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2012 Radiochemistry Progress Report

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"Learning from Plutonium and Uranium Workers"

WASHINGTON STATE UNIVERSITY
World Class. Face to Face.

Radiochemistry Laboratory Operations

- Building Maintenance and Modification
- Laboratory Equipment
- Method Development
- Sample Processing and Analysis

Building Maintenance and Modification

- HVAC repairs and modifications

- Building exterior exclusion area

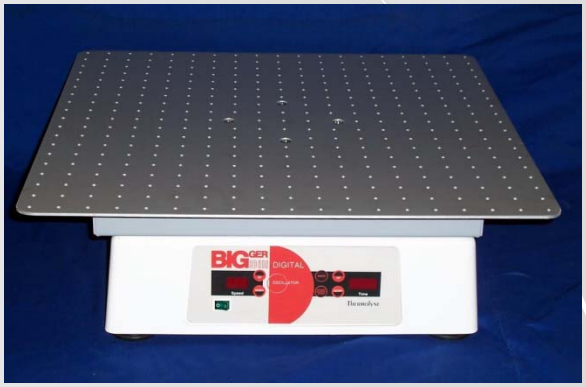
Laboratory Equipment

- Hotblocks, Shaker, and Supplies
- Instrument Networking
- General Laboratory Equipment
- Alpha Spectroscopy

Hotblocks, Shaker and Supplies

SCP Sciences DigiPREP MS

Thermolyne Big Bill

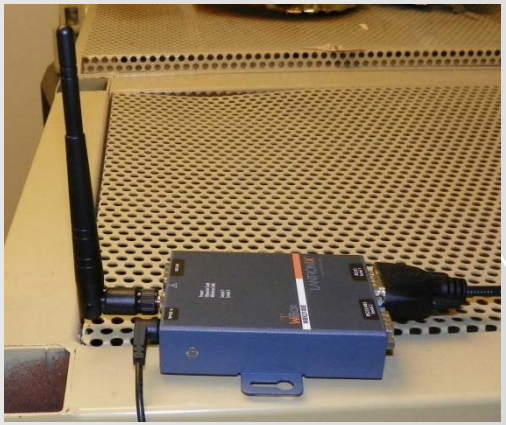


Environmental Express SC-150

Instrument Networking

LABTRONIX WiBox

- 802.11n wireless
- Serial port connectivity
- Remote administration
- Communicates with Watlow F4s and Anton Paar controllers



Watlow F4s

999 programmable ramp/soak settings

Direct input and network programmable/controllable

Data logging

Intuitive user interface

"Smart" over/undershoot control

General Laboratory Equipment

Quincy Laboratories Model 20AF

- Rapid cycling of microwave digestion vessels
- Small volumetric glassware
- Electodeposition end caps

Whirlpool Dishwasher

- Superior cleaning
- Dispenses detergent and Radiac Wash
- Requires manual reset for second rinse

Alpha Spectroscopy

AlphaVision v. 5.6.2 update installed

- Isotope database content replaced with ICRP 107 data
- USTUR tracer dilutions and calibration sources added to database

Detectors calibrated and placed into service

Method Development

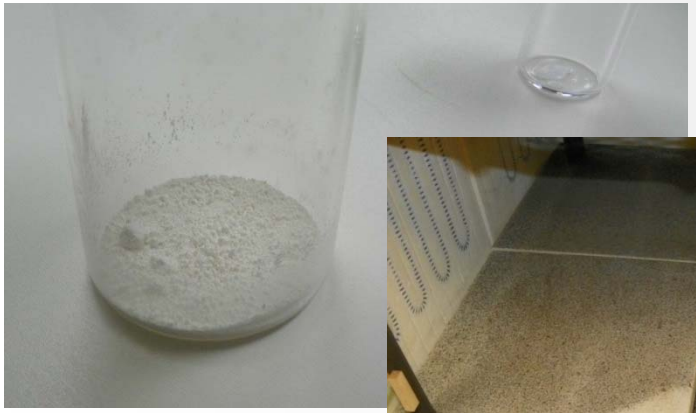
- Marrow Separation
- Ashing
- Microwave Drying
- Microwave Digestion
- Separation Techniques
- Electrodeposition

