



# Eichrom Technical Support Busters

Terence C. O'Brien and Lawrence E. Jassin

Eichrom Technologies LLC

55<sup>th</sup> Annual Radiobioassay and Radiochemical  
Measurement Conference

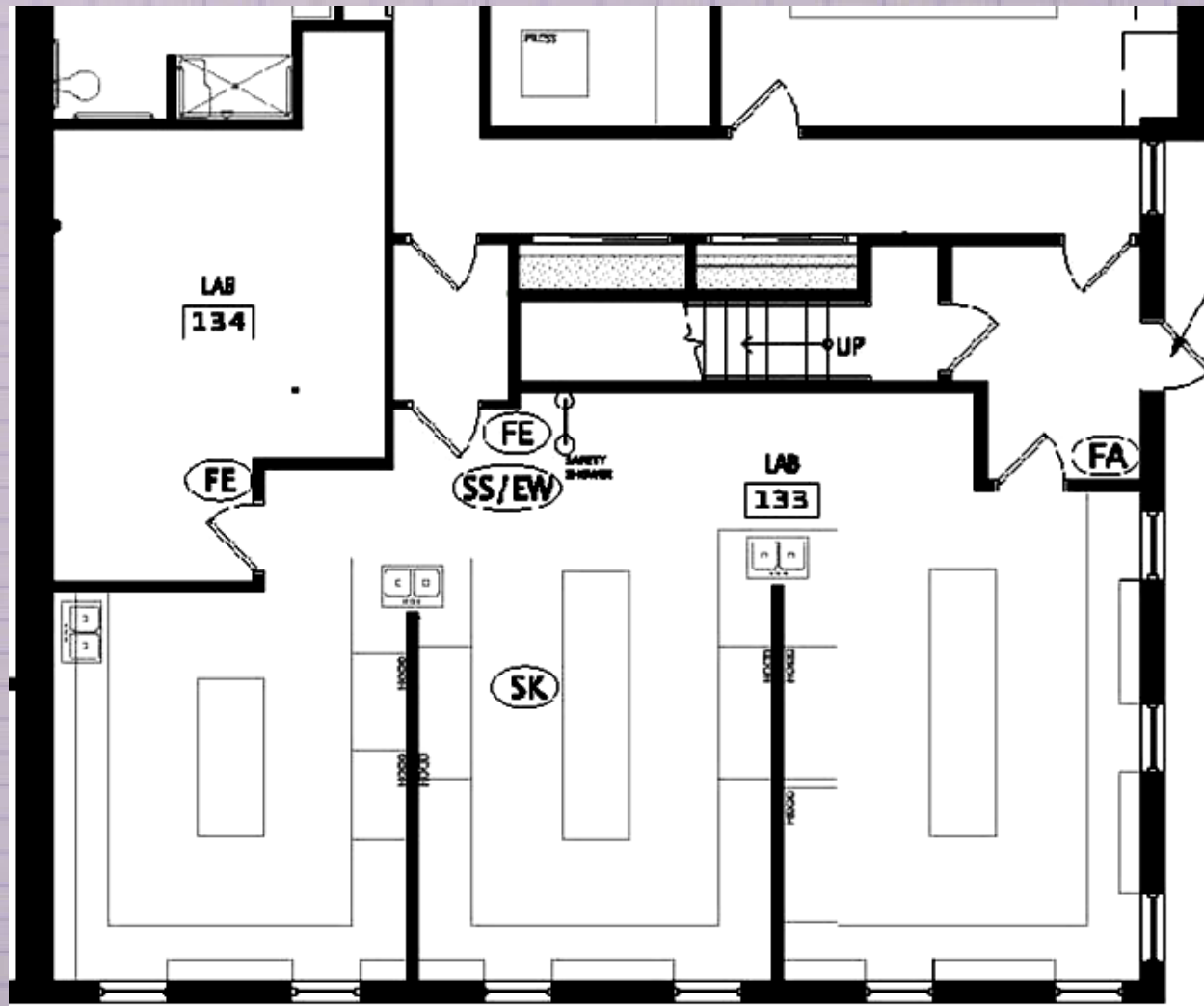
October 26-30, 2009



# Eichrom's Technical Support Busters



# Eichrom's Technical Support Shop





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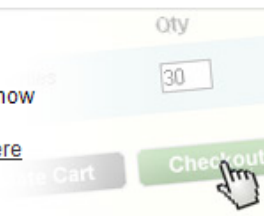
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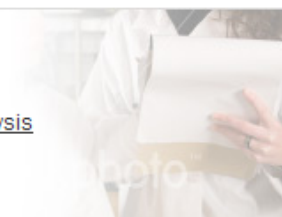
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Eichrom Technologies, LLC  
 Tel: (630) 963-0320  
 Fax: (630) 963-1928  
[Email: info@eichrom.com](mailto:info@eichrom.com)

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## Our Products

Eichrom commercialized its breakthrough chemical separation techniques in the 1990s. Today, accredited laboratories and regulatory agencies worldwide trust Eichrom's line of analytical-chemistry products, all developed through the expertise of our team of dedicated chemists.

| Product Name           | Color Code | Applications*                                       |                                |                              |
|------------------------|------------|---|--------------------------------|------------------------------|
| Accessories            |            | Plastic accessories for columns and cartridges      | <a href="#">product info</a>   | <a href="#">part numbers</a> |
| Resolve™ Filters       |            | Alpha spectroscopy source preparation               | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Actinide Resin         | ● Yellow   | Group actinide separations/gross alpha measurements | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Beryllium Resin        |            | Be  | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| DGA Resin              |            | Actinides, Lanthanides, Y, Ra                       | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Diphonix® Resin        |            | Actinides and transition metals                     | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Ion Exchange Resins    |            | Analytical grade cation and anion exchange resins   | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Ln Resin               | ● Purple   | Lanthanides, Ra-228                                 | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| MnO <sub>2</sub> Resin |            | Ra  | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Nickel Resin           | ● Pink     | Ni  | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Pb Resin               | ● Black    | Pb  | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Pre-filter Material    |            | Organics removal                                    | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| RE Resin               |            | Th, U, Np, Pu, Am, Cm, rare earth elements          | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Sr Resin               | ● Red      | Sr, Pb  | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| TEVA® Resin            | ● Green    | Tc, Th, Np, Pu, Am/lanthanides                      | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| Tritium Column         |            | <sup>3</sup> H                                      | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| TRU Resin              | ● Blue     | Fe, Th, Pa, U, Np, Pu, Am, Cm                       | <a href="#">technical info</a> | <a href="#">part numbers</a> |
| UTEVA® Resin           | ● Orange   | Th, U, Np, Pu                                       | <a href="#">technical info</a> | <a href="#">part numbers</a> |

