



**2003 AFCEE Technology Transfer Workshop**

San Antonio, Texas

*Promoting Readiness through Environmental Stewardship*

# **The Alternative Cover Assessment Program (ACAP)**

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# ***Presentation Outline***

- **Why ACAP? Alternative cover issues**
- **The ACAP field effort**
- **Field results**
- **Modeling results**
- **ACAP design procedure**
- **Should you participate? The ACAP program structure**



# *Alternative Cover Issues*

- **No performance criteria**
- **No defined method of demonstrating equivalency**
- **No defined design process**
- **Deficient numerical prediction methods**
- **Lack of field-scale data that incorporate all physical processes relevant to landfill scale**



# ***The ACAP Field Effort***

- **13 sites, 24 large lysimeters in 8 states**
- **Site owners: public, private, DOD, DOE**
- **Coordinated with 11 state and federal agencies**
- **Directly involved 12 consulting engineering firms**

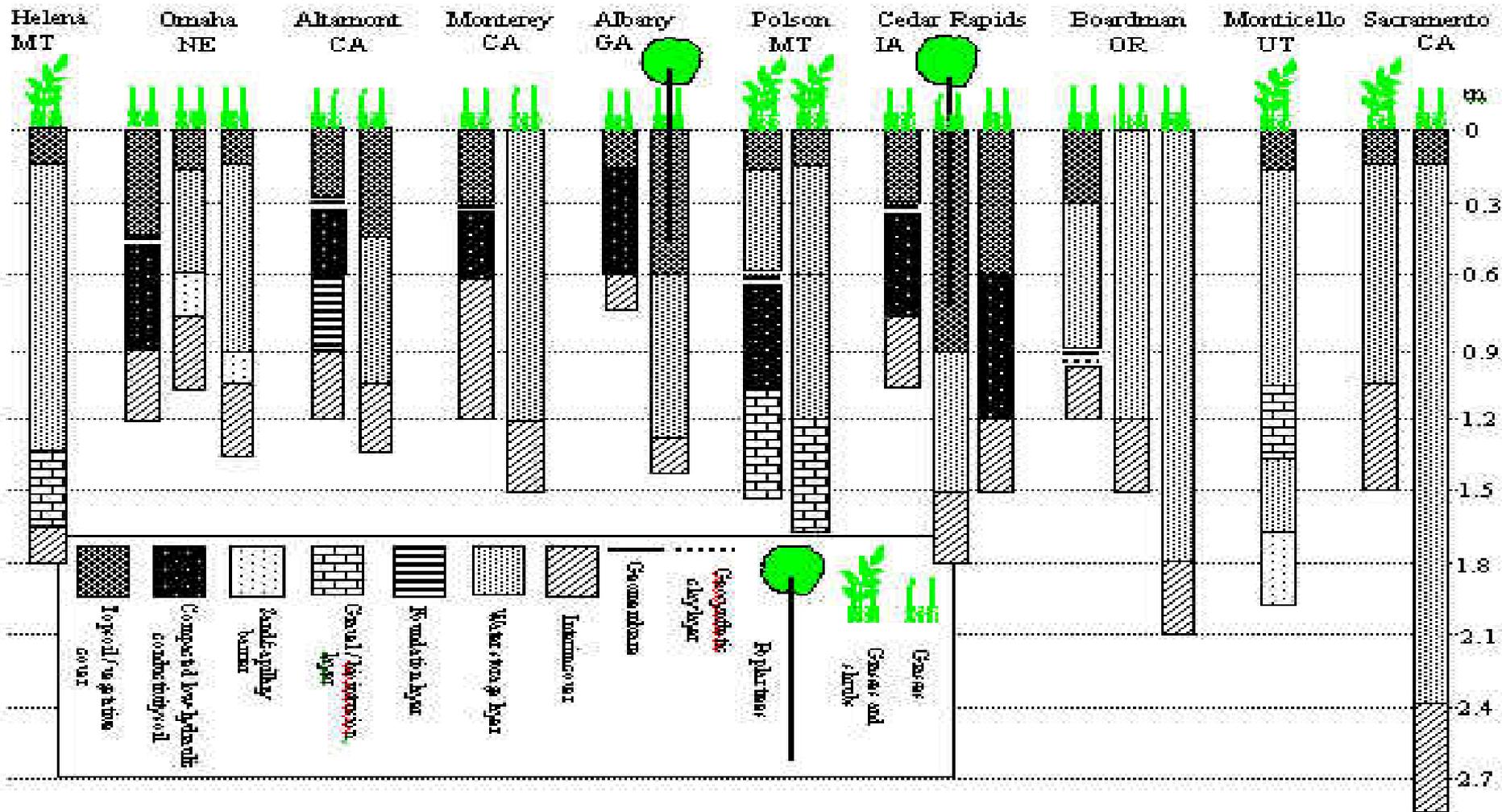


