New Mexico State University Department of Chemistry and Biochemistry

Antonio Lara
Jamie Vela
Nick Beltran
Emilio Rivera
Jared Domenico
Seal Ortega-Rodriguez
Erika Velasco
Beau Badonie

Dr. Robert Marquez

Share what we know about Uranium

Abatement - Potable Water

Meet partners in this endeavor to produce Potable water

Share what we need to succeed

Uranium Abatement - Potable Water

are beyond proof-of-concept, so ……

ppropriate Solution – Mother Earth Heals

ommunity involvement/share - Collaborate/

Partnership - Contacts/consultant

esources, to include disposal (cradle-to-grave)

Soil Samples, Uranium Standards, Water samples

udents

hat We Need to Succeed

ontacts/consultants - Support the continuation

Appropriate Solution

- Water purification, safe potable water from **ANY water sourc**
  - Abate pathogens, toxic heavy metals, uranium
- **Simple, inexpensive household systems**
- Provide
  - Household system
  - Workshops – health, method, sampling, analysis
  - Sharing quality control, self-sustaining
- Clay Pellets (Mother Earth provides)

Pellets (Mother Earth):

What's NOT Appropriate: RO and Distillation and Whole House Kinetic Degradation

(Next 4 slides)

Historical origins - Dr. Robert Marquez's work in Mexico √

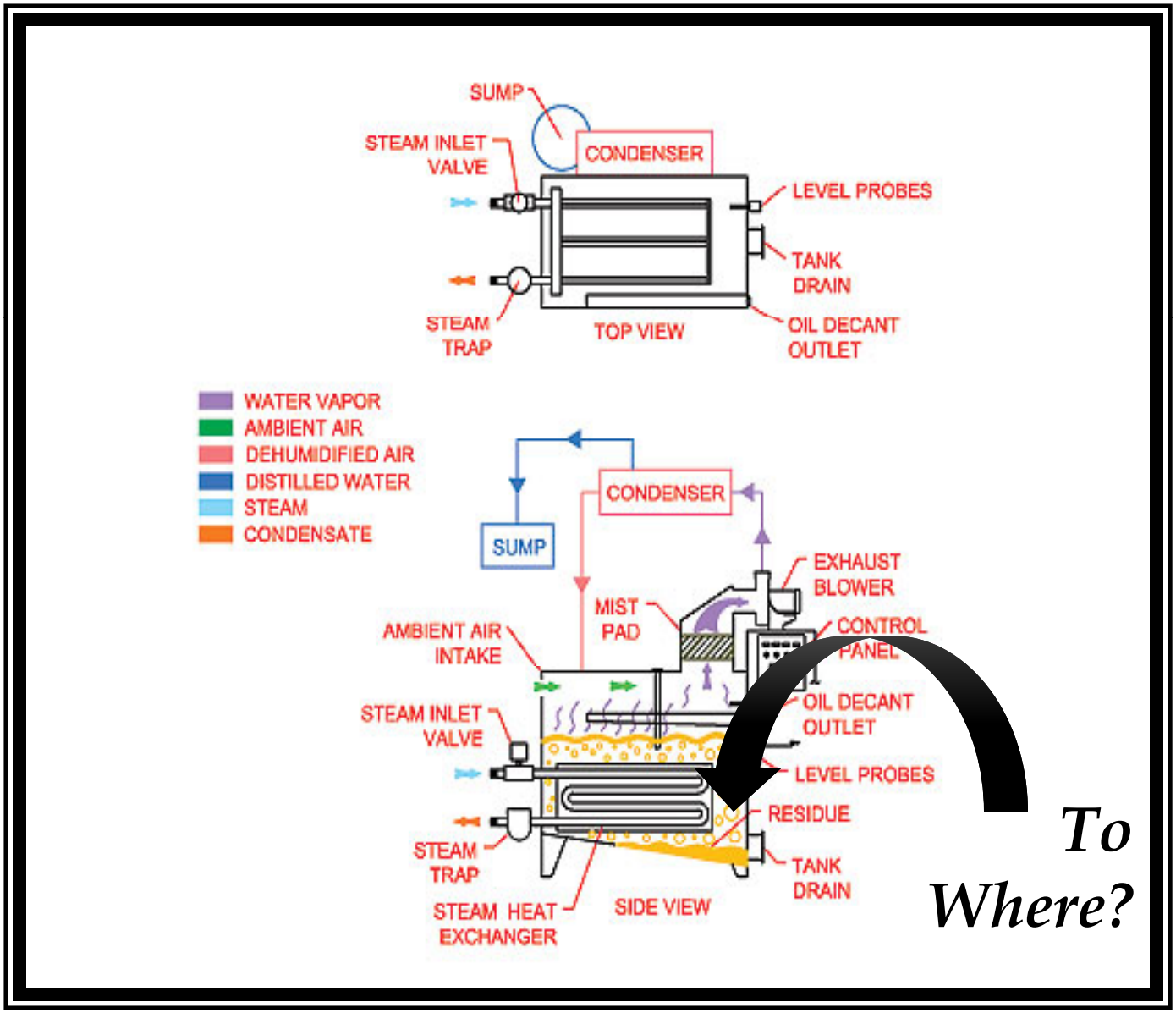
BUT in water, clay makes a mud suspension