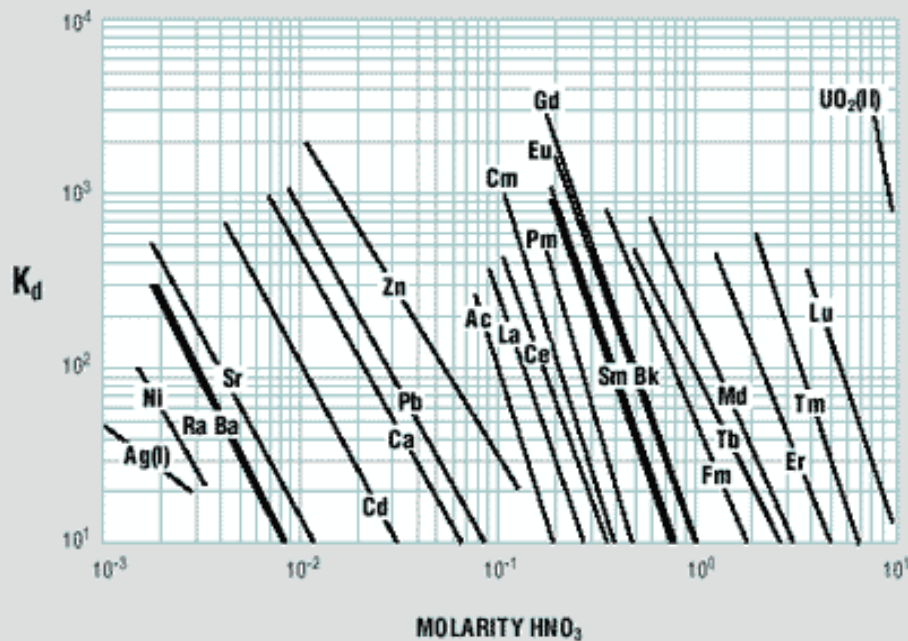
# Support Issues

## Confirmed / Plausible / Busted

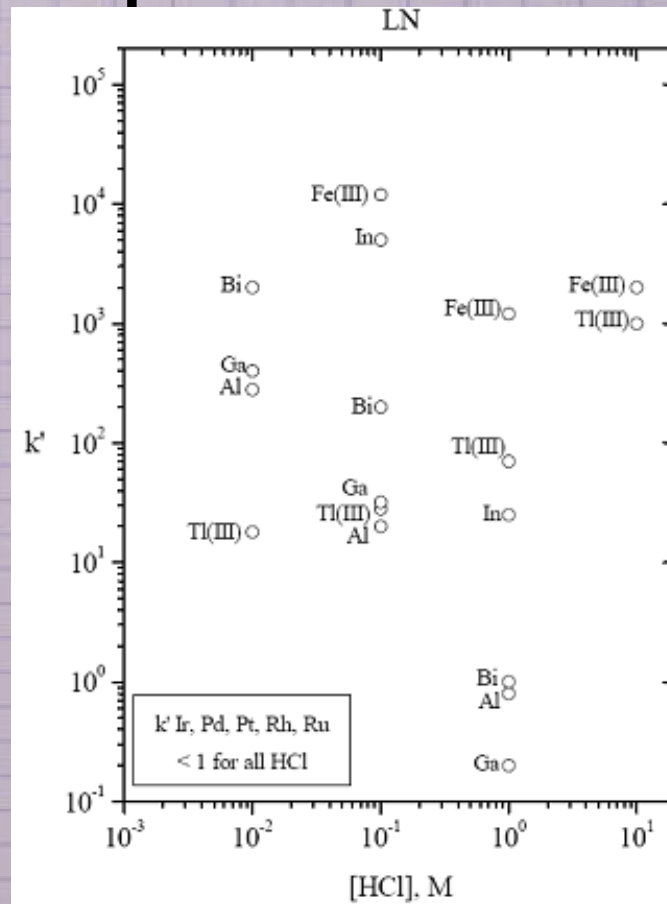
- Separation of Sn and Cd using Ln Resin
- Determination of Sr in 10L of Seawater
- Interference of Po210 on Am Air Samples
- Interference of U on Np sample results
- Determination of Th in samples high in both phosphate and iron
- Weakened/Melted Support Rods in some 12 and 24 hole vacuum boxes

# Tin / Cadmium Separation

Uptake of Various Elements by Ln Resin



Horwitz, et. al (1975)