# *ACAP Locations*





# ACAP Cover Profiles





# ***ACAP Lysimeter Construction***



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# ***ACAP Lysimeter Construction***





# ***ACAP Lysimeter Construction***



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# *ACAP Lysimeter Construction*



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# ***ACAP Construction Testing***



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# ACAP Soil Sampling



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# ***ACAP Soil Instrumentation***



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# ***ACAP Data and Communications***



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# *ACAP Site at Sacramento*



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# ***ACAP Site at Sacramento - green***



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# ***ACAP Site MCLB - Georgia***



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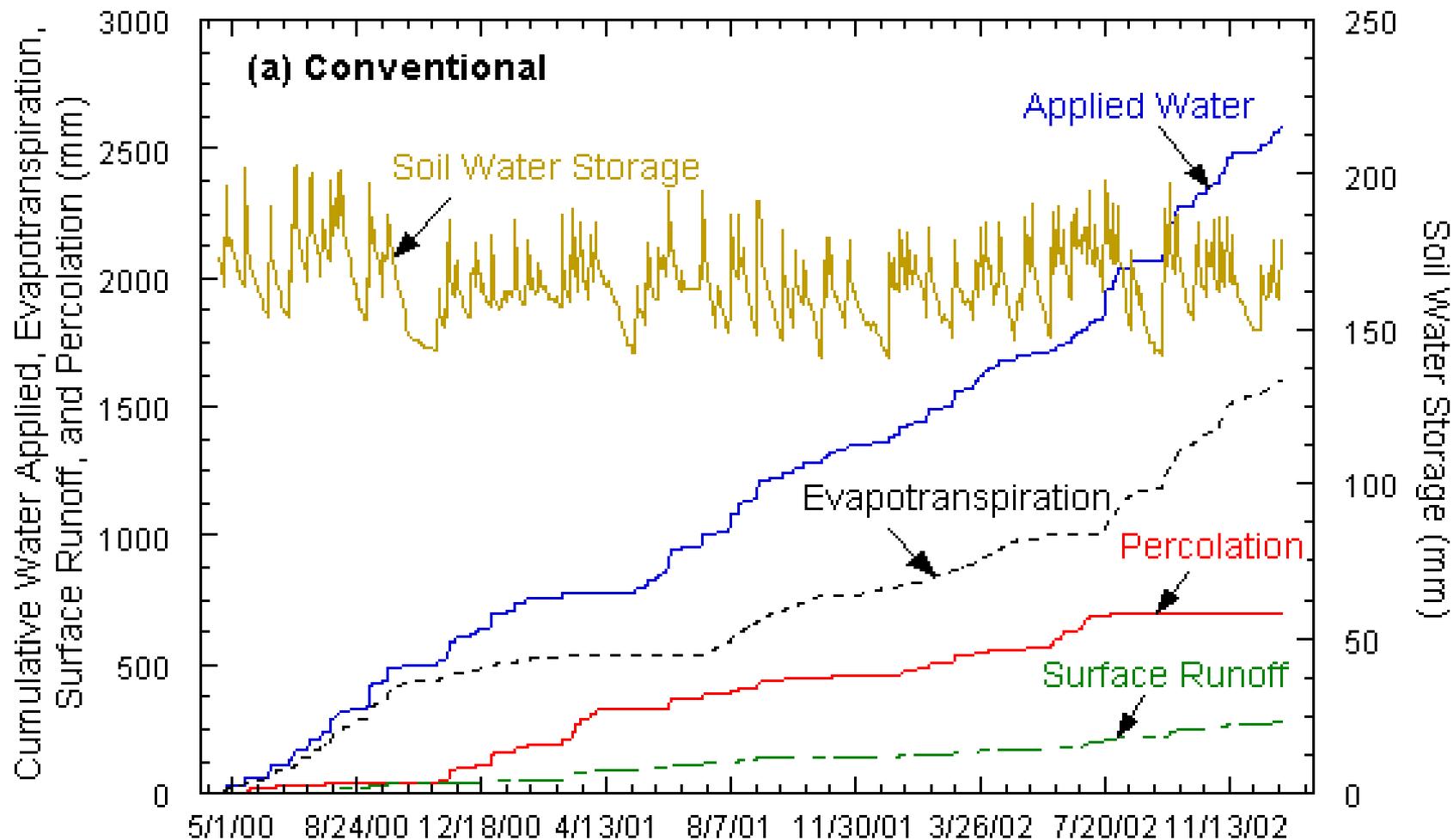
# ***ACAP Site MCLB – with leaves***