Clay Pellets (Mother Earth)

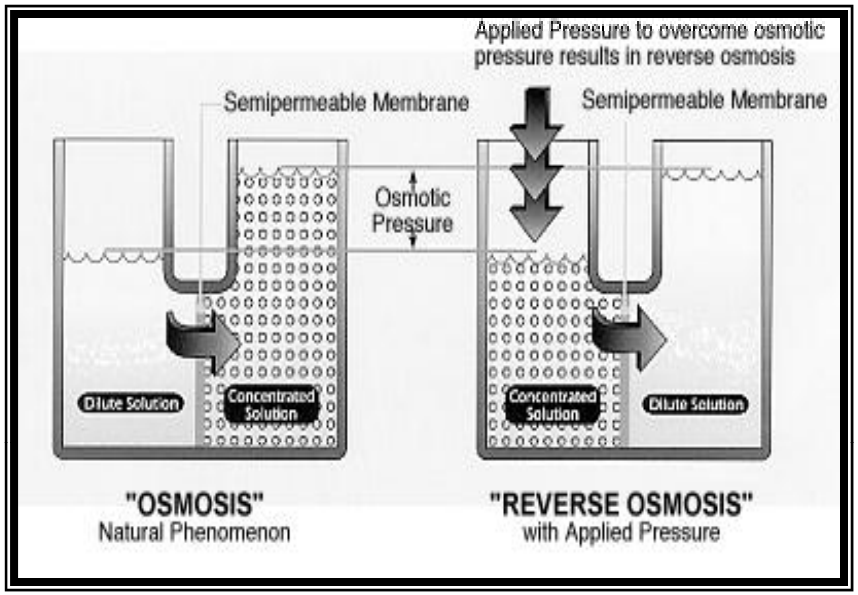
Distillation

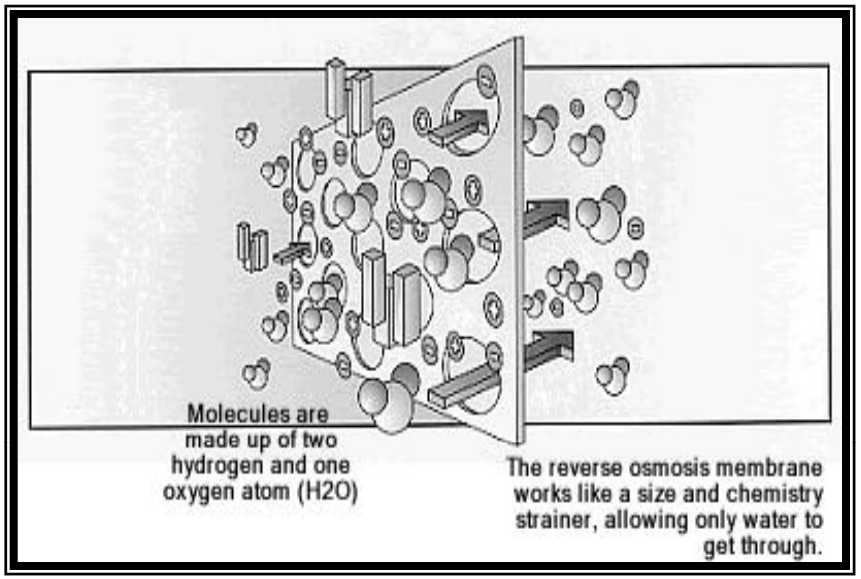
Price $549.95

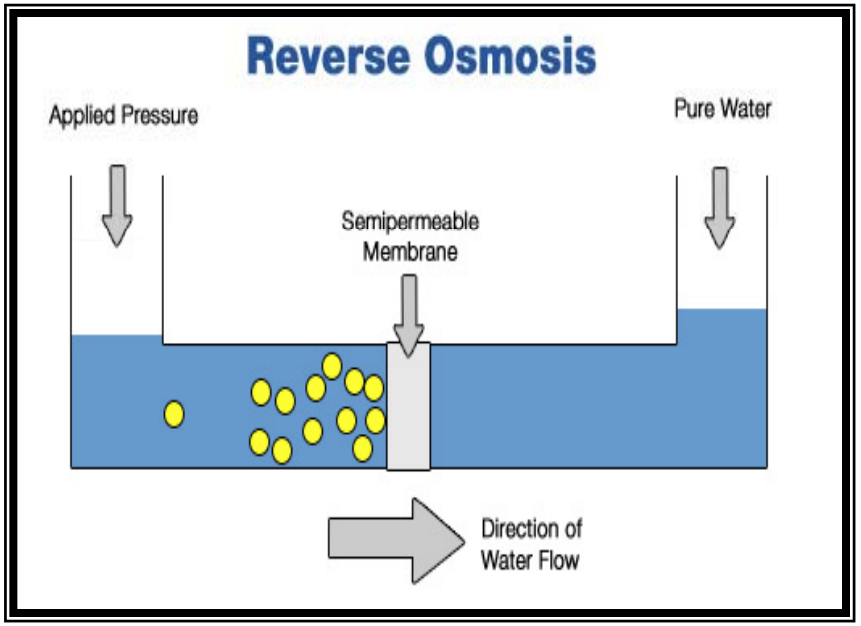
Price $129

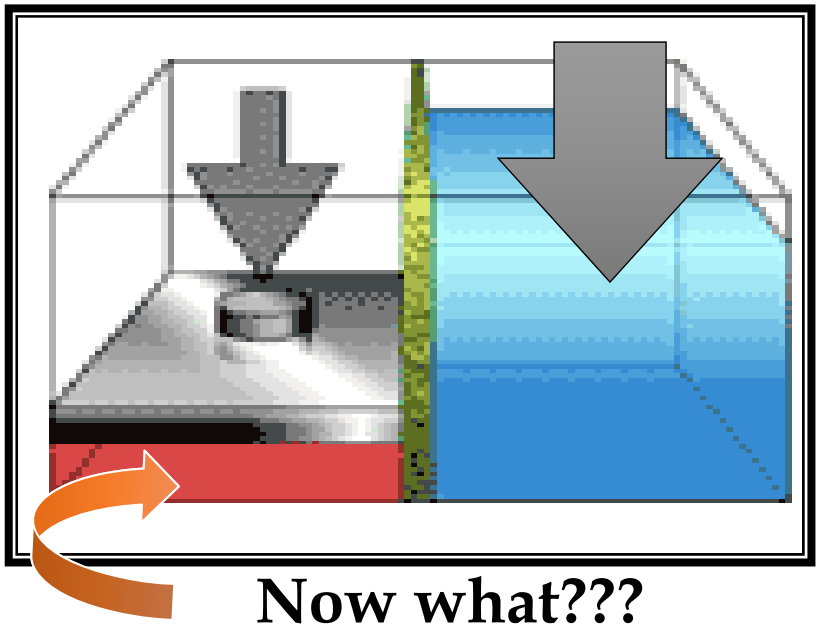


Reverse Osmosis









Now what???

Whole House Kinetic Degradation Fluxion (KDF)

BUY NOW IN USA!

US $359.95

+ $19.95 shipping

How does KDF Work?

In short, the KDF redox process works by exchanging electrons with contaminants. This "give and take" of electrons converts many contaminants into harmless components. During this reaction, electrons are transferred between molecules, and new elements are created. Some harmful contaminants are changed into harmless components. Others are electrochemically bound to the KDF media.

