USING ERAS TO PLAN CLEANUPS AND MEASURE SUCCESS

Harry Compton and Mark Sprenger
Environmental Response Team

We know we can change this

Palmerton, PA, 1980; Blue Mountain

To this

Palmerton, PA, 1990

We can demonstrate revegetation as well as changes in chemical form and bioavailability of metals

But how do we demonstrate that the remediation is successful?

What do we need to know?

What is the land use? What are the remediation goals?

(Currently residential land use is not an option, unless the contaminants do not pose a human health risk.)

But how do we know we have met our goals?

- Is the site now an attractive nuisance?
- Have we remediated the correct risk drivers?
- Could different contaminants be presenting unacceptable risk after the remediation?

Basically

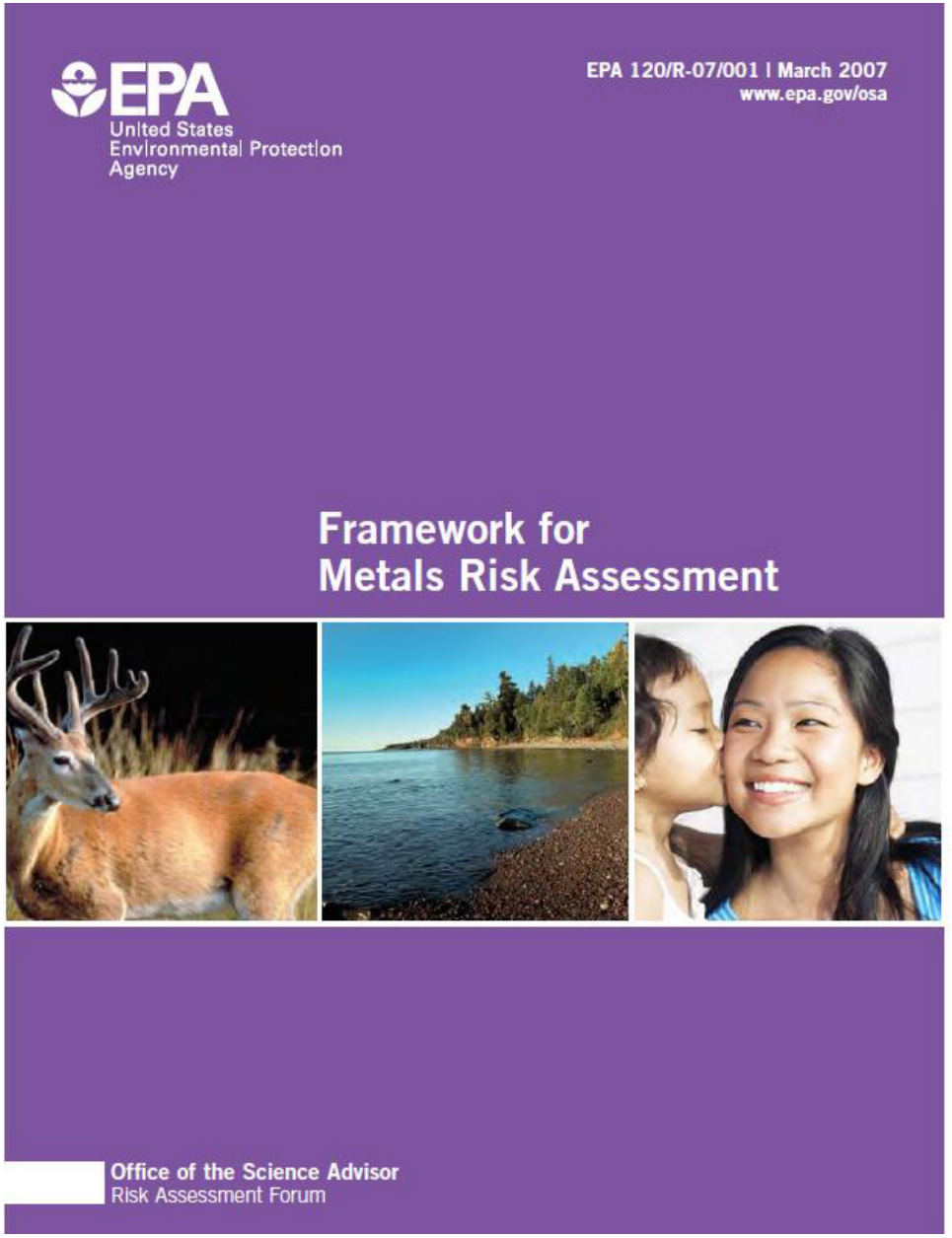
What are the remediation performance measures?

In order to answer those questions; what other questions do we need answers to?

- What are all of the contaminants of potential concern (COPCs) by habitat?
- What are the important exposure pathways?
- What are the concentrations of other contaminants, which are not currently important COPCs?

Where do we get this information?

