STATE OF COLORADO EXPERIENCE WITH WASTE REPOSITORY CAPS AND COVERS

By

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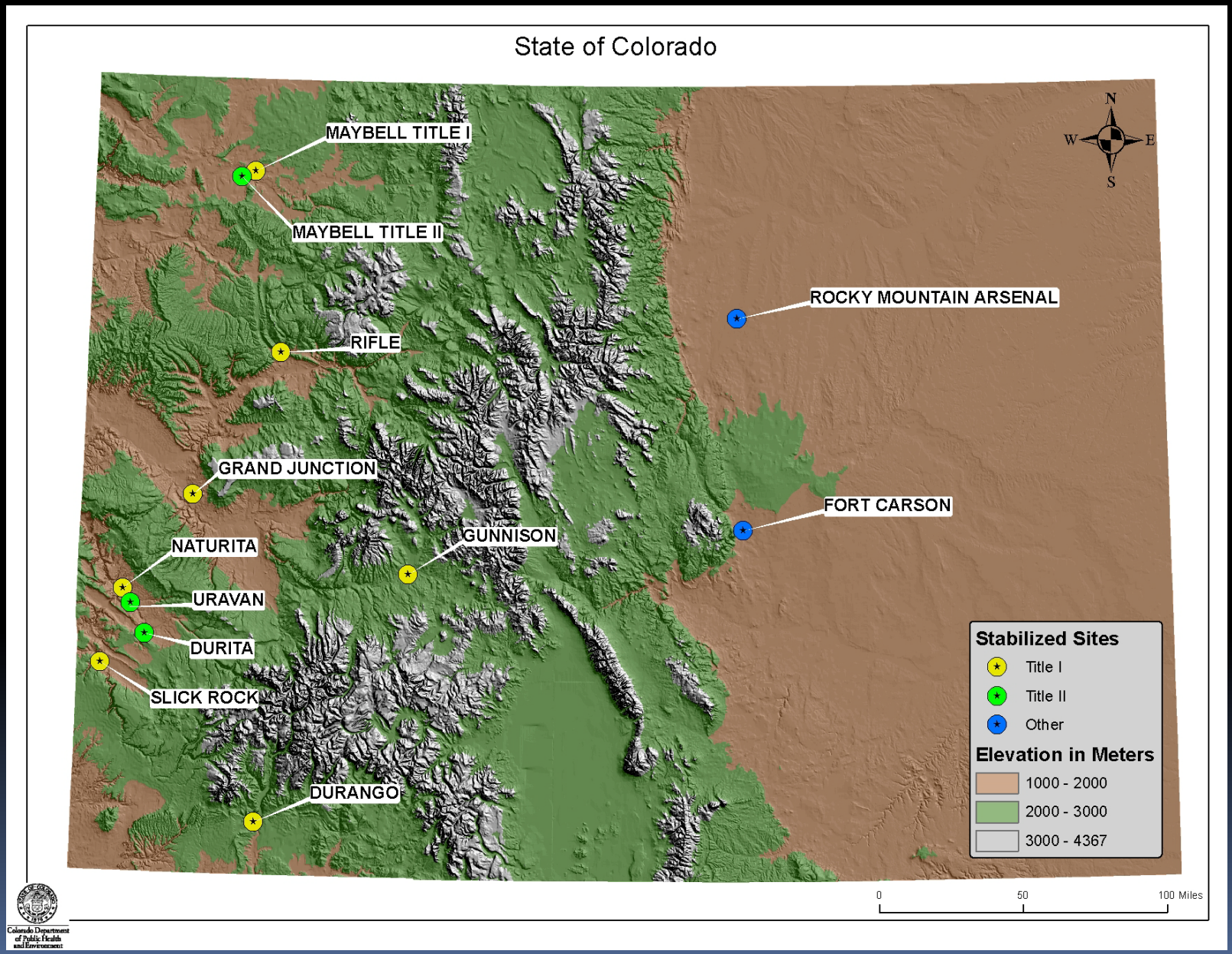
Colorado Department of Public Health & Environment

