ASSESSING THE TOXICITY POTENTIAL OF MINE-WASTE PILES

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and

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Colorado State University and

the Colorado School of Mines


Rocky Mountain Regional
Hazardous Substance Research Center


Colorado State University
Knowledge to Go Places


SCHOOL OF MINES
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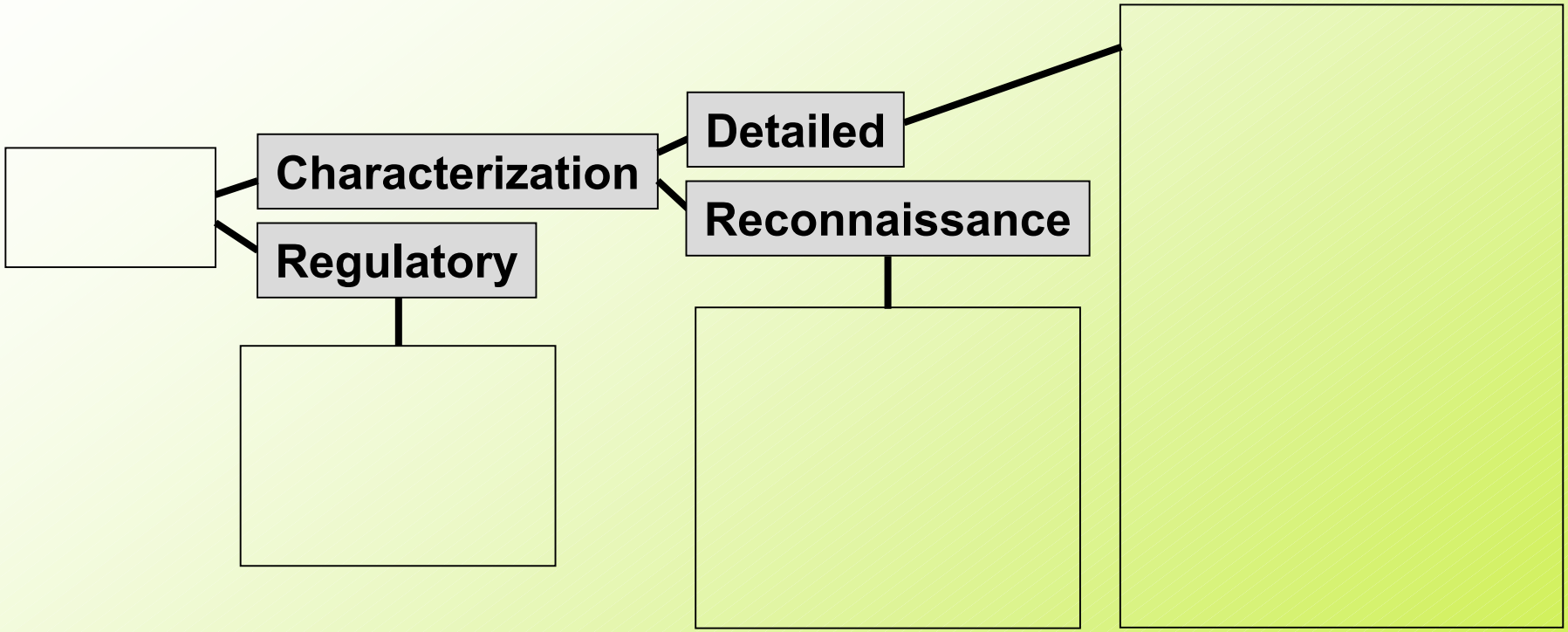
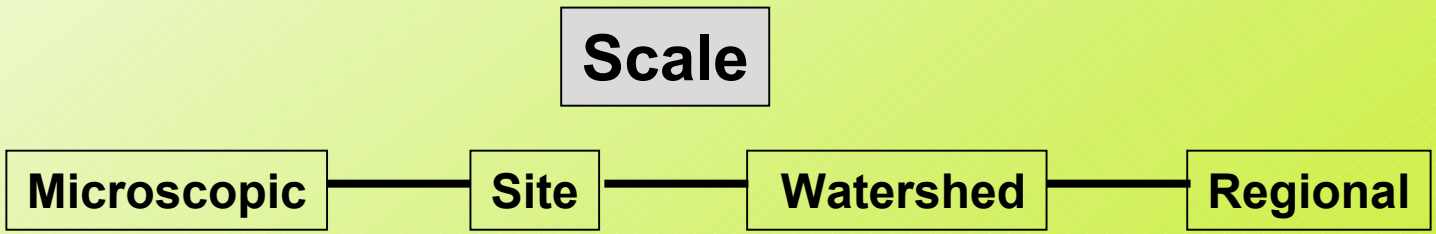
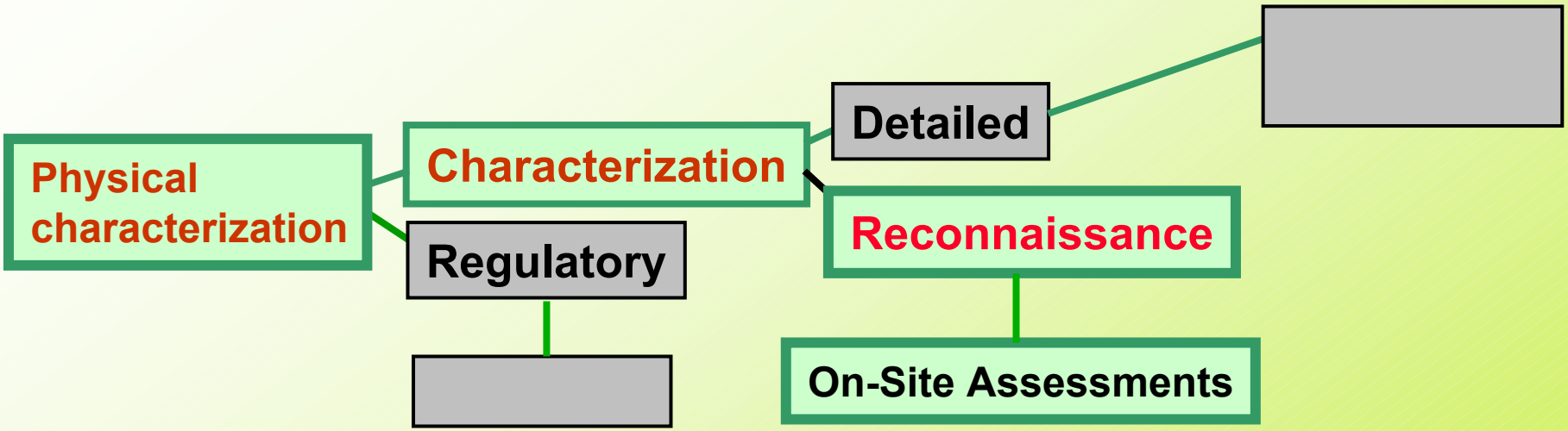
- **I. Introduction**
  - A. Scope of Workshop (*Tom Wildeman*)
  - B. Mine Drainage Chemistry (*Kathy Smith and Tom Wildeman*)
  - C. Mining Wastes Overview (*Sharon Diehl and Kathy Smith*)
- **II. Methods to Determine Bioaccessibility of Metals from Wastes** (*LaDonna Choate and Jim Ranville*)
- **III. Physical Characterization of Waste Piles**
  - A. Physical Characterization of Waste Piles *(Tom Wildeman)*
  - *B.* Fate and Transport of Metals & Sediment in Surface Water *(Rosalia Rojas & Mark Velleux)*
- **IV. The Importance of Geology *(Sharon Diehl)***
- **V. Geophysical Applications *(Bruce Smith)***
- **VI. Waste Pile & Water Sampling *(Kathy Smith)***
- **VII. Chemical Analysis *(Kathy Smith)***
- **VIII. Leaching Tests**
  - A. Leaching Studies *(Phil Hageman)*
  - *B.* Assessing Mine Wastes: Chemical Criteria *(Tom Wildeman)*
- **IX. Acid-base Accounting *(David Fey)***
- **X. Decision Tree (*Tom Wildeman*)**