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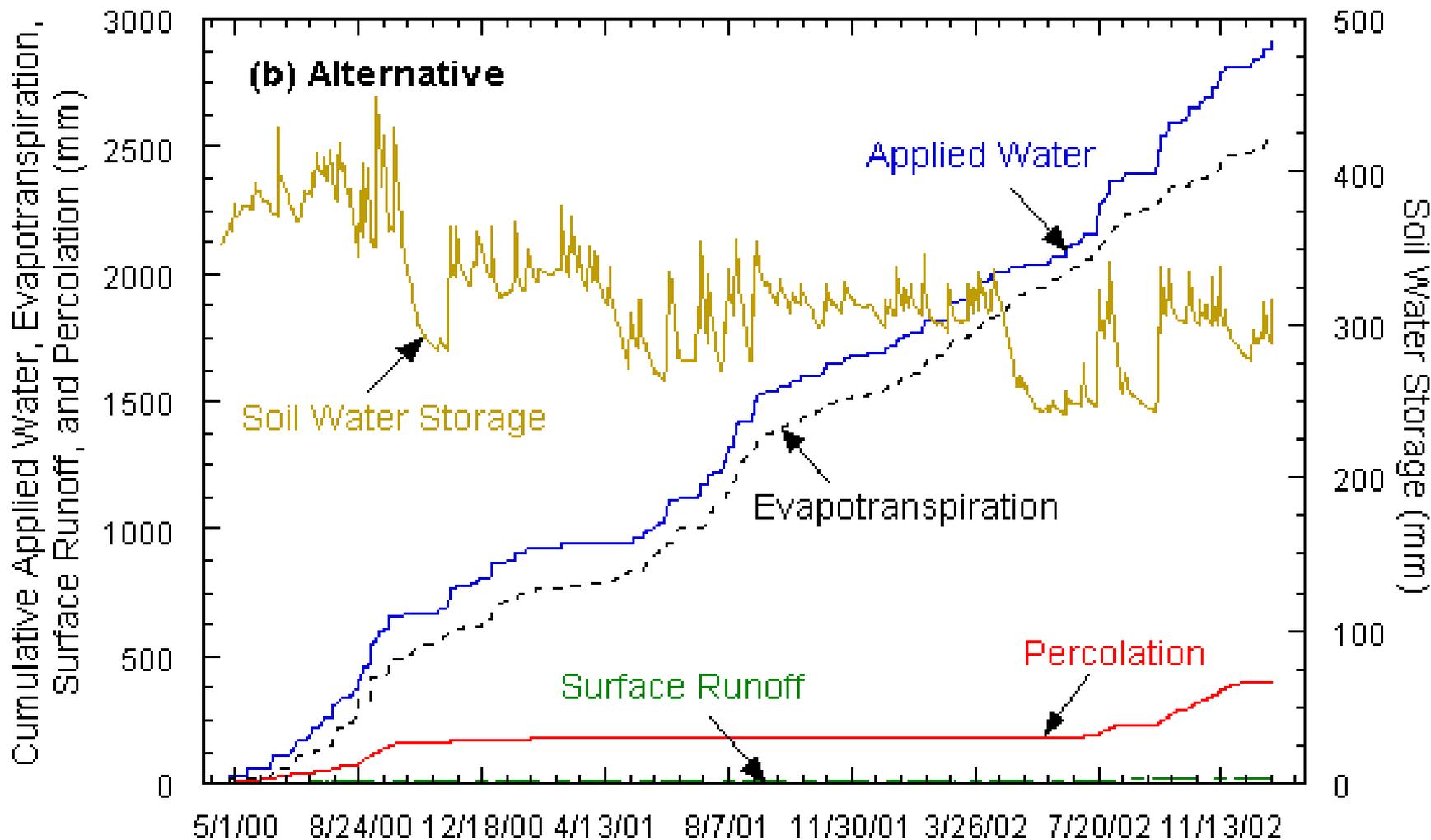