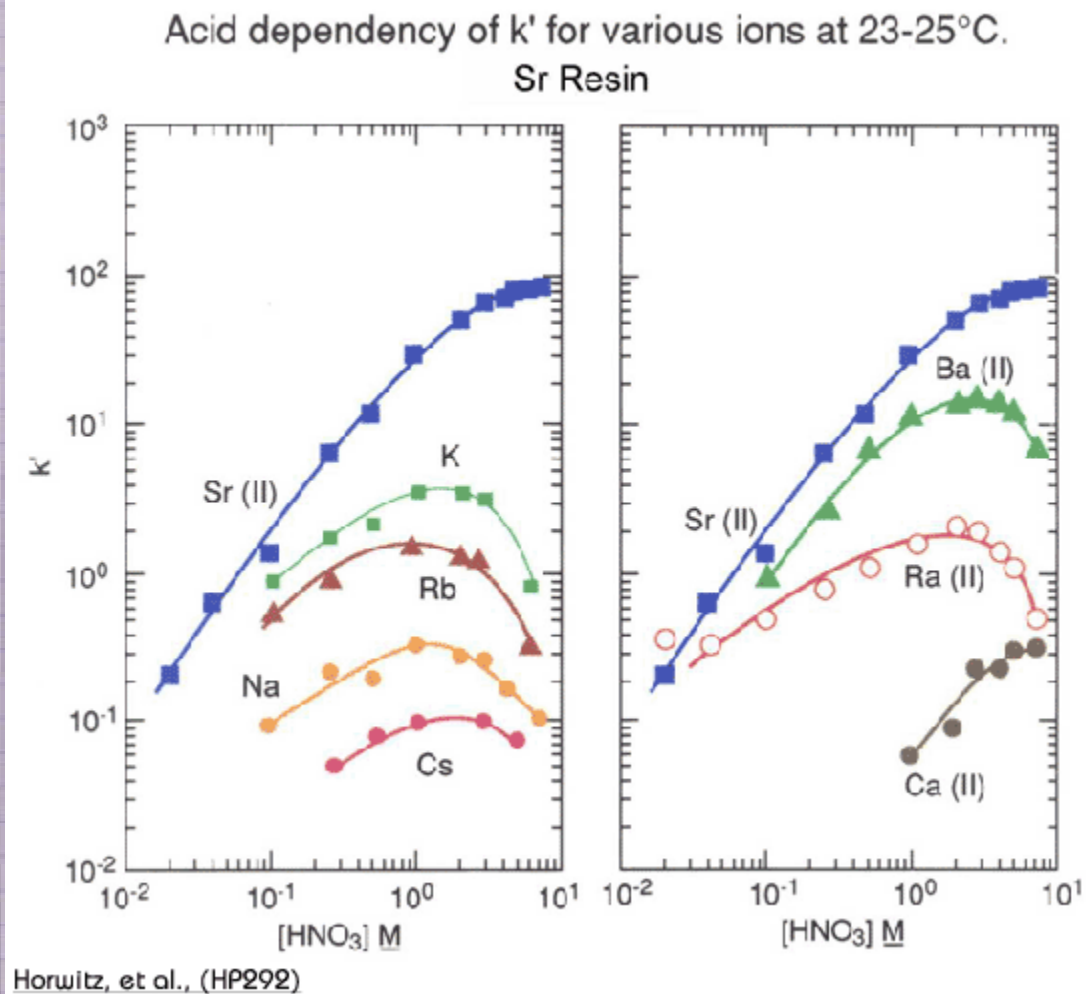


- Load 0.3M HCl – Pass Cd & Retain Sn
- Strip Sn with 1.0M HCl



# Sr in 10L of Seawater

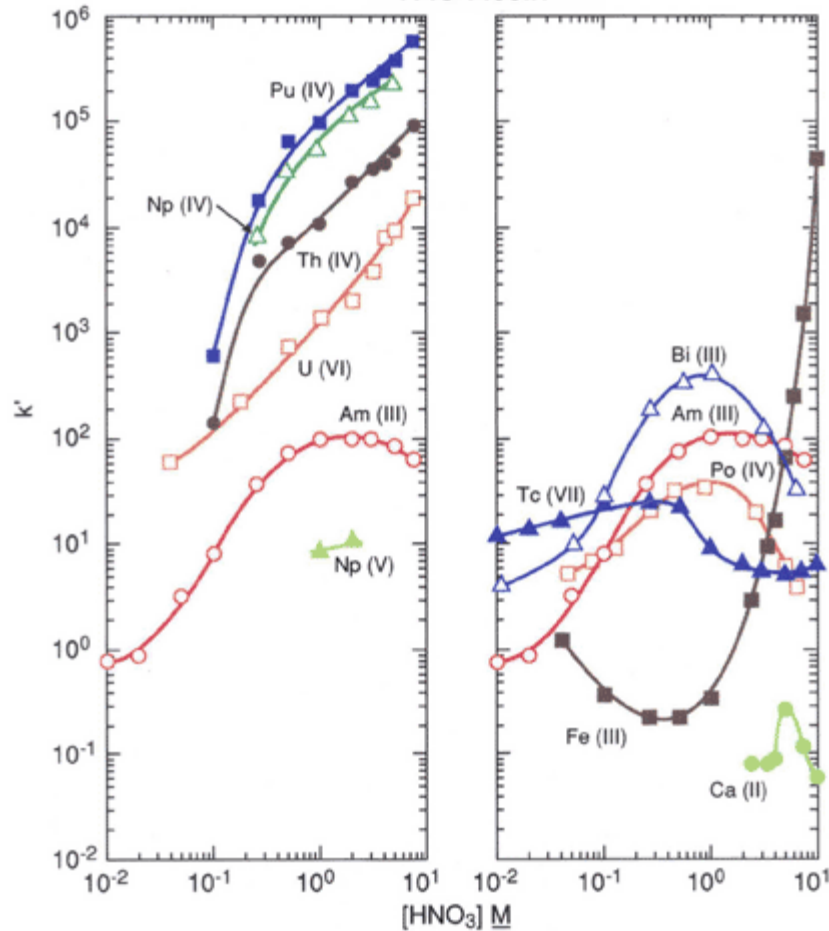
- Acidify to 0.5M  $\text{HNO}_3$
- Add 6g Oxalic Acid
- Adjust pH to 4
- Precipitate Ca, Ba & Sr
- Discard Supernate
- Wash with Deionized Water



- Destroy oxalic acid precipitate with  $\text{HNO}_3$
- Dilute to 30mL with 8M  $\text{HNO}_3$
- Pass solution through 6mL of Sr Resin

Figure 2

Acid dependency of  $k'$  for various ions at 23-25°C.  
TRU Resin



Horwitz, et al. (HP193)

