

Groundwater Analysis Strategy Meeting



Presentation Overview

- ▶ Review
- ▶ Data Overview
- ▶ New analyses
- ▶ Considerations for next steps

Database

- ▶ URS Molycorp Database, V. 8.1 dated 11/30/04
- ▶ Just received new version data 2/15/05
 - Will re-run analyses using this version

Preliminary List of Analytes

Aluminum

Cadmium

Chromium

Cobalt

Copper

Iron

Lead

Manganese

Molybdenum

Nickel

Sulfate

Zinc

Conceptual Chemistry Data Analysis Approach

- ▶ What?
 - Substances
- ▶ Where?
 - R, M, T designations
 - Aquifer type
- ▶ When?
 - Pattern over time
 - Consistent, spill event
- ▶ To what degree?
 - Frequency of exceedence
 - Magnitude of exceedence – Does this matter?

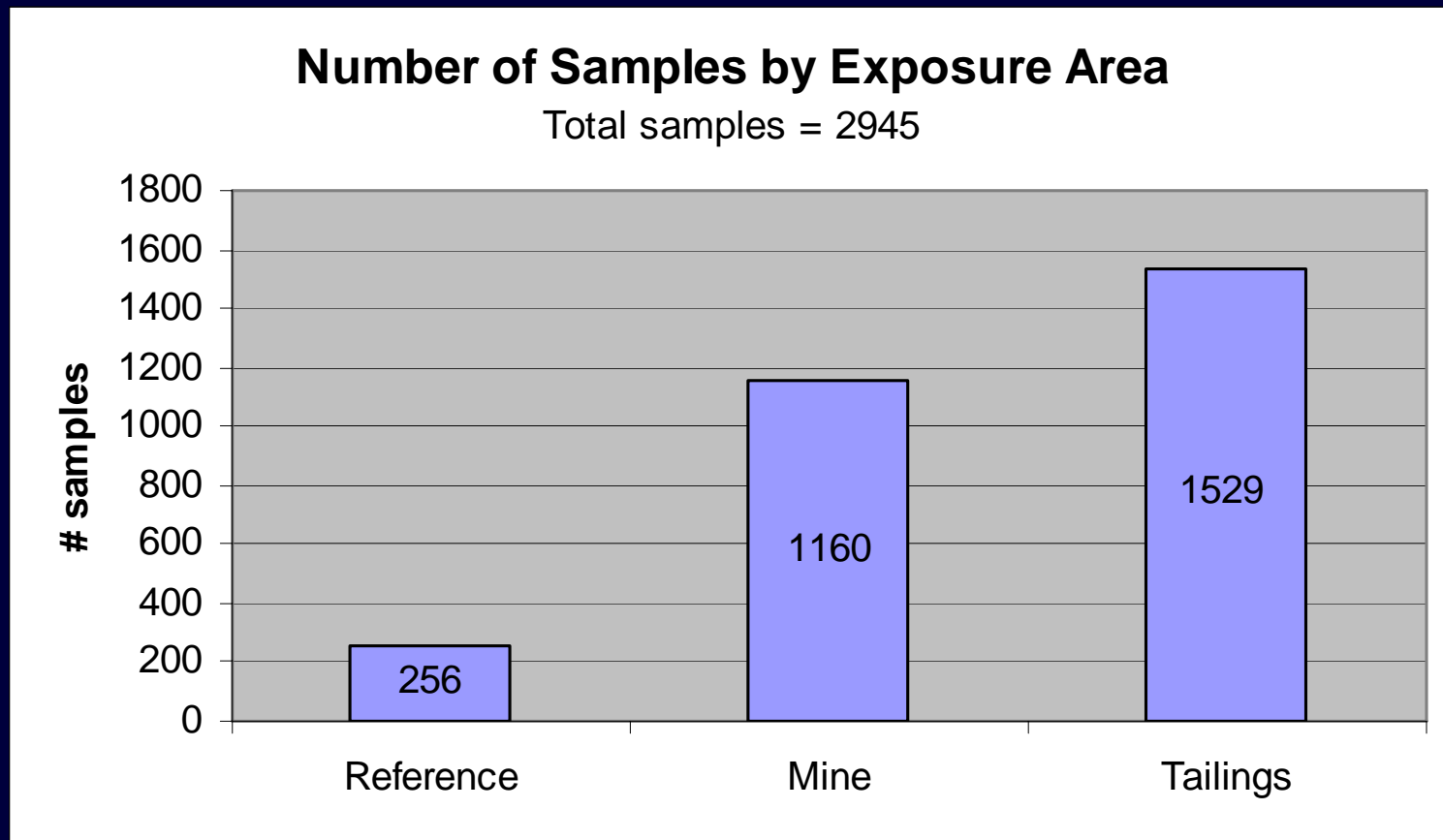
Water Quality Standards

- ▶ New Mexico State Standards
 - 20.6.2 NMAC, New Mexico Water Quality Control Commission Regulations
 - 20.6.2.3103 Standards for groundwater
 - Dissolved fraction only
 - 3 types of standards
 - Human Health
 - Other domestic
 - Irrigation

Data Overview

- ▶ Validated vs. non-validated data
- ▶ Sample sizes
 - M, R, T
 - Reference vs. assessment
 - Aquifer types
 - Direct comparisons for ref vs. assess
 - Time
 - Years
 - months

Sample sizes by Exposure Area



Aquifer type (“wb_zone”) comparisons

Aquifer type (“wb_zone”) comparisons

▶ Reference

- Alluvial Aquifer
- Basal Alluvial Aquifer
- Basal Bedrock Aquifer
- Bedrock
- Bedrock/Colluvium
- Colluvium
- Unknown
- Upper Alluvial Aquifer