Marrow Separation

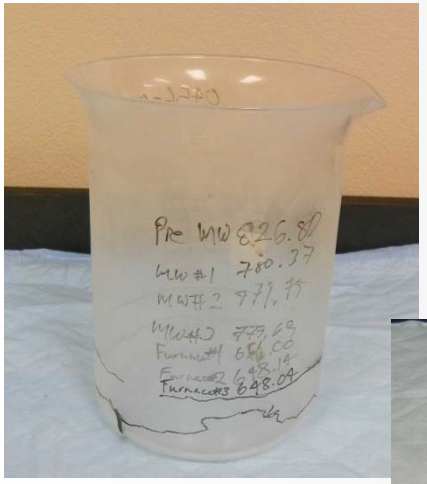
- Determine analytes of interest concentrations in bone marrow
- Large bones contain 2-20g of red and/or yellow marrow
- Ashing reduces mass to ≤0.1%

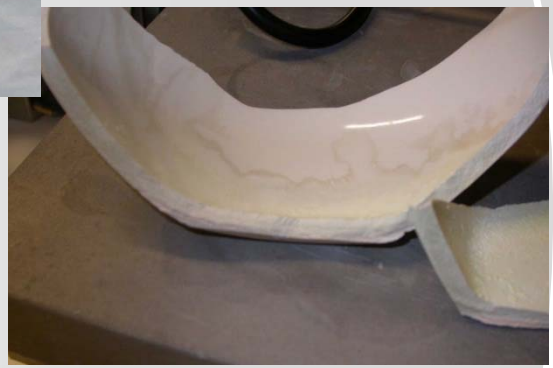
Ashing

- High vs. Low Temperature
- Kiln Furniture Performance
- Vessel Performance



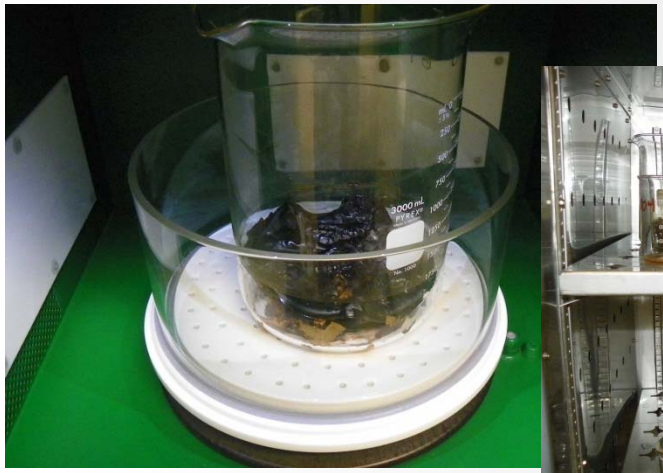
Vessel Performance

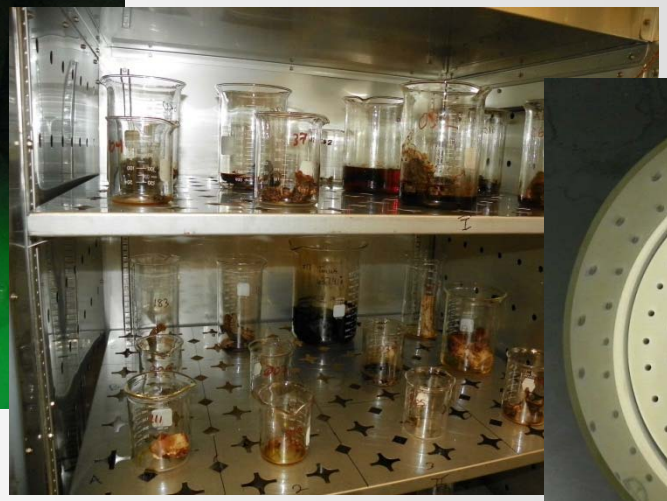


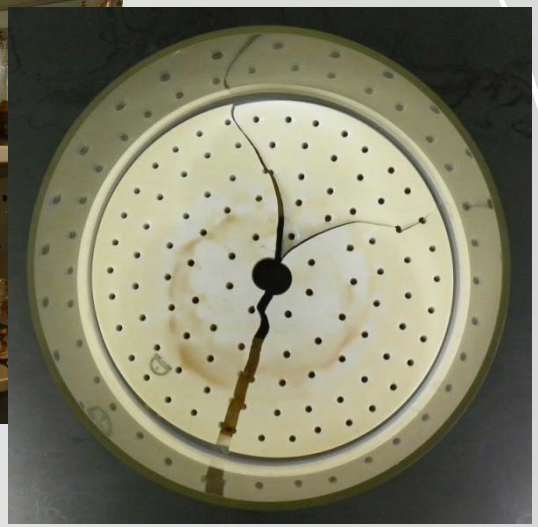


Microwave Drying

- Sample throughput limits
- Sample mass advantages
- Equipment limits

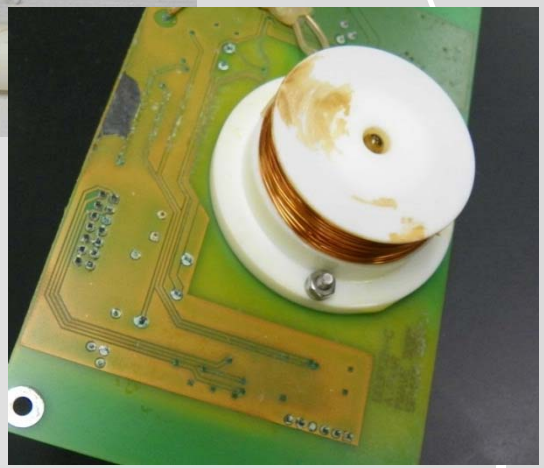






Microwave Digestion

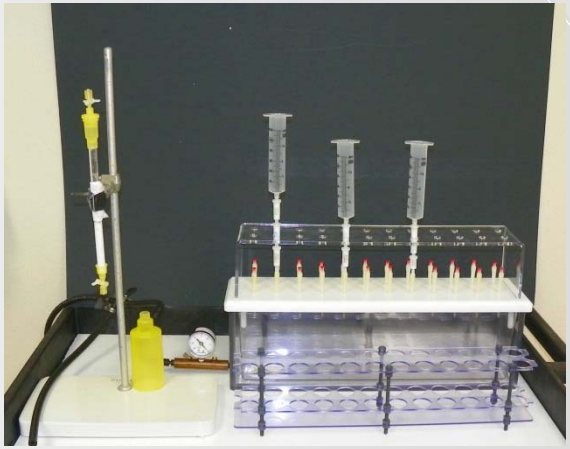
- Rapid digestion
- Adaptability and reagent selection
- Sample mass limits
- Equipment limits



Separation Techniques

Transition from columns to cartridges

- Cartridge selection
