

NORTHWEST GEOLOGICAL SOCIETY

A regional association of professionals, students & others interested in geology
Please browse www.nwgs.org for more about us



December 2011 Newsletter

Volume 25, Number 8

December 13 Program Speaker

Speaker: Peter Selkin, UW Tacoma Environmental Science

Title: From footprint to fingerprint: using soil magnetism and mineralogy to trace smelter contamination in Tacoma

Abstract: Heavy metal soil contamination is widespread throughout the South Puget Sound region, due mainly, but not uniquely, to ash from copper smelting operations in Ruston, WA. Here we take a combined rock magnetic and mineralogical approach to fingerprint likely smelter contamination based on analyses of slag and contaminated soil from near the smelter. Magnetic analyses provide a sensitive and rapid means of materials characterization in situations where standard mineralogical and chemical techniques are unfeasible, or cannot distinguish between sources. In the Tacoma area, contaminated soil, like slag, has magnetic properties generally consistent with maghemite with a small amount (<30%) of oxidation and a similarly small amount of cation substitution. Magnetic particles in smelter ash and slag span a relatively wide range of sizes, from small, single magnetic domains to large, multidomain particles. These properties match predictions from XRD and SEM/EDS measurements of oxides in smelter slag and are consistent with modern and archeomagnetic observations. In contrast, less contaminated soils have magnetic properties closer to those of pure magnetite, and contain a narrower distribution of magnetic particle sizes. These results indicate that it is possible to construct a two-endmember mixing model based on magnetic measurements to quantify the amount of smelter ash in local soils. Such a model will provide a guide to interpreting heavy metal concentrations in soils where multiple sources of metals (e.g. smelting and pesticides) may have contributed to high levels of contamination.

5:30pm: No-host social hour

6:30pm: Buffet dinner

7:30pm: Speaker program

All are welcome to attend –
reservations are required
if coming for dinner.

► [Reservations here](#)



PROGRAM DINNER RESERVATIONS: NWGS members: **\$45**; Non-members: **\$50**; Full-time students : **\$15**. \$50 for LATE REGISTRATION. Make your reservation and payment on-line at www.nwgs.org (or mail your payment to *Northwest Geological Society, 4616 25th Ave NE #397, Seattle, WA. 98105* (must be received by Thursday prior to meeting)). Contact him at 206-937-5313 or nwgeo@yahoo.com.

If attending the speaker program only, a \$5 voluntary donation to help defray the meeting room cost is requested.

Location: Pacific Dining Hall at the [Talaris Conference Center](#), 4000 NE 41st St., Seattle, WA. Ph 206-268-7000. **Directions:** See [on-line directions with map](#), or: from I-5 northbound or southbound in Seattle, take Exit 168B (NE 45th St.). Drive east on NE 45th St. past UW down the hill and past University Village. Turn south (right) onto Mary Gates Memorial Drive at the 5-way intersection. MGM Drive will curve east (left) and become NE 41st St. Continue several blocks to the [Talaris Conference Center](#) entrance on the north (left) side. We meet in the Pacific Dining room on the left.

Upcoming Speakers and Field Trips

January 19 Meeting (joint AEG meeting at **Ivar's Salmon House**, Seattle): Tom Pratt, USGS, topic TBA.

February 8 Meeting: Eric Cheney, UW Earth and Space Sciences, The 3 1/2 geologies of greater Washington.

Spring, 2012 Field Trip: Steve Reidel, Washington State University-TriCities, Abandoned channels of the Pleistocene Columbia River, date TBA.