Hazardous Materials and Waste Management Division

- Solid Waste
  - EPA delegated authority to Colorado
- Hazardous Waste
  - EPA delegated authority to Colorado
- Radioactive Waste
  - NRC Agreement State

Closed Colorado Sites

- Title I sites
  - Durango
  - Grand Junction
  - Gunnison
  - Maybell
  - Naturita
  - Rifle
  - Slick Rock
- Title II Sites
  - Durita
  - Maybell
  - Uravan
- Hazardous Waste Landfills
  - Rocky Mountain Arsenal
  - Ft. Carson LF 5


State of Colorado
MAYBELL TITLE I
MAYBELL TITLE II
ROCKY MOUNTAIN ARSENAL
RIFLE
GRAND JUNCTION
FORT CARSON
GUNNISON
NATURITA
URAVAN
DURITA
SLICK ROCK
DURANGO
N
W
E
S
Stabilized Sites
Title I
Title II
Other
Elevation in Meters
1000 - 2000
2000 - 3000
3000 - 4367
0
50
100 Miles
Colorado Department of Public Health and Environment

Durango

June 2003

Gunnison

May 2006

Naturita

May 2009

Rifle

Aug 2009

Unwanted Vegetation on Covers

Maybell Title I

Aug 2009

Gunnison

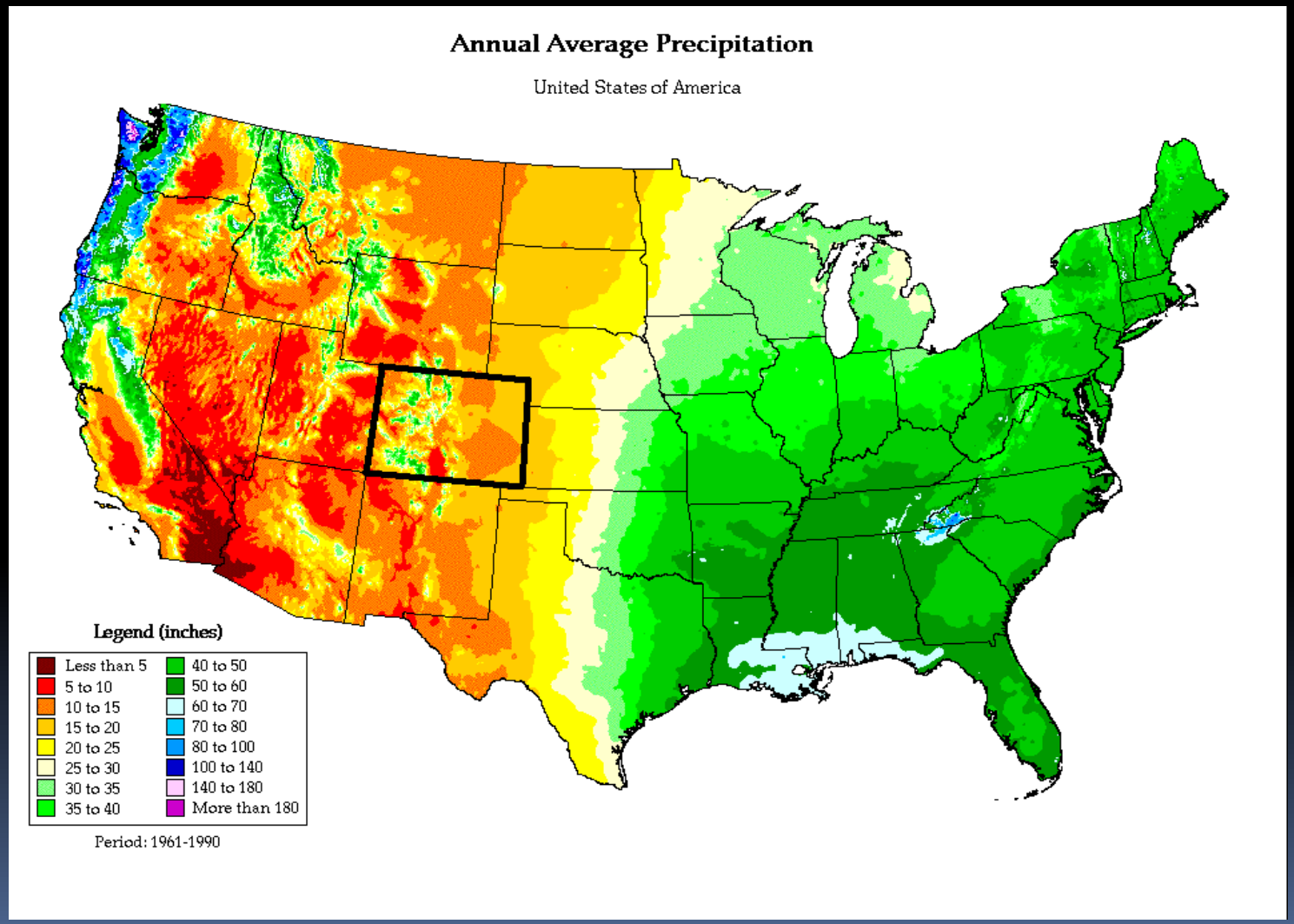
June 2008

Vigilant maintenance required, or expect negative impacts over the long term.

CONCLUSIONS
Title I and Title II Cells

- No evidence of cover failure (e.g., elevated radon flux, seeps, excessive erosion, slope instability) on any existing Title I or Title II covers in Colorado.
- However, unwanted vegetation will quickly establish on rock-armored covers.
- Long-term integrity of disposal cell may be challenged unless active maintenance continually performed.