- Procedure development and documentation



Rongalite vs. ammonium iodide

- Value of hydrofluoric acid in system

Electrodeposition

- Phoenix electrodeposition unit setup and tuning

- Reagent selection – sulfuric acid v. sodium sulfate

Sample Processing

Case No	Analyte	PB/WB	Ashed	Dissolved	Analyzed	Method
0303	$^{239, 240, 241}$Pu	WB		11	11	ICP/MS
0407	$^{239, 240, 241}$Pu	WB		14	14	ICP/MS
0456	$^{239, 240, 241}$Pu	WB	35	35		Pending
0503	$^{239, 240, 241}$Pu	WB		1	1	ICP/MS
0631	$^{239, 240, 241}$Pu	WB		3	3	ICP/MS
0706	$^{239, 240, 241}$Pu	WB		1	1	ICP/MS
0740	$^{239, 240, 241}$Pu	WB	41	41	48	ICP/MS
0821	$^{239, 240, 241}$Pu	PB		1	2	ICP/MS
0834	$^{239, 240, 241}$Pu	WB		6	6	ICP/MS
0846	^{241}Am	WB			32	ICP/MS
1031	$^{235, 238}$U	WB	34	34	34	ICP/MS
1060	$^{235, 238}$U	WB	25	25	15	ICP/MS
1063	$^{235, 238}$U	PB		37	37	ICP/MS
Totals			165	209	204	

Sample Processing