Whole House Kinetic Degradation Fluxion (KDF)

$Met^{n+} \bullet x(H_2O)\ y(OH^-)$; (x + y typically = 6)

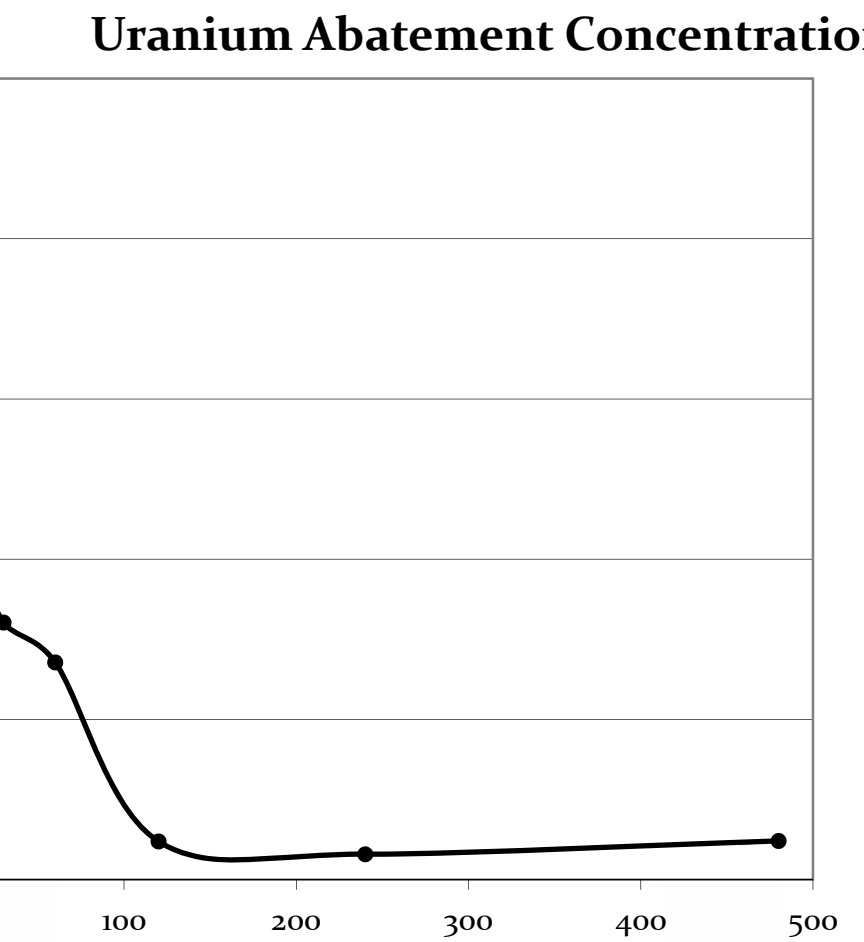
Only if

n = 0 or n = y Insoluble

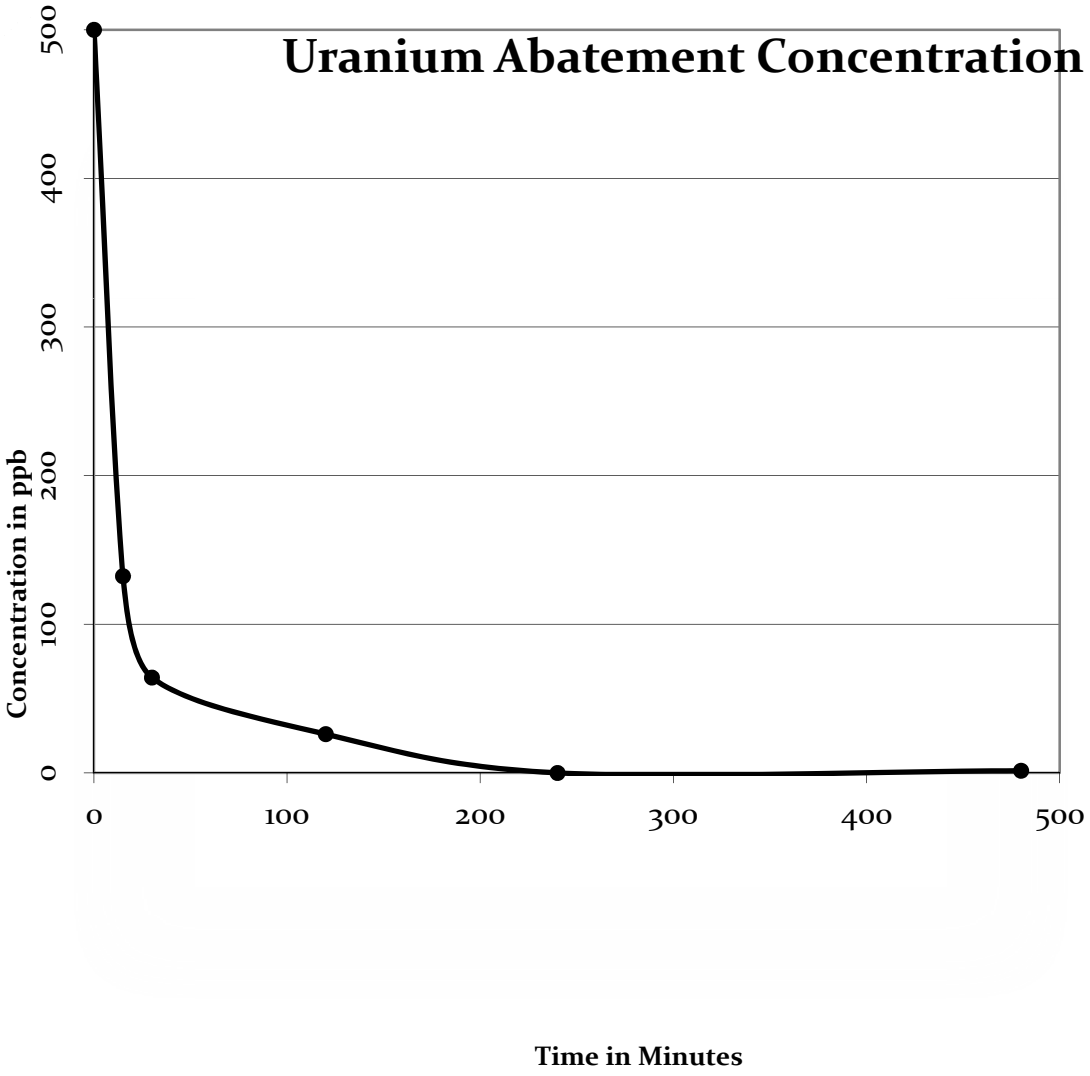
Solubility is very pH and pE dependent

ICP/MS Results

Berino Soil

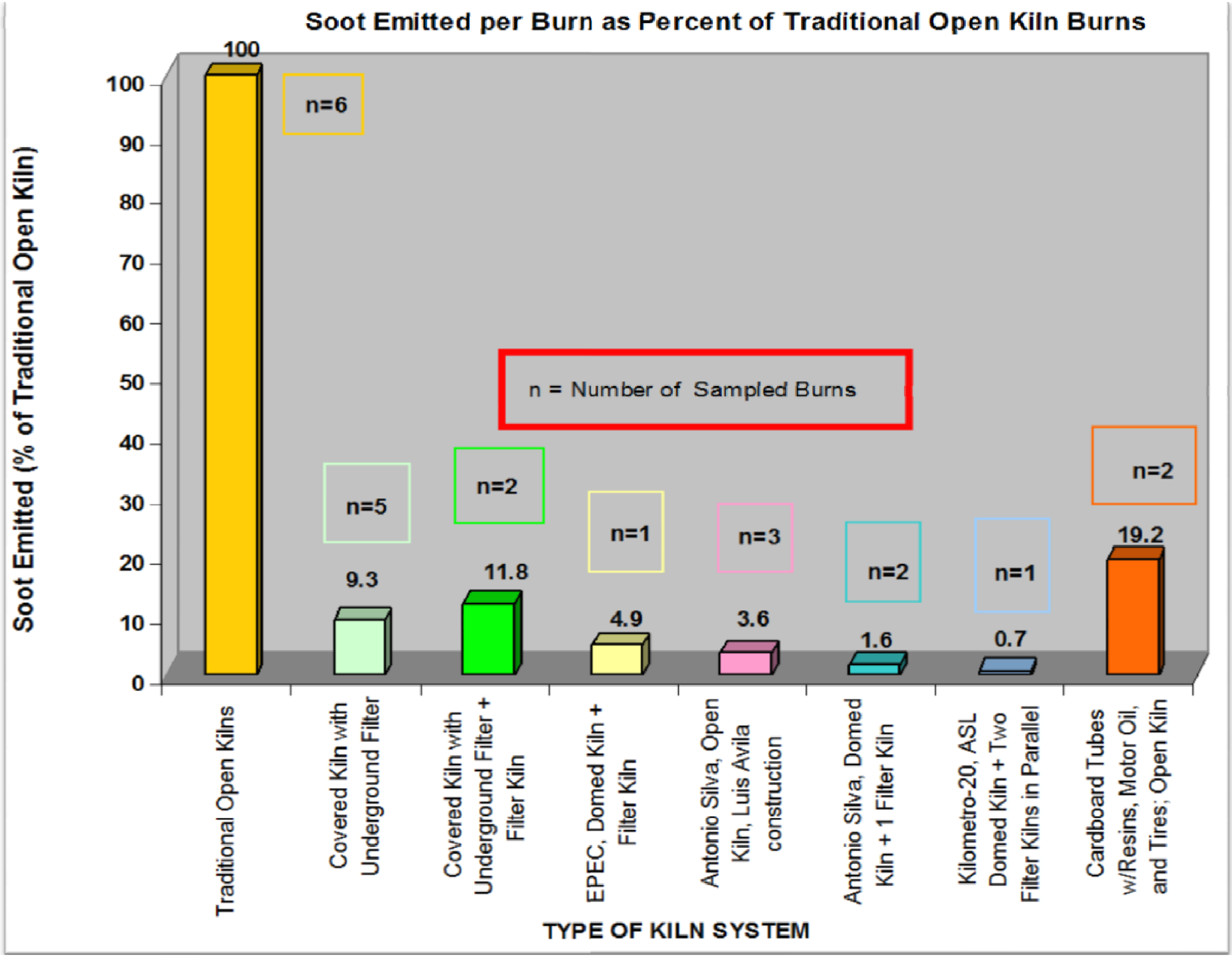


Gallup Soil



MK-3 Results

MK-4: Compare


Soot Emitted per Burn as Percent of Traditional Open Kiln Burns
Soot Emitted (% of Traditional Open Kiln)
100
90
80
70
60
50
40
30
20
10
0
n=6
n=5
n=2
n=1
n=3
n=2
n=1
n=2
n = Number of Sampled Burns
100
9.3
11.8
4.9
3.6
1.6
0.7
19.2
Traditional Open Kilns
Covered Kiln with Underground Filter
Covered Kiln with Underground Filter + Filter Kiln
EPEC, Domed Kiln + Filter Kiln
Antonio Silva, Open Kiln, Luis Avila construction
Antonio Silva, Domed Kiln + 1 Filter Kiln
Kilometro-20, ASL Domed Kiln + Two Filter Kilns in Parallel
Cardboard Tubes w/Resins, Motor Oil, and Tires; Open Kiln
TYPE OF KILN SYSTEM

WHY SOILS?

Manageable

Safe to transport

Will not leach

Inexpensive

Ease of final disposal

Robust (Temperature, Redox, pH)

