**Simbol Data Gap**

**Aqueous Chemistry Only- Simbol is not sampling cuttings (rocks) like UC Davis (see page 2 below) is planning to do. However, we need to make sure that Rock Chemistry REE’s match Aqueous Chemistry REEs so that UC Davis can match rock cuttings element analysis to aqueous chemistry analysis.**

* Missing 14 of 15 Lanthanide chemical elements (all except Cerium)
* Missing  13 of 15 Actinide chemical elements (all except Thorium and Uranium)
* Missing Scandium, Yttrium, and Technetium

**PNNL – Shane Adelman – AOP Project Reference Number 1521**

**Aqueous Chemistry Data Gap**

* Lanthanide- Europium (Atomic # 63) –
* Lanthanide Dy – Dysprosium (Atomic 66)

**UC Davis**

**Aqueous Chemistry and Rock Chemistry Content Model Data Gap**

**From:** Robert Zierenberg [mailto:razierenberg@ucdavis.edu]   
**Sent:** Thursday, January 08, 2015 4:54 PM  
**To:** Popovich, Neil  
**Cc:** Anderson, Arlene (HQ); Reinhardt, Timothy (HQ); Steve Richard (steve.richard@azgs.az.gov); Andrew Fowler  
**Subject:** Re: NGDS Aqueous Chemistry/Rock Chemistry Model Missing Parameters

Hi Neil,

Our project is focussed on providing high precision, accurate REE data on both geothermal fluids and hydrothermal alteration minerals.  Both the aqueous chem and rock chem templates should have fields for La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu.  In addition, we routinely measure Ba, Sc, and Y as related elements and/or to correct for potential interferences, so fields should be included for these elements as well.  Please let me know if you have further questions.

Thanks,

Z

Robert Zierenberg

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**Tusaar Corporation**

**Aqueous Chemistry Gaps (**yellow highlights are in Aqueous Chem, red highlights need to be added to Aqueous Chem)

**From:** Dean Stull [mailto:dean.stull@gmail.com]   
**Sent:** Tuesday, January 13, 2015 10:01 AM  
**To:** Popovich, Neil  
**Cc:** CAjo-Franklin@lbl.gov; Pete.McGrail@pnnl.gov; raymond.addleman@pnnl.gov; renew@southernresearch.org; susanna.ventura@sri.com; akaramal@andrew.cmu.edu; Reinhardt, Timothy (HQ); Anderson, Arlene (HQ); Thomas, Holly (HQ); earl.mattson@inl.gov; Gregory.Mines@inl.gov  
**Subject:** Re: Mineral Recovery Analyte/Sample Feedback Needed by December 30th

Neil,

I appreciate your efforts to help in this way.

Tusaar believes that the Woods data is good for modeling geothermal water that has commercial operations already in operation.  In general, this water is slightly acidic with pH in the 5.5 to 7 range which is fine.  These waters are also high is solids.

We are also looking for alternative water sources that do not have to be commercial and are much more acidic.  These generally are also much lower in solids and higher in REEs for example.  To that end, samples and/or more data would be useful.

Two fields we are targeting are the Yellowstone Caldera field and surrounding area. Another is the Valles Caldera in New Mexico.  We would love to get our hands on samples of low pH from both areas.

We are looking for data that represents a "standard" water analysis (pH, TDS, Anions including chloride, nitrate, sulfate) along with ICP MS data for the typical elements.  A generic list in alphabetical order follows.

Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Hg, Ho, In, K, La, Li, Lu, Mg, Mn, Mo, Na, Nb, Nd, Ni, P, Pb, Pr, Rb, Re, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn, Zr

Thank you.

Dean