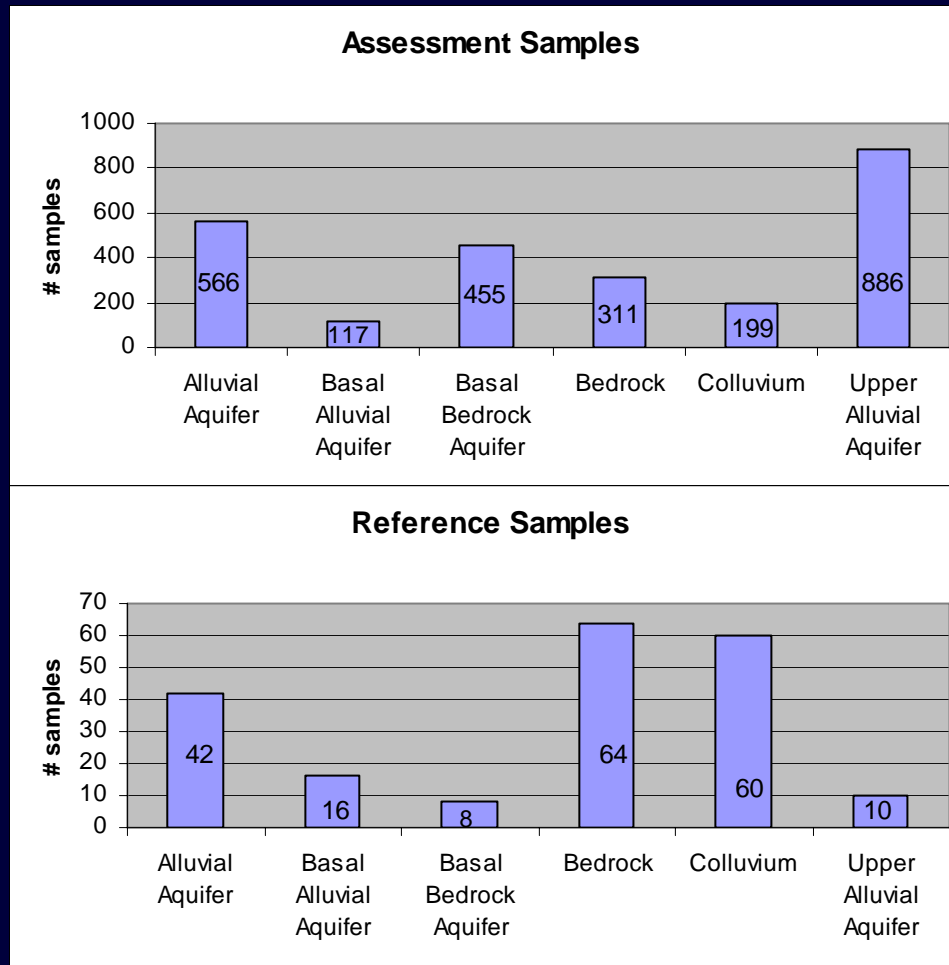
▶ Mine

- Alluvial Aquifer
- Alluvial/Bedrock
- Alluvial/Colluvium
- Bedrock
- Colluvium
- Spring/Seep
- Unknown