# Interference of Po210 on Am Air Sample Analysis

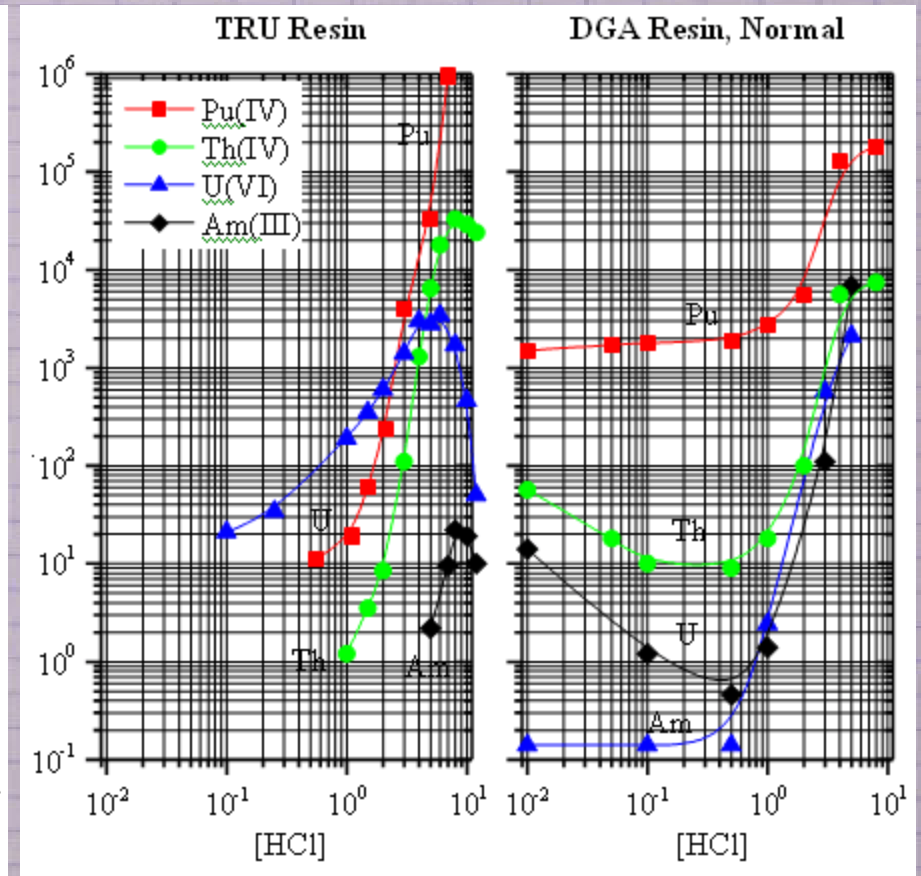
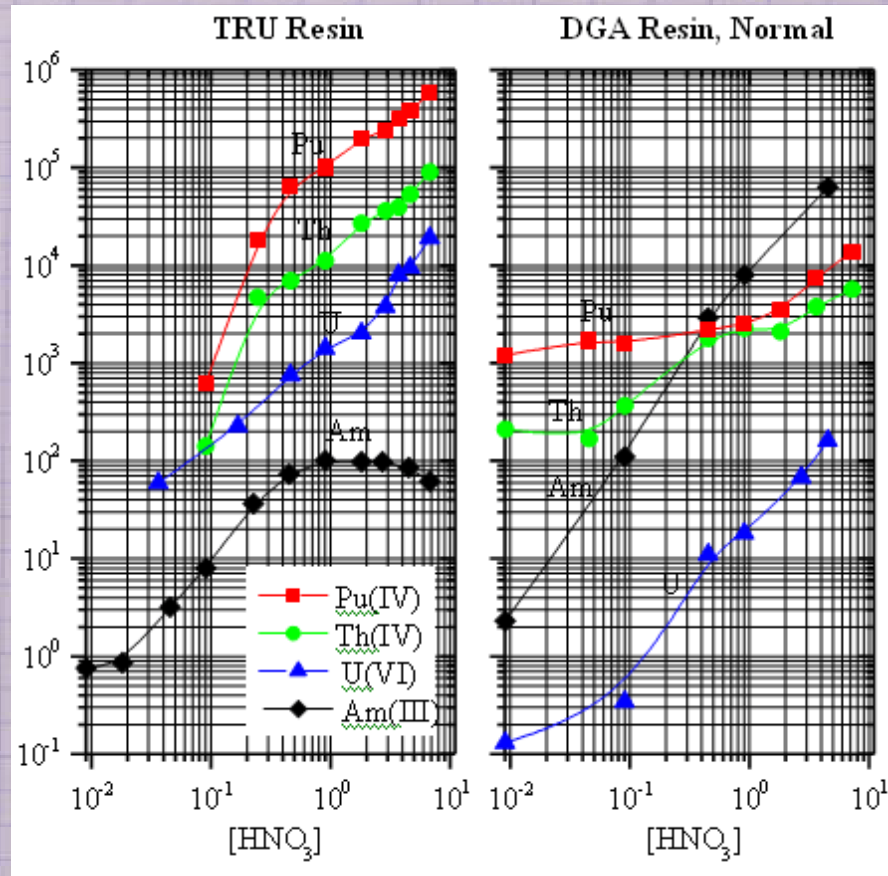
- Client reports having elevated Am243 tracer recoveries when separating with TRU resin
- Suggested additional 4x of 5mL 8M HNO3 rinses
- Then eluting the Am with 4M HCl

# Interference of U on Np sample results

- Samples had high concentration of U
- After separation with TEVA resin samples precipitated without Ti(III)Cl still had U
- Suggested Clean up of Np fraction with Ln resin and also
- Borrowed a suggestion from Sherrod Maxwell to add H<sub>2</sub>O<sub>2</sub> to ensure the U is in the +6 state and will not co-precipitate.