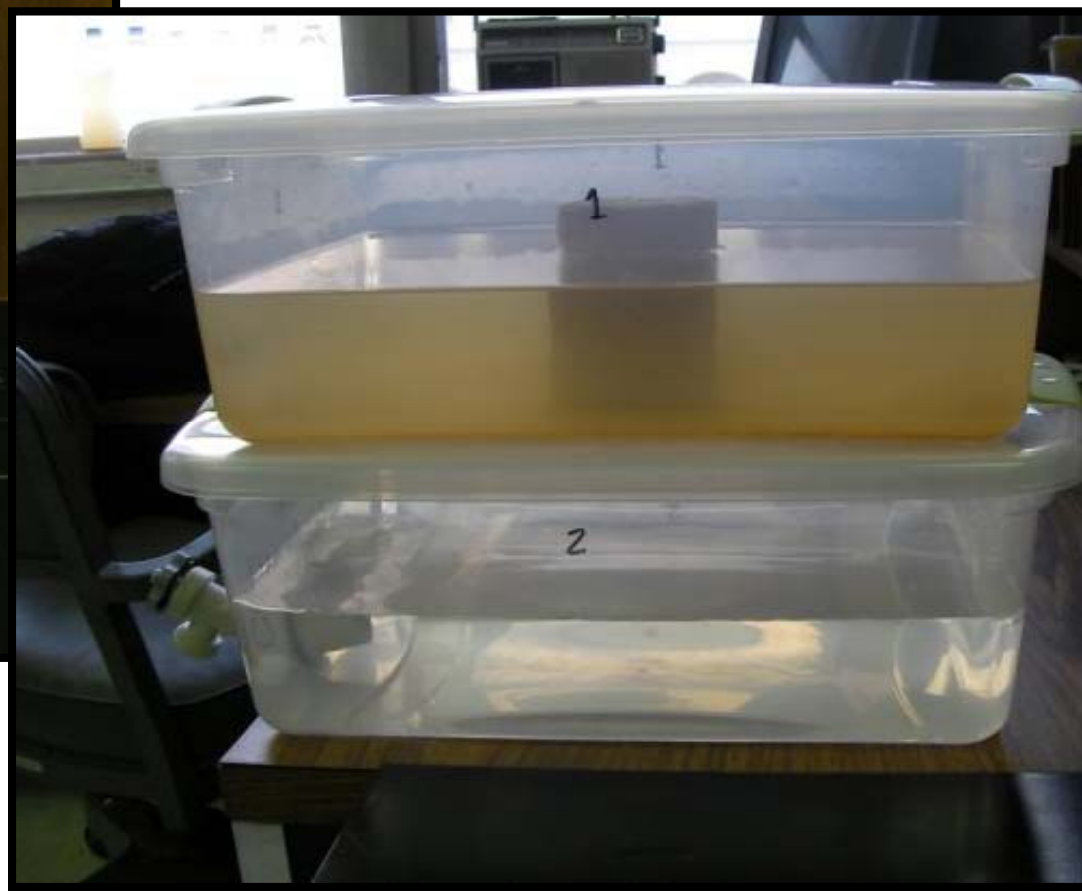
Vitrification for added safety

Research Lab

ECOFILTRO

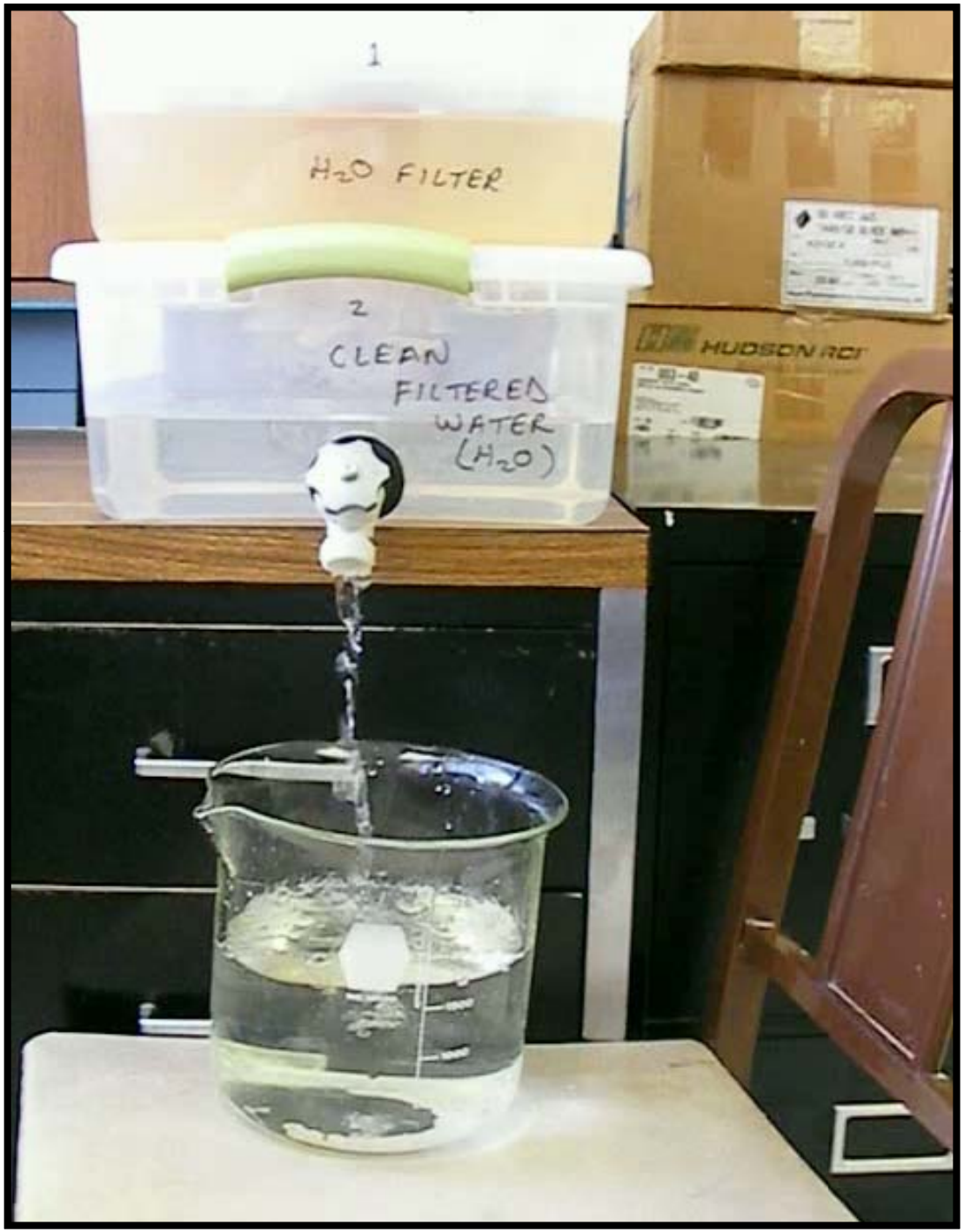
Arroyo water before & after

oyo water at start of filter process



Arroyo water after 10 h

Arroyo water after 10 hours



Potable water, pouring for immediate consumption

Simple

Inexpensive

Long life-time

No energy

No moving parts

Elegant

Appropriate Technology

Clays

Universally available materials

$$$ ↓

simple, easy

source of income

Sustainable, long-term Quality Assurance

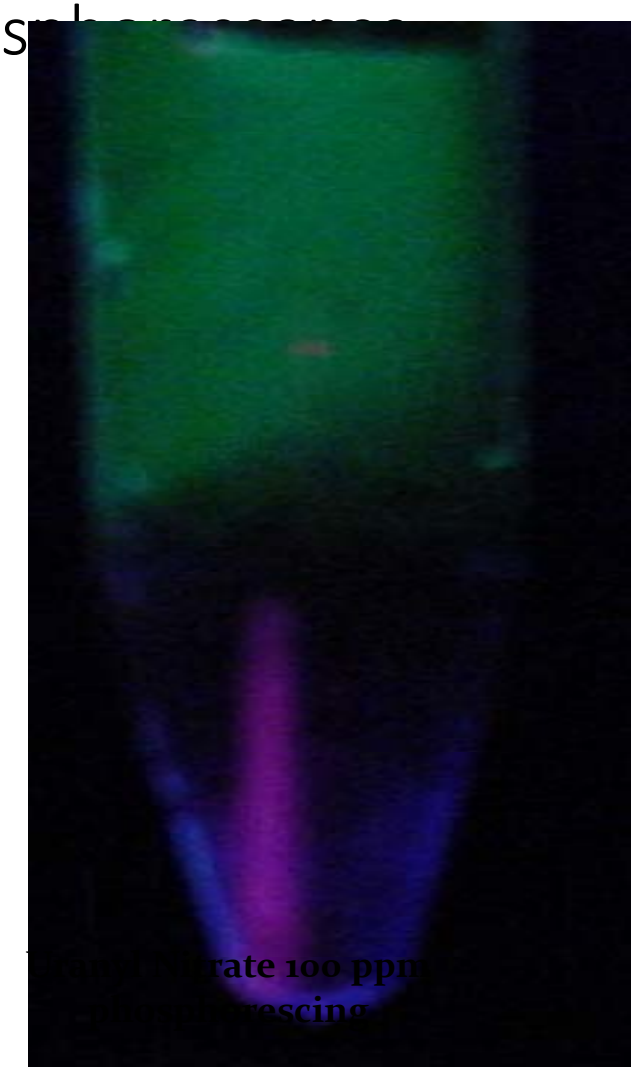
- Sampling (unregulated)
- Materials
- Student funding
- ICP/MS,instrumentation vs outsourcing

Research

LS 55 Luminescence Spectrometer

Allows measurment of phos

- Uranium Nitrate or Uranyl Nitrate $UO_2(NO_3)_2 \bullet 6H_2O$
- When exposed to ultraviolet light, U is visible as a faint green glow



ICP-MS
(Inductively Coupled Plasma – Mass Spectrometer

LC-MS
Gas chromatogra
– mass spectromete

Surface / Pore Size Analyzer

Handheld

X-Ray Fluorimeter

Problem

What we know / Methods

Quality assurance

Time Table

Friends

Conclusion

Time Table

Proof-of-concept (Bench Model)

Lab prototype/Pellet fabrication-publication in process

Prototype in- Situ, Tsaile, or Chapter Site chosen

Full system, to include their own pellet fabrication, pellet distribution, dissemination, quality assurance

Assistance Needed

- Info for proposals
  Illnesses/Deaths/Compensation- Statistics
- Strong Letters of Recommendation
- Funding Sources

1. ICPMS/Materials/Analysis
2. Stipends
3. Continue with the Time Table

In a nutshell

ay pellets will abate uranium

Vhen optimized, pellets can be used for other heavy metals a
any other contaminants worldwide

ocial Entrepreneurship

1. **$$$ for pellet maker**
2. **Pellet fabrication and dissemination**
3. **Pellet Fate**

Iealthier Society

Thank you

AISES
Alcopox