Average Annual Precipitation



Denver
16 in/yr

Grand Junction
12 in/yr

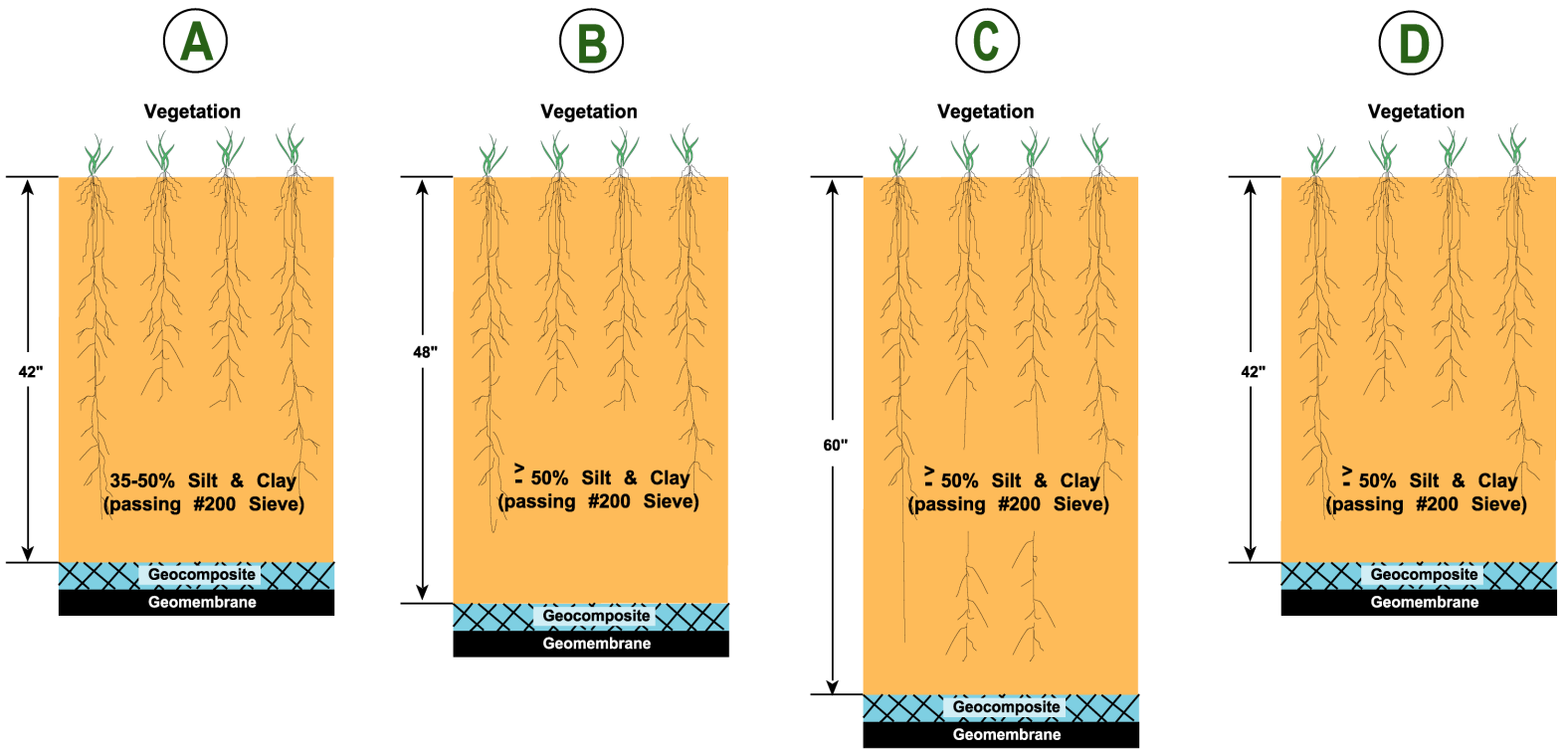
Rocky Mountain Arsenal

- Manufactured chemical warfare agents WW II to 1982.
- Leased parts of facility to companies, including Shell Oil, during 1950s – 1960s.
- Record of Decision (ROD) signed in 1996.
  - Large land areas to be covered with “RCRA-Equivalent” cap, consistent with Subtitle C (hazardous waste) regulations.
- Army, Shell and USF&WS (RVO) chose water balance cover with capillary barrier instead of barrier cover.