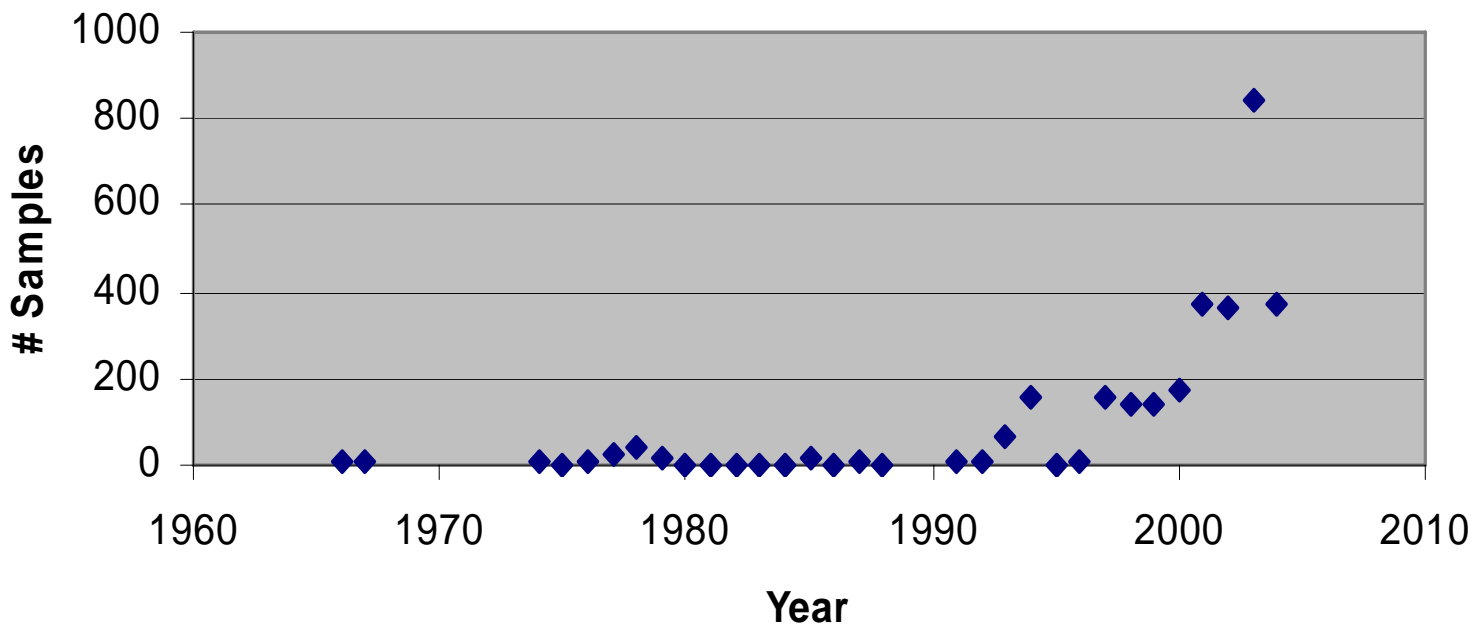
▶ Tailings

- Alluvial/Bedrock
- Basal Alluvial Aquifer
- Basal Bedrock Aquifer
- Spring/Seep
- Unknown
- Upper Alluvial Aquifer