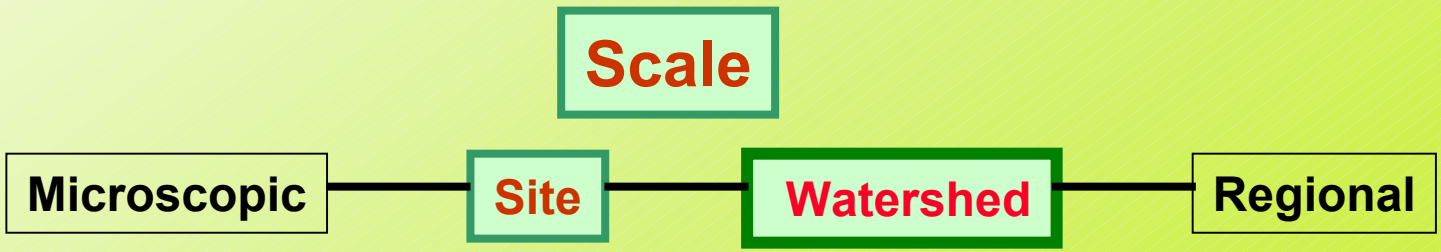
Flow Chart for Ranking and Prioritization



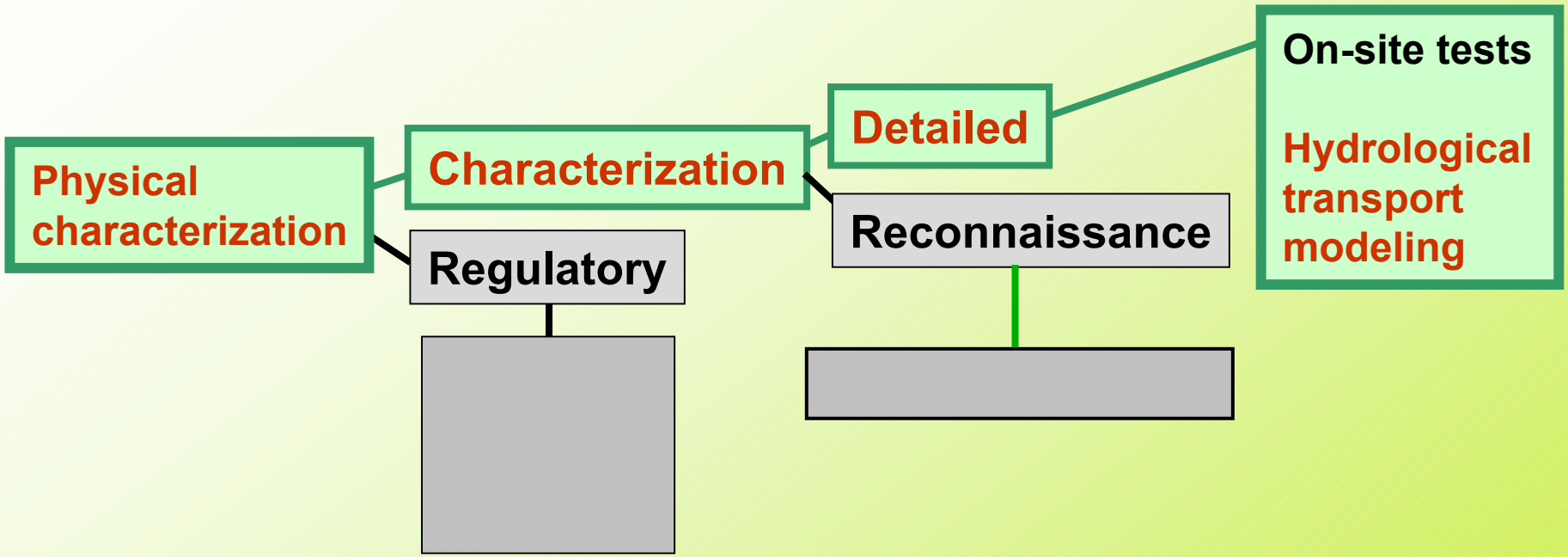


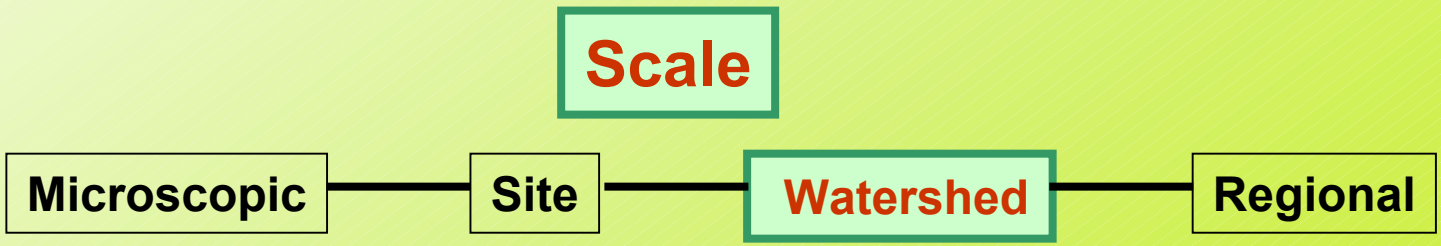
Flow Chart for Ranking and Prioritization (THOMAS WILDEMAN)





Flow Chart for Ranking and Prioritization (ROSALIA ROJAS)





SCOPE

WATERSHED → SITE → ROCK → MINERAL

EMPHASIS

PHYSICAL ←→ CHEMICAL ←→ BIOLOGICAL

PRIMARY OBJECTIVES

1. PROVIDE A SIMPLE & PRACTICAL METHOD OF ASSESSING THE POTENTIAL TOXICITY OF A WASTE-ROCK PILE
2. PROVIDE SUFFICIENT SCIENTIFIC & TECHNICAL BACKGROUND TO SUPPORT THE SIMPLE ASSESSMENT METHODS

MINE WASTE DECISION TREE

CHEMICAL CRITERIA

PASTE pH, ALKALINITY

- **< 5** → **Assume Toxicity. Check with TCLP & CDMG extraction tests.**
- **> 5** → **Toxicity Uncertain** → **TCLP, CDMG, & USGS extraction tests are necessary.** **Develop a simple bioavailability test to confirm toxicity.**

PHYSICAL CRITERIA

A. ON-SITE ASSESSMENTS

1. **Proximity to year-round or ephemeral stream or gulch.**
2. **Size of waste-rock pile.**
3. **Extensiveness of erosion features.**
4. **Presence of cementation crusts.**
5. **Presence of a kill zone.**
6. **Presence of vegetation.**

B. ON-SITE TESTS

1. **Develop a settling test.**

Concerning the tests and observations within the criteria, only the paste pH test can be used as an either/or criterion for determining toxicity. For the other tests, ratings will have to be developed for which the aggregate score will determine the degree of hazard of a waste-rock pile.

OTHER FEATURES

- END OF THIS SECTION
  - GLOSSARY
- END OF EACH SECTION
  - KEY PAPERS
- LAST SECTION OF NOTES
  - KEY REFERENCES
  - RELATED LITERATURE
  - RELATED RESOURCES

GROUND RULES

- **NONE REALLY – JUST HAVE A GOOD DAY.**
- **ASK QUESTIONS AT ANY TIME.**

RUSSELL GULCH NEAR CENTRAL CITY, CO