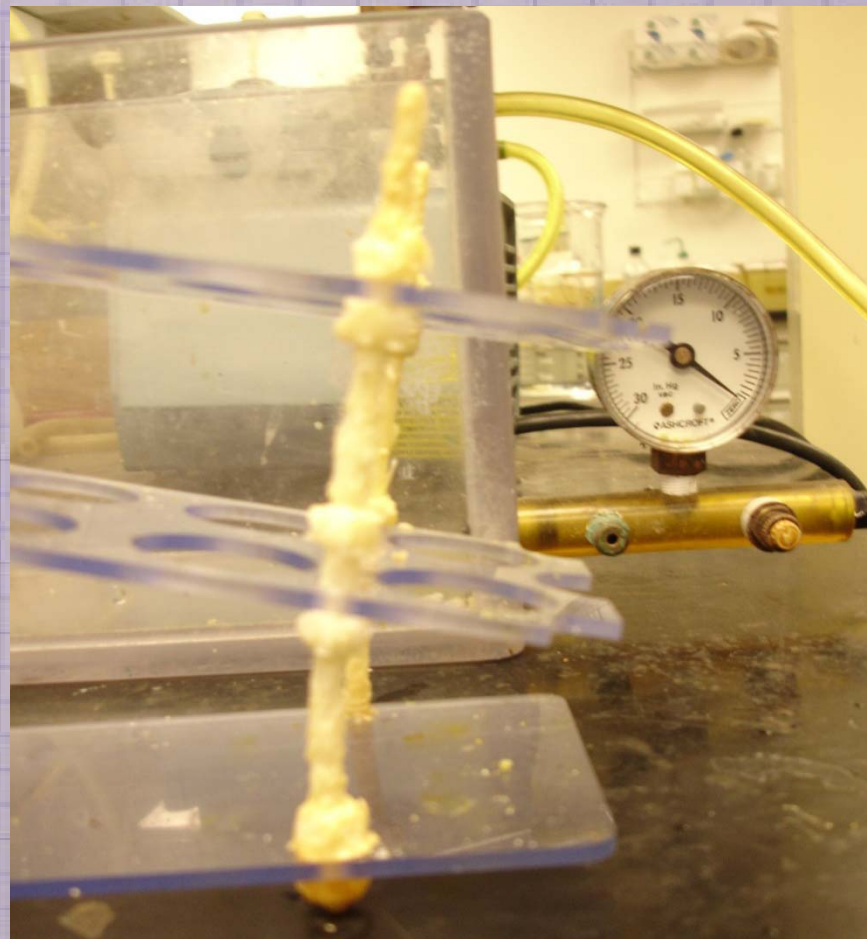


# Determination of Th in samples high in both phosphate and iron soil samples





# Weakened/Melted Support Rods in some 12 and 24 hole vacuum boxes



# Issues In-Progress

- Improvements to Radium Separation Methods
- Further testing of Resolve Filters  
3 $\mu$  PTFE Laminate Media