Sample sizes by aquifer types



Number of Samples per Year



Analyses

- ▶ Exceedence analysis
 - Analytes
 - Exceed – yes or no
 - Magnitude of exceedence
 - NM state standards
 - Dissolved fraction only

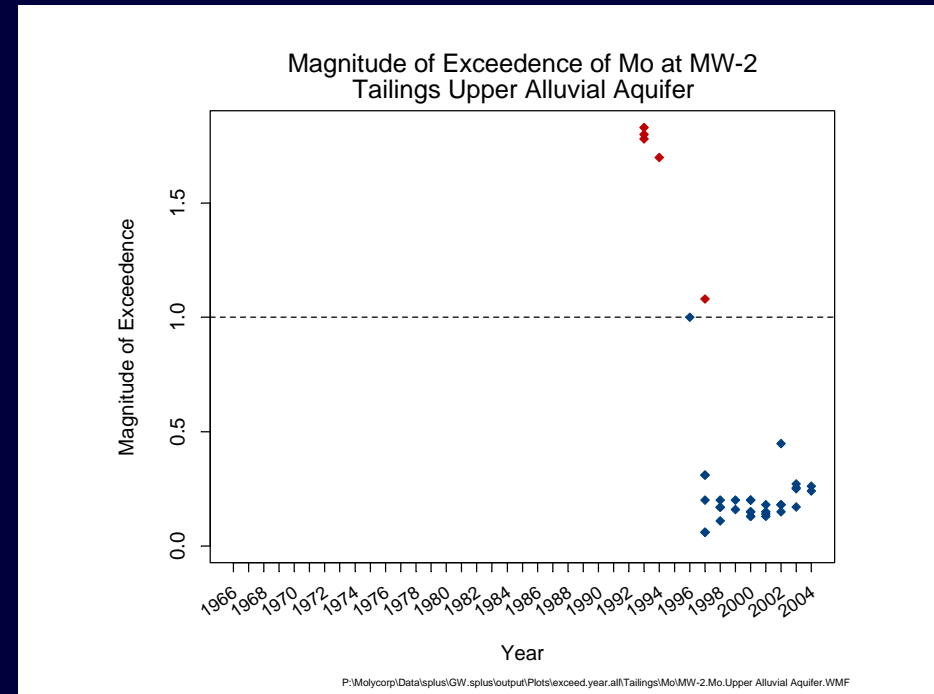
GIS/Mapping

- ▶ 3 sets of maps (M, R, T)
- ▶ For each analyte
- ▶ Layers for each aquifer type
- ▶ Labeled site names

- ▶ Purpose
 - Serve as a spatial scan to identify where exceedences are occurring
 - At aquifer level
 - Sample site level

Plots

- ▶ Exceedences at sample sites over time
- ▶ Too many plots to be useful until problem sites are identified
- ▶ Serve as tool to focus on specific sites later in analysis



Exceedence comparisons

- ▶ By exposure area, aquifer type and analyte
 - For direct comparison zones only
- ▶ Frequency (percent) exceedence
- ▶ Average magnitude of exceedence
- ▶ Maximum magnitude of exceedence

Next Step Considerations

- ▶ Sample size weighting
- ▶ Exceedence analysis using EPA standards
 - Diss or tot?
- ▶ Use total fraction – would it make a difference?
- ▶ Lack of sulfate and fluoride reference data
- ▶ Revise analyte list?
- ▶ Further characterization of temporal trends
- ▶ Other types of analysis
 - I.e. hypothesis testing of reference vs. assessment concentrations.