We start with a good risk assessment

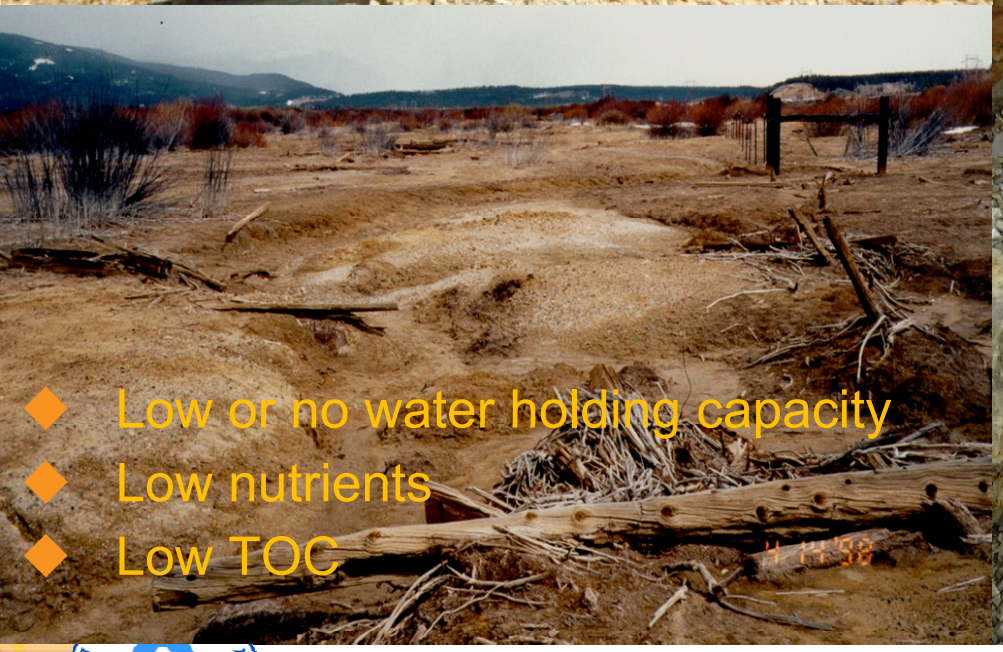

EPA
United States
Environmental Protection
Agency
EPA 120/R-07/001 | March 2007
www.epa.gov/osa
Framework for
Metals Risk Assessment
Office of the Science Advisor
Risk Assessment Forum

For Mining Sites we typically need to know:

- If observed impacts and/or risks are physical and/or agronomic or contaminant dominated
- What are the current chemical forms and under what conditions will they change chemical form?

Physical Impact vs Chemical Risk

If you are in the mine, on the waste rock, standing on tailings or bag house material, you are standing on something that has few characteristics of a soil:



- Low or no water holding capacity
- Low nutrients
- Low TOC

What contaminants (metals) are toxic to what organisms (assessment endpoints)

Cd through food chain

Pb through direct sediment ingestion

Cu or Zn through direct water exposure

When contaminants move, they can change form and expose different receptors – terrestrial areas can be the source of risk to the aquatic system

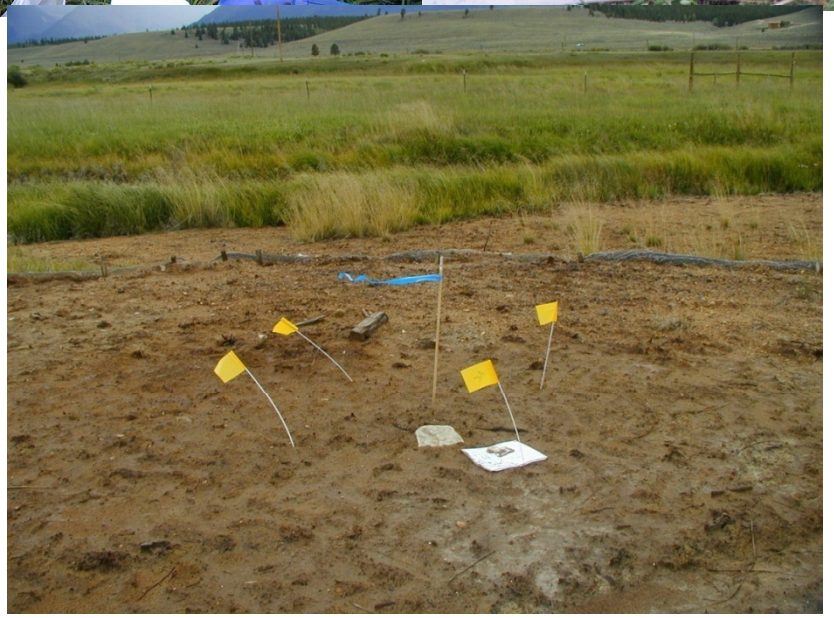
Why do all that?

- Risk reduction can be demonstrated through measures of toxicity and contaminant mobility – it is your performance measure.
- The risk assessment is the basis and baseline for the evaluation of the performance of the remedy.
- However, the acceptability of the remediation may remain an issue.

Earthworm *(Eisenia foetida)* Assays - Survivorship & Biomass/Organism

Sample	Untreated Survival (%)	Untreated Biomass (mg)	Treated Survival (%)	Treated Biomass (mg)
CL	0	NA	100.0	329.3
CO	0	NA	98.9	323.0
MB/ME	0/0	NA	90.0	372.0
RA/RB	0/0	NA	10.0*	280.3
Ref. A	-	-	98.7	244.0
Upst. Ref.	-	-	96.7	196.0
Lab Con.	100	not measured	100.0	258.6

* significantly < reference samples and/or control sample



- Body burden data can also be used as input to dietary exposure models.
- However, the performance measure can not be “statistically significant accumulation above background.”
  There will be accumulation above background.
- The question is whether or not the amount of accumulation is acceptable? This question is answered through the risk assessment process.

Future land use plays a part in the acceptability of the remediation technology especially in relation to human health risk

A site strategy must be developed to accomplish the site goals and establish realistic expectations and remedy success evaluation benchmarks, remember:

The total soil concentrations will not significantly change.

There will be statistically significant accumulation above background of something; however, that does not mean the action was not a success.

Contact Information

Harry Compton, ERT
(732) 321-6751
compton.harry@epa.gov

Mark Sprenger, ERT
(732) 906-6826
sprenger.mark@epa.gov