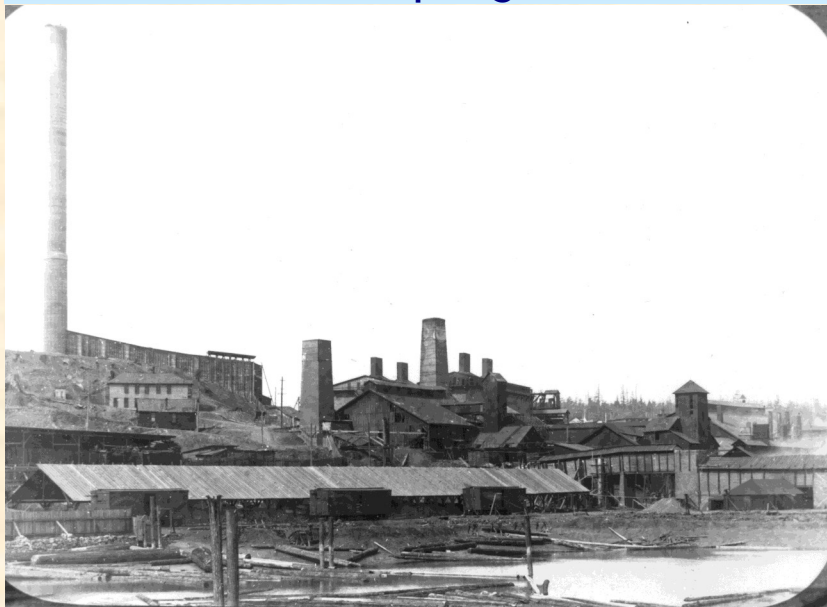
Please see the [NWGS website](#) for detailed announcements.

Contact webmaster [Julie Masura](#) if you have any announcements to post on the website.

Announcements

- The dinner charge has been raised to **\$45** for members to cover costs. See details p.1.
- Dinner and field trip reservations and payments may now be made on the NWGS [on the NWGS website](#) at www.nwgs.org!
- The 25 year anniversary symposium is now rescheduled for **May of 2013** due to the Society's pending application for non-profit 501-3-C status. Please mark your calendar!
- The **January meeting** will be a **joint meeting** with the Assoc. of Eng. Geologists (AEG) on **January 19** at **Ivar's Salmon House** on Lake Union in Seattle.
- NWGS Historian [Donn Charnley](#) requests any pre-1980s NWGS information. Contact him at donncharnley@frontier.com or 206.546.3868.
- Next **Board meeting**: Tuesday, December 13, 4:30 p.m., Talaris Conference Center.
YOU would like to be involved!

Photo Spotlight



The ASARCO plant (circa 1905) before the stack was replaced with the 571-foot chimney that lasted until demolition in 1993. The smelter, located in Ruston, WA. near Tacoma, began as a lead smelter in 1889, and was converted to a copper smelter in 1902. It was sold to ASARCO in 1905. It specialized in concentrates high in arsenic, and is likely the main source of high heavy metal concentrations in area soils. Photo submitted by Peter Selkin, courtesy Tacoma Public Library (Richards Studio Collection C117132-2), caption modified by the Editor.

About NWGS

NWGS, a regional association of professionals, students & other persons interested in **geology**, provides a forum for the presentation and discussion of a wide range of geological topics, emphasizing those of the Pacific Northwest of fundamental scientific interest.

YOU would like to be involved!

Program meetings: 2nd Tuesdays, October through May in the Pacific Dining Hall at the [Talaris Conference Center](#) in Seattle (see 1st page). Anyone may attend the speaker program, but a reservation is necessary for those wanting dinner (see 1st page). **Field trips (members only):** one in late spring/early summer and one in late summer/early fall, usually of 1-3 days in length. **Membership** is open to anybody with a professional or amateur interest in geology. **Annual dues:** Professional: \$30; Student: \$5. **To join or pay annual dues:** send a check payable to NWGS to Secretary [Dan Smith](#), 10203 40th Ave SW, Seattle, WA. 98146. Please include your name, address, home phone, email, and employer/affiliation (if any). Professional dues may now also be paid at www.nwgs.org.

YOU would like to be involved!

Recommended Readings

- Banerjee, S.K. 1991, Magnetic properties of Fe-Ti oxides, in D.H. Lindsley, ed., Oxide Minerals: Petrologic and Magnetic Significance, Mineralogical Society of America Reviews in Mineralogy v. 25. 107-128.
- Jordanova, D., N. Jordanova, and V. Hoffmann, 2006, Magnetic mineralogy and grain-size dependence of hysteresis parameters of single spherules from industrial waste products, Physics of the Earth and Planetary Interiors 154: 255-265.
- Petrovsky, E. and B.B. Ellwood, 1999, Magnetic monitoring of air-, land- and water-pollution, in B.A. Maher and R. Thompson, eds., Quaternary Climates, Environments, and Magnetism, Cambridge, UK: Cambridge University Press. 279-322.

Please send your reading recommendations to Newsletter Editor [Tom Bush](#).

To report a change of email or postal address or request to be removed from mailings, notify Secretary [Dan Smith](#) at 206.937.5313. Questions or comments? Contact President [Julie Masura](#).

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