Rocky Mountain Arsenal

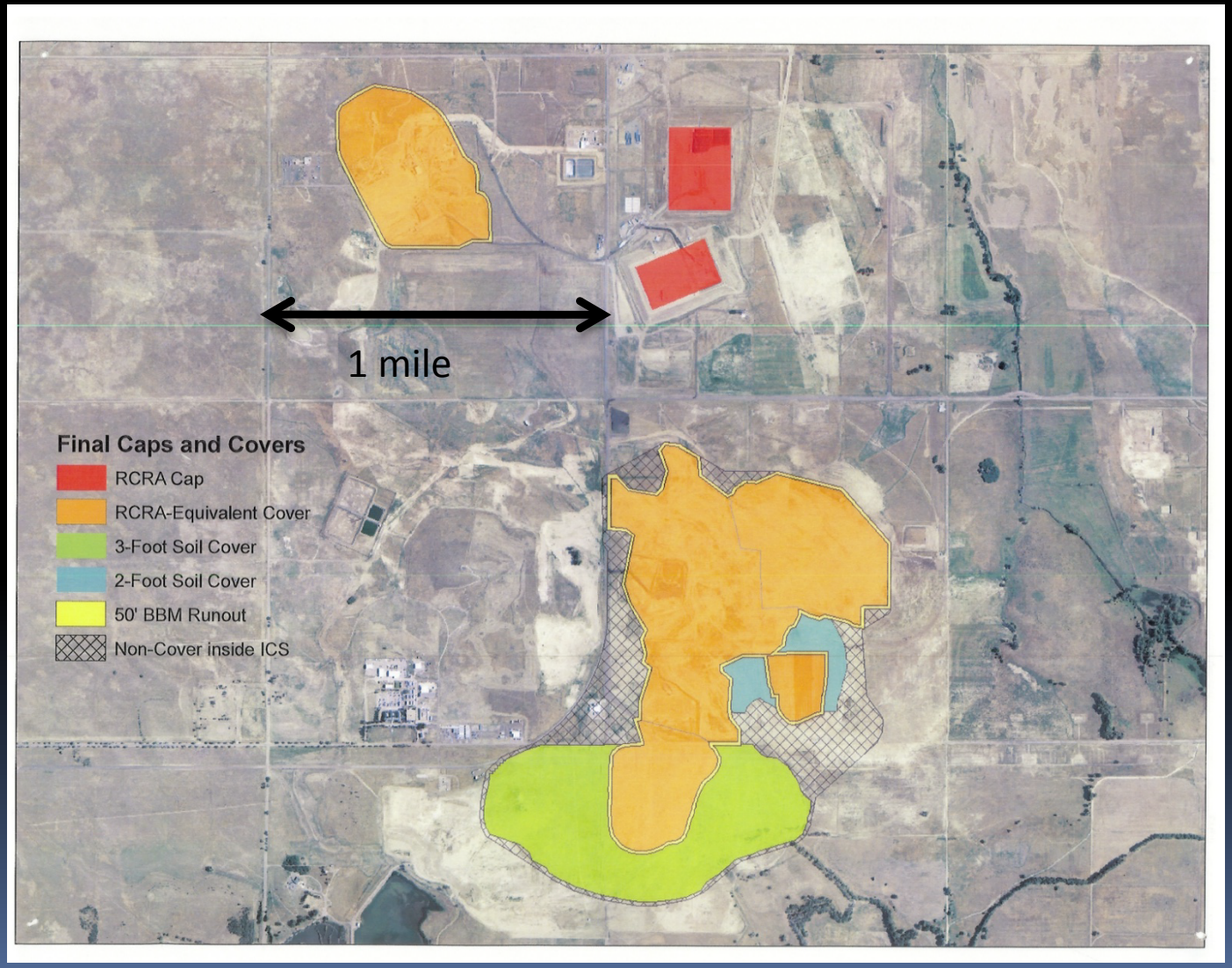
- In order to demonstrate “equivalency”, four soil test plots constructed.
- Vegetation established over three years followed by one year test period.
- Percolation measured in 30-ft x 50-ft pan lysimeters.
- Results of test year indicated that any of the four test configurations would be acceptable.