# Issues to be Busted

| 2010             |     |     |     |     |     |     |
|------------------|-----|-----|-----|-----|-----|-----|
| <b>January</b>   |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  |     |     |     |     | 1   | 2   |
| 3                | 4   | 5   | 6   | 7   | 8   | 9   |
| 10               | 11  | 12  | 13  | 14  | 15  | 16  |
| 17               | 18  | 19  | 20  | 21  | 22  | 23  |
| 24               | 25  | 26  | 27  | 28  | 29  | 30  |
| 31               |     |     |     |     |     |     |
| <b>February</b>  |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  | 1   | 2   | 3   | 4   | 5   | 6   |
| 7                | 8   | 9   | 10  | 11  | 12  | 13  |
| 14               | 15  | 16  | 17  | 18  | 19  | 20  |
| 21               | 22  | 23  | 24  | 25  | 26  | 27  |
| 28               |     |     |     |     |     |     |
| <b>March</b>     |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  | 1   | 2   | 3   | 4   | 5   | 6   |
| 7                | 8   | 9   | 10  | 11  | 12  | 13  |
| 14               | 15  | 16  | 17  | 18  | 19  | 20  |
| 21               | 22  | 23  | 24  | 25  | 26  | 27  |
| 28               | 29  | 30  | 31  |     |     |     |
| <b>April</b>     |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  |     |     |     | 1   | 2   | 3   |
| 4                | 5   | 6   | 7   | 8   | 9   | 10  |
| 11               | 12  | 13  | 14  | 15  | 16  | 17  |
| 18               | 19  | 20  | 21  | 22  | 23  | 24  |
| 25               | 26  | 27  | 28  | 29  | 30  |     |
| <b>May</b>       |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  |     |     |     |     |     |     |
| 2                | 3   | 4   | 5   | 6   | 7   | 8   |
| 9                | 10  | 11  | 12  | 13  | 14  | 15  |
| 16               | 17  | 18  | 19  | 20  | 21  | 22  |
| 23               | 24  | 25  | 26  | 27  | 28  | 29  |
| <b>June</b>      |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  |     | 1   | 2   | 3   | 4   | 5   |
| 6                | 7   | 8   | 9   | 10  | 11  | 12  |
| 13               | 14  | 15  | 16  | 17  | 18  | 19  |
| 20               | 21  | 22  | 23  | 24  | 25  | 26  |
| 27               | 28  | 29  | 30  |     |     |     |
| <b>July</b>      |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  |     |     |     | 1   | 2   | 3   |
| 4                | 5   | 6   | 7   | 8   | 9   | 10  |
| 11               | 12  | 13  | 14  | 15  | 16  | 17  |
| 18               | 19  | 20  | 21  | 22  | 23  | 24  |
| 25               | 26  | 27  | 28  | 29  | 30  | 31  |
| <b>August</b>    |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  | 1   | 2   | 3   | 4   | 5   | 6   |
| 7                | 8   | 9   | 10  | 11  | 12  | 13  |
| 14               | 15  | 16  | 17  | 18  | 19  | 20  |
| 21               | 22  | 23  | 24  | 25  | 26  | 27  |
| 28               | 29  | 30  | 31  |     |     |     |
| <b>September</b> |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  |     |     | 1   | 2   | 3   | 4   |
| 5                | 6   | 7   | 8   | 9   | 10  | 11  |
| 12               | 13  | 14  | 15  | 16  | 17  | 18  |
| 19               | 20  | 21  | 22  | 23  | 24  | 25  |
| 26               | 27  | 28  | 29  | 30  |     |     |
| <b>October</b>   |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  |     |     |     |     | 1   | 2   |
| 3                | 4   | 5   | 6   | 7   | 8   | 9   |
| 10               | 11  | 12  | 13  | 14  | 15  | 16  |
| 17               | 18  | 19  | 20  | 21  | 22  | 23  |
| 24               | 25  | 26  | 27  | 28  | 29  | 30  |
| 31               |     |     |     |     |     |     |
| <b>November</b>  |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  | 1   | 2   | 3   | 4   | 5   | 6   |
| 7                | 8   | 9   | 10  | 11  | 12  | 13  |
| 14               | 15  | 16  | 17  | 18  | 19  | 20  |
| 21               | 22  | 23  | 24  | 25  | 26  | 27  |
| 28               | 29  | 30  |     |     |     |     |
| <b>December</b>  |     |     |     |     |     |     |
| SUN              | MON | TUE | WED | THU | FRI | SAT |
|                  |     |     |     | 1   | 2   | 3   |
| 4                | 5   | 6   | 7   | 8   | 9   | 10  |
| 11               | 12  | 13  | 14  | 15  | 16  | 17  |
| 18               | 19  | 20  | 21  | 22  | 23  | 24  |
| 25               | 26  | 27  | 28  | 29  | 30  | 31  |

**Busted?**

¿ Questions ?