copper deposit, Pima mining district, Pima County, Arizona, *in* Titley, S.R., ed., *Advances in geology of porphyry copper deposits, southwestern North America*: Tucson, Univ. Arizona Press, p. 467-474

Kinnison, J.E., 1966, The Mission copper deposit, Arizona, *in* Titley, S.R., and Hicks, C.L., eds., *Geology of the porphyry copper deposits southwestern North America*: Tucson, Univ. Arizona Press, p. 281-287.

For Sierrita:

Anon., 2013, Freeport McMoRan corporate website: http://www.fcx.com/operations/usa_arizona_sierrita.htm

Aiken, D.M., and Baugh, G.M., 2007, The Sierrita copper-molybdenum deposit: An update report, Pima mining district, Pima County, Arizona *in* Graybeal, F., et al., eds., *Porphyry copper systems of southern Arizona: Arizona Geological Society, Ores and Orogenesis Symposium, Tucson, Arizona, September 24-30, 2007, Guidebook No. 8*, p. 1-46.

Anon., 2013, Porter GeoConsultancy Database website: <http://www.portergeo.com.au/database/mineinfo.asp?mineid=mn207>

Lynch, D.W., 1966, The economic geology of the Esperanza Mine and vicinity, *in* Titley, S.R., and Hicks, C.L., eds., *Geology of the porphyry copper deposits, southwestern North America*: Tucson, Univ. Arizona Press, p. 267-279.

Titley, S.R., *et al*, 1986, Evolution of fractures and alteration in the Sierrita-Esperanza hydrothermal system, Pima County, Arizona: *Economic Geology*, v. 81, p. 343-370.

West, R.J., and Aiken, D.M., 1982, Geology of the Sierrita-Esperanza deposit, Pima County, Arizona, *in* Titley, S.R., ed., *Advances in geology of porphyry copper deposits, southwestern North America*: Tucson, Univ. Arizona Press, p. 433-465.

Sierrita Rhenium:

Blazya, P., Jdida, E.A., Floreancigb, A., and Mottetb, B., 1993, Selective recovery of rhenium from gas-scrubbing solutions of molybdenite roasting using direct precipitation and separation on resins: *Separation Science and Technology*, v. 28, no. 11-12, p. 2073-2096.

Polyak, D.E., 2013, Mineral Commodity Summaries: US Geological Survey, p. 130.

For Rosemont:

Anon., 2013, Rosemont Copper corporate website: <http://rosemontcopper.com/>

Anzalone, S.A., 1995, The Helvetia area porphyry copper systems, Pima County, Arizona, *in* Pierce, F.W., and Bolm, J.G., eds., *Porphyry copper deposits of the American Cordillera: Arizona Geological Society Digest 20*, p. 436-441.

Selected References, continued
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Hardy, J.J., Jr., 1996, Dismemberment of porphyry copper mineralization in the Rosemont-Helvetia district, Arizona, *in* Thompson, T.B. ed., Society of Economic Geologists Guidebook Series, v. 25, p. 157-178.

Huss, C.E., 2012, Rosemont Copper Deposit NI 43-101 Technical Report – Updated Feasibility Study, Pima County, Arizona, USA, *prepared for: Augusta Resource Corporation by M3 Engineering, Tucson, AZ.*

Rose, W.L., 2006, Mineral Resource Estimate – Revised Technical Report for the Rosemont Deposit, Pima Country Arizona, USA, *prepared for: August Resource Corporation by WLR Consulting, Lakewood Colorado, filed on Sedar as NI 43-101.*