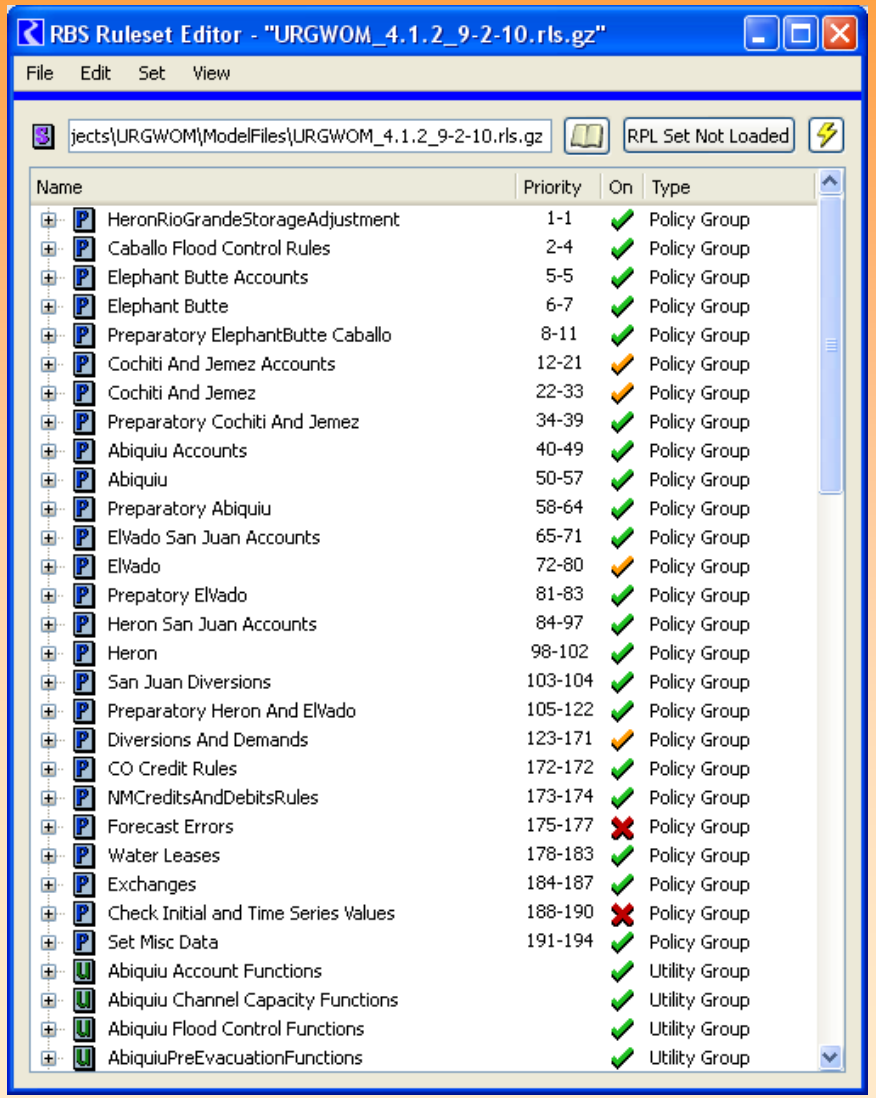
Rule Updates



URGWOM Technical Review

October 14, 2010

Rulebased Simulations

- Planning and Water Operations model runs are rulebased simulations completed using the single URGWOM ruleset.
- Ruleset represents calculations for demands in the Middle Valley and the associated water needs from upstream.
- Releases from upstream are set to meet these demands
  - if the relevant water supply is available and
  - with consideration for the operational constraints at each reservoir.

Demands

- Flow needed to meet MRGCD Demand at Cochiti.
- Letter Water Deliveries
- Flow needed for the Albuquerque diversion.
- Flow needed to meet targets.

MRGCD Demand at Abiquiu

- Separate side simulation completed to determine the MRGCD demand at Abiquiu (i.e. total outflow needed from Abiquiu) to provide the MRGCD demand at Cochiti
  - with consideration for flows from the mainstem,
  - ungaged local inflows between Abiquiu and Cochiti,
  - Rio Chama diversions, and
  - conveyance losses between Abiquiu and Cochiti.

MRGCD Demand at El Vado

- Separate side simulation completed to determine the MRGCD demand at El Vado (i.e. total outflow needed from El Vado) to provide the MRGCD demand at Cochiti
  - ungaged local inflows between El Vado and Abiquiu and
  - conveyance losses between El Vado and Abiquiu.
- Minimum needed bypass (or release) computed as
  - the MRGCD demand at El Vado minus
  - any letter water deliveries to payback MRGCD.

Letter Water Deliveries

- Deliveries by contractors to payback the river for effects of depletions in the basin based on an input schedules.
  - Debt to river established and paid back as water becomes available
    - Deliveries for the Combined account come out of El Vado.
    - Deliveries for the Albuquerque account come out of Abiquiu.

Albuquerque Demand at Abiquiu

- The release of Albuquerque San Juan-Chama Project water at Abiquiu is set to ½ of the diversion

  (i.e. San Juan Chama Project water delivery of 65 cfs)

  – increased for accounting losses between Abiquiu and the diversion.
    - No hypothetical simulation involved.