# Results: Georgia – compacted clay cap



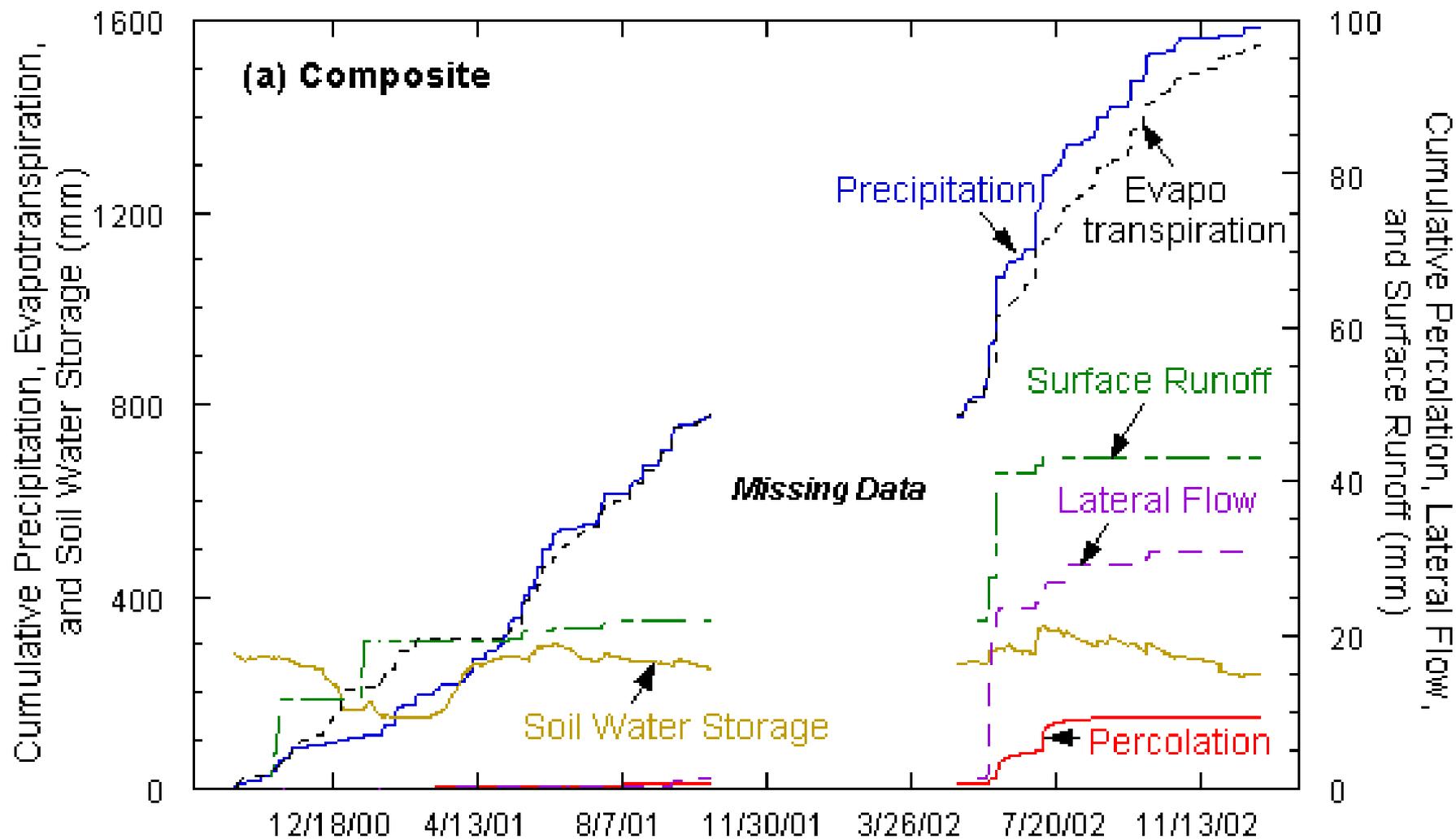


# Results: Georgia - Alternative



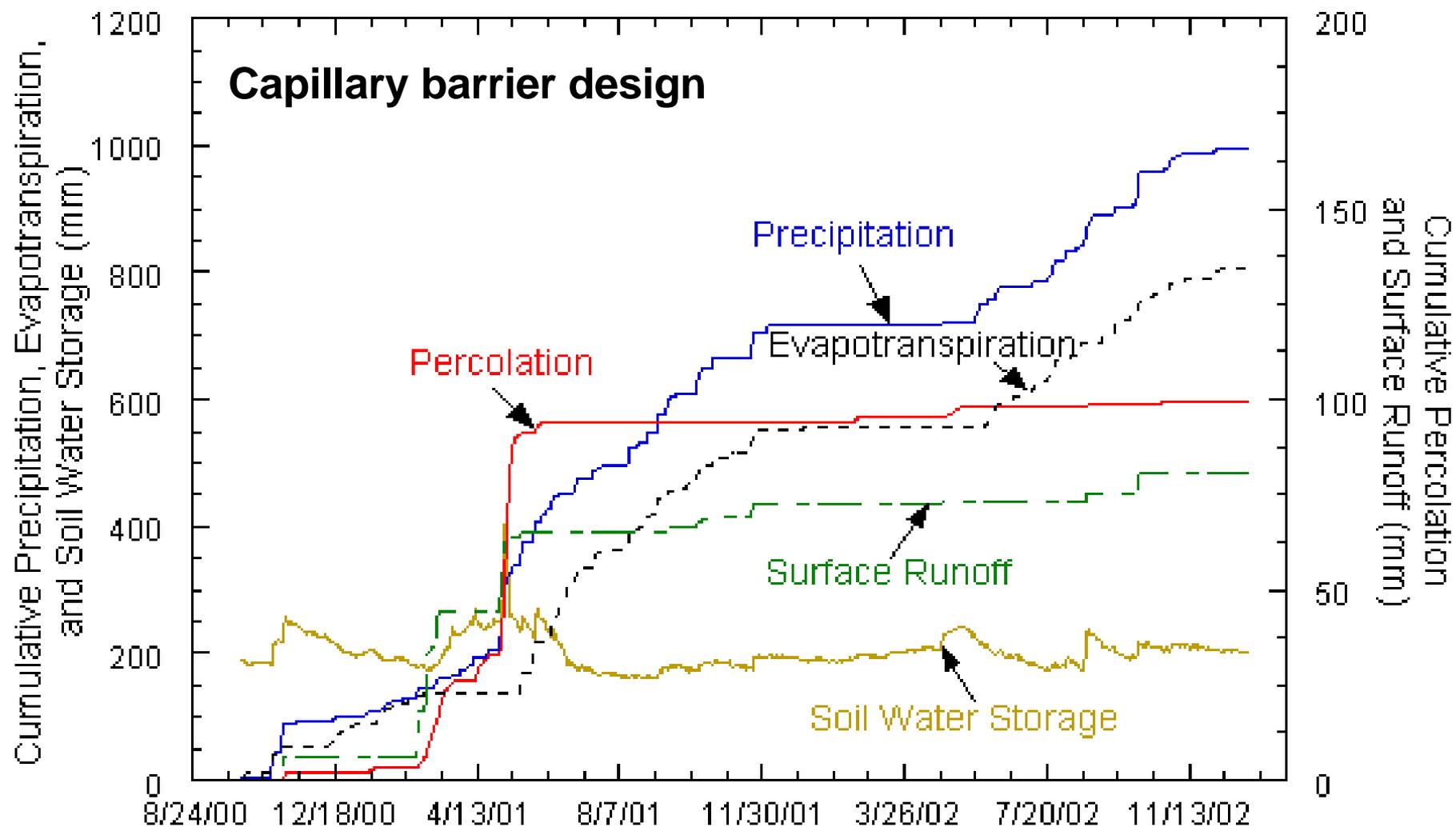


# Results: Cedar Rapids – Composite cap



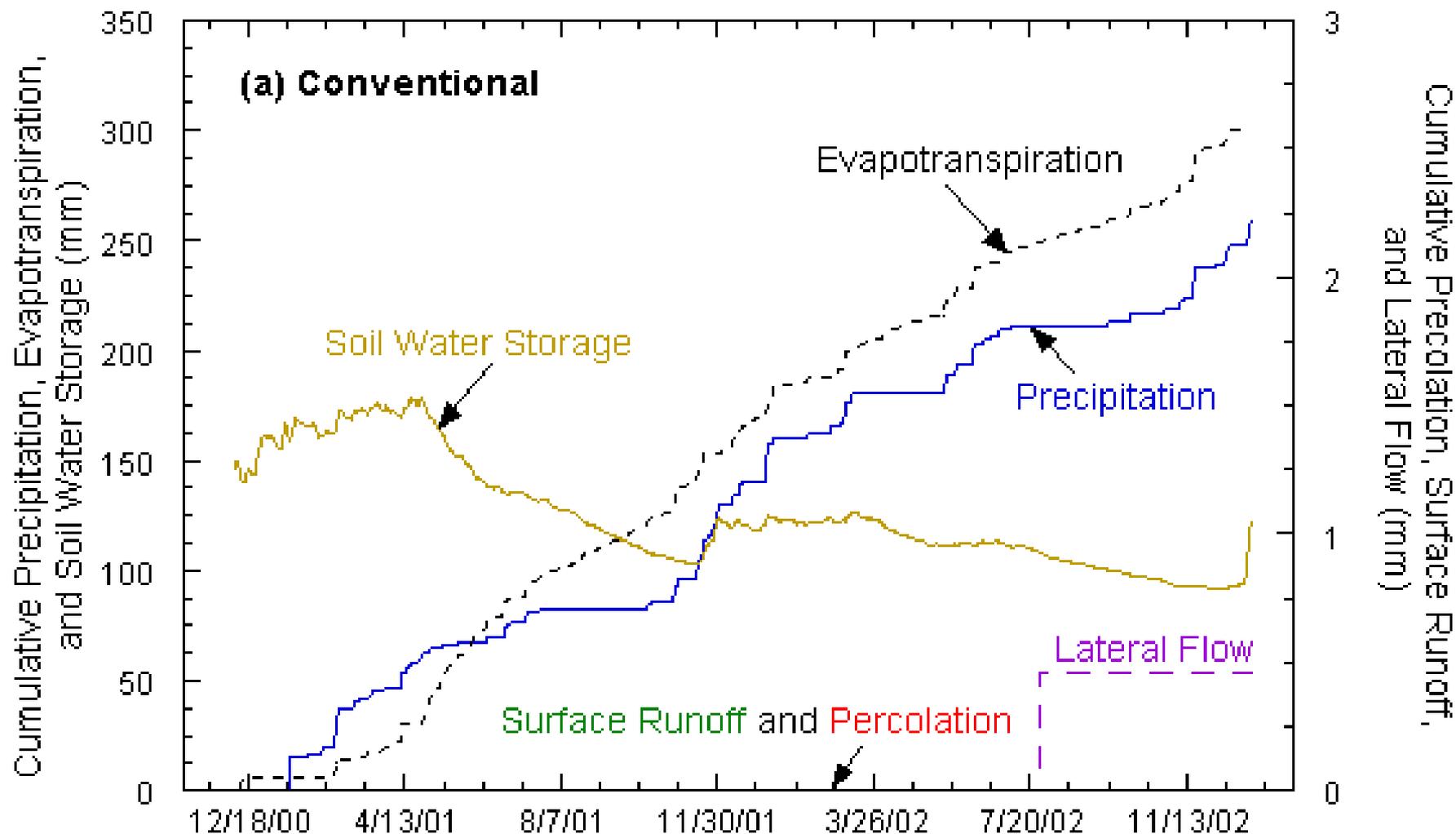


# Results: Omaha - Alternative



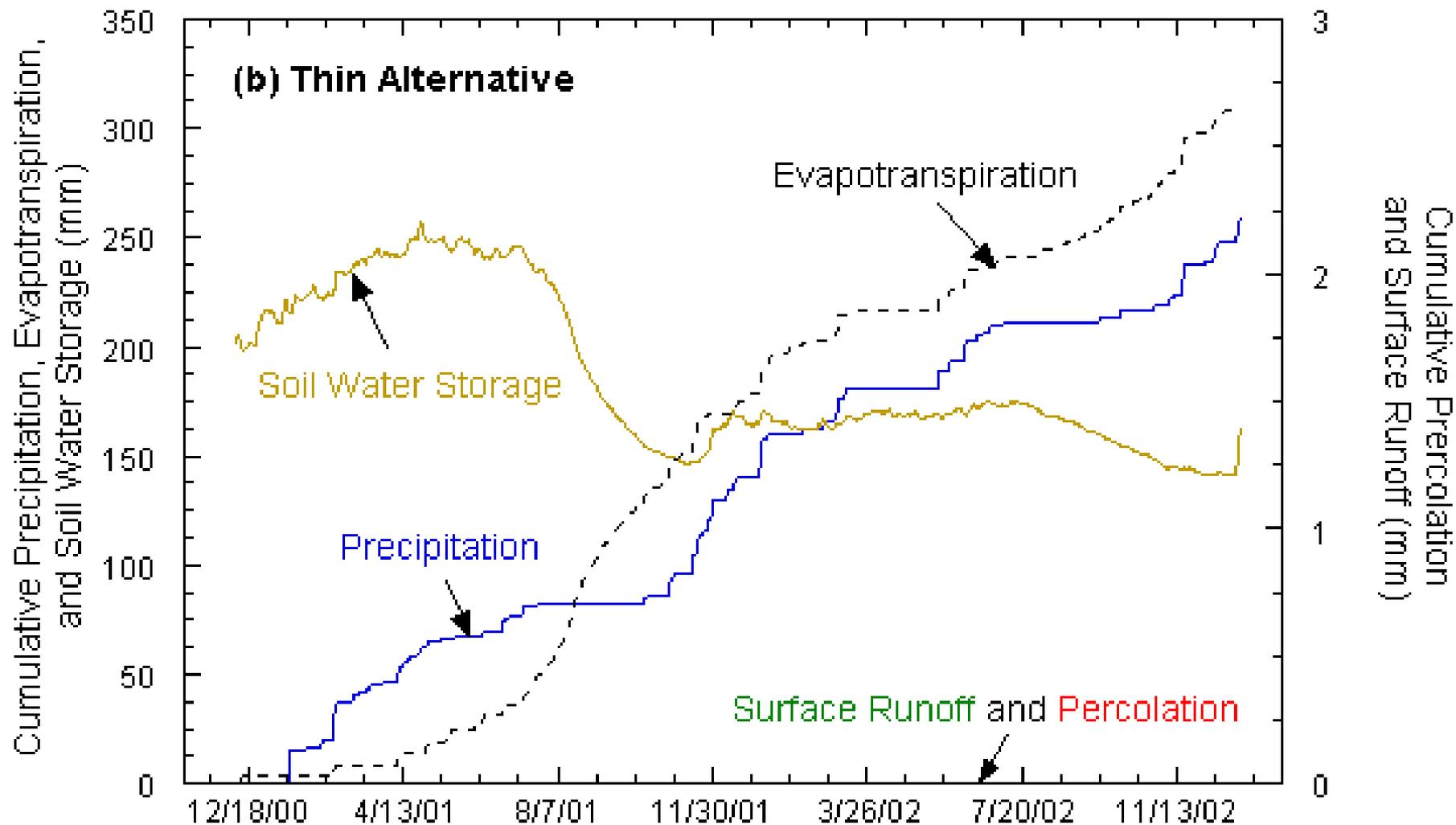


# Results: Oregon - Conventional





# Results: Oregon - Alternative





# ***ACAP Modeling***

- Simulations performed with HELP and UNSAT-H
- Neither code gives results with enough accuracy to stand alone for regulatory permitting purposes
- ✓ Sensitivity analysis-type analysis probably gives considerable value to regulatory negotiations
- ✓ Model must accurately simulate the physics to allow the validity of a design to be considered and to allow design engineers to be creative



# *ACAP Design Procedure*

- Requires shift from *prescriptive design* to *descriptive process*
- Characterize site variables: soil, plants, climate
- Initial calculation of soil depth required to store design precipitation event
- Refine and validate design with modeling
- Workshops sponsored by regulators and taught by ACAP PIs



# ***ACAP: Is it for you?***

- **At some locations the site characteristics and regulatory awareness are suitable for alternative technology**
- **Hosting an ACAP site has considerable benefits**
  - **State-of-art design procedure**
  - **Independent data collection and analysis**
  - **Research team interface between regulators and site owners**
  - **Benchmark data**