Rocky Mountain Arsenal



Test Cover Cross Sections

Rocky Mountain Arsenal

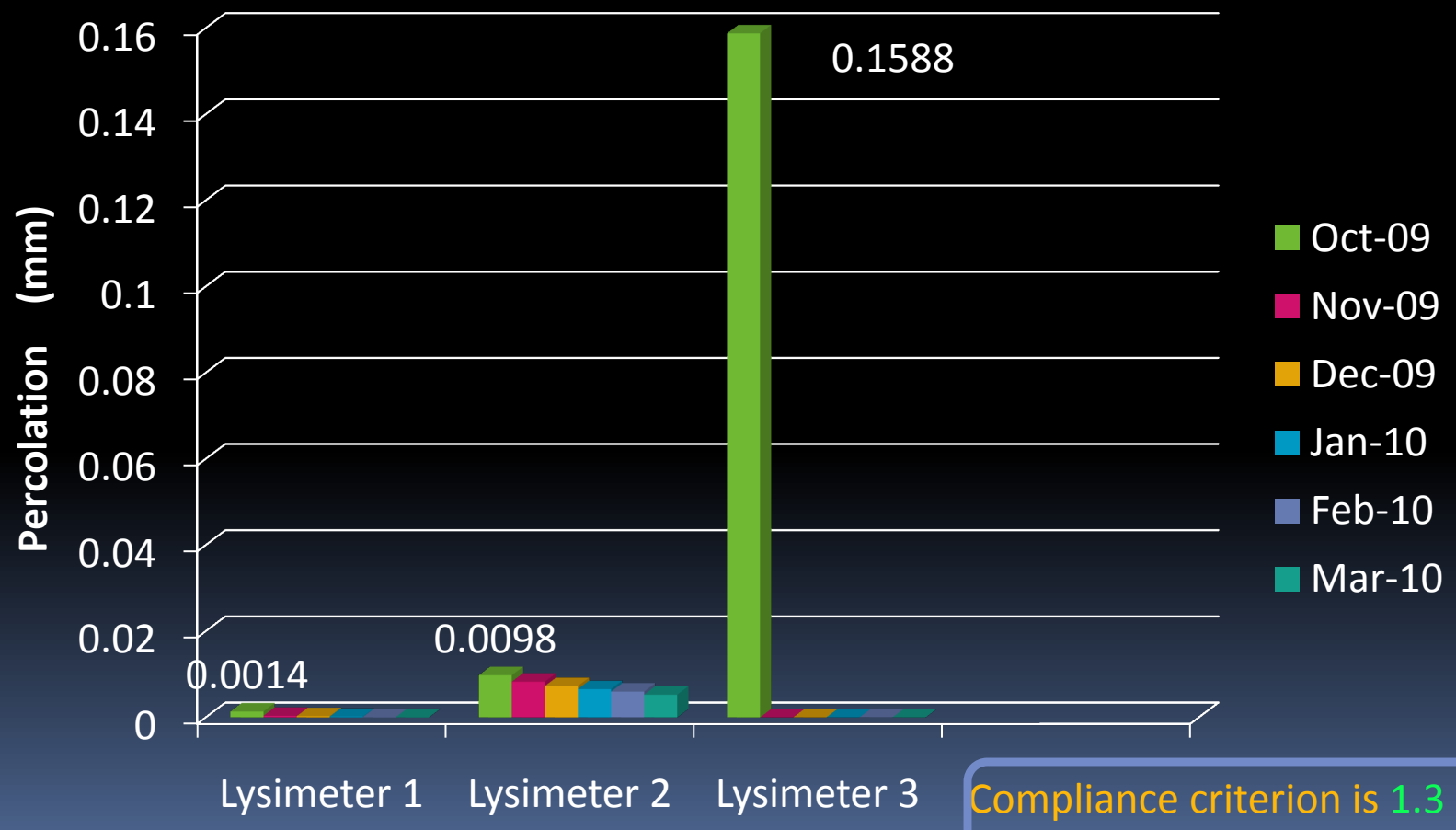


Rocky Mountain Arsenal
Shell Cover

Rocky Mountain Arsenal

Shell Cover

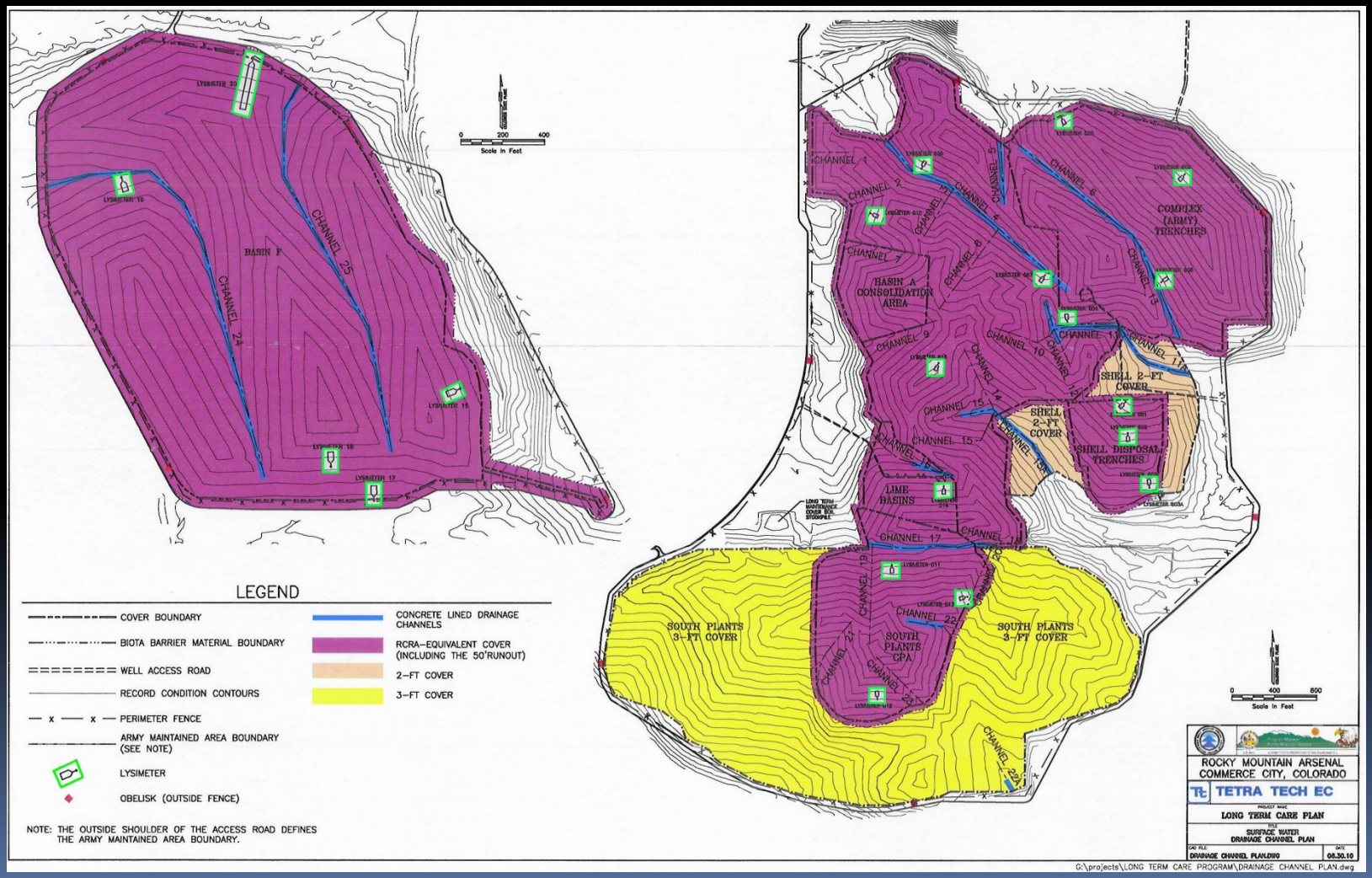
Rolling 12-Month Percolation Totals



Compliance criterion is 1.3 mm beginning 2013

Rocky Mountain Arsenal

RCRA-Equivalent Covers Lysimeter Locations



Rocky Mountain Arsenal
Basin F Cover

May 2010

Rocky Mountain Arsenal
Basin F Cover

May 2010

Rocky Mountain Arsenal
Basin F Cover

May 2010

Rocky Mountain Arsenal
Fully Lined Channel on Cover

May 2010

CONCLUSIONS
Water Balance Covers in Colorado

- Initial percolation data at the Rocky Mountain Arsenal very promising.
- Design can be adapted for stabilized tailings cell along with appropriate radon barrier.
- Based on experience in Colorado, water balance cover advantages:
  - Restore the natural ecosystem.
  - Easier to construct and maintain.
  - Cost less compared to barrier covers.

Rocky Mountain Arsenal Shell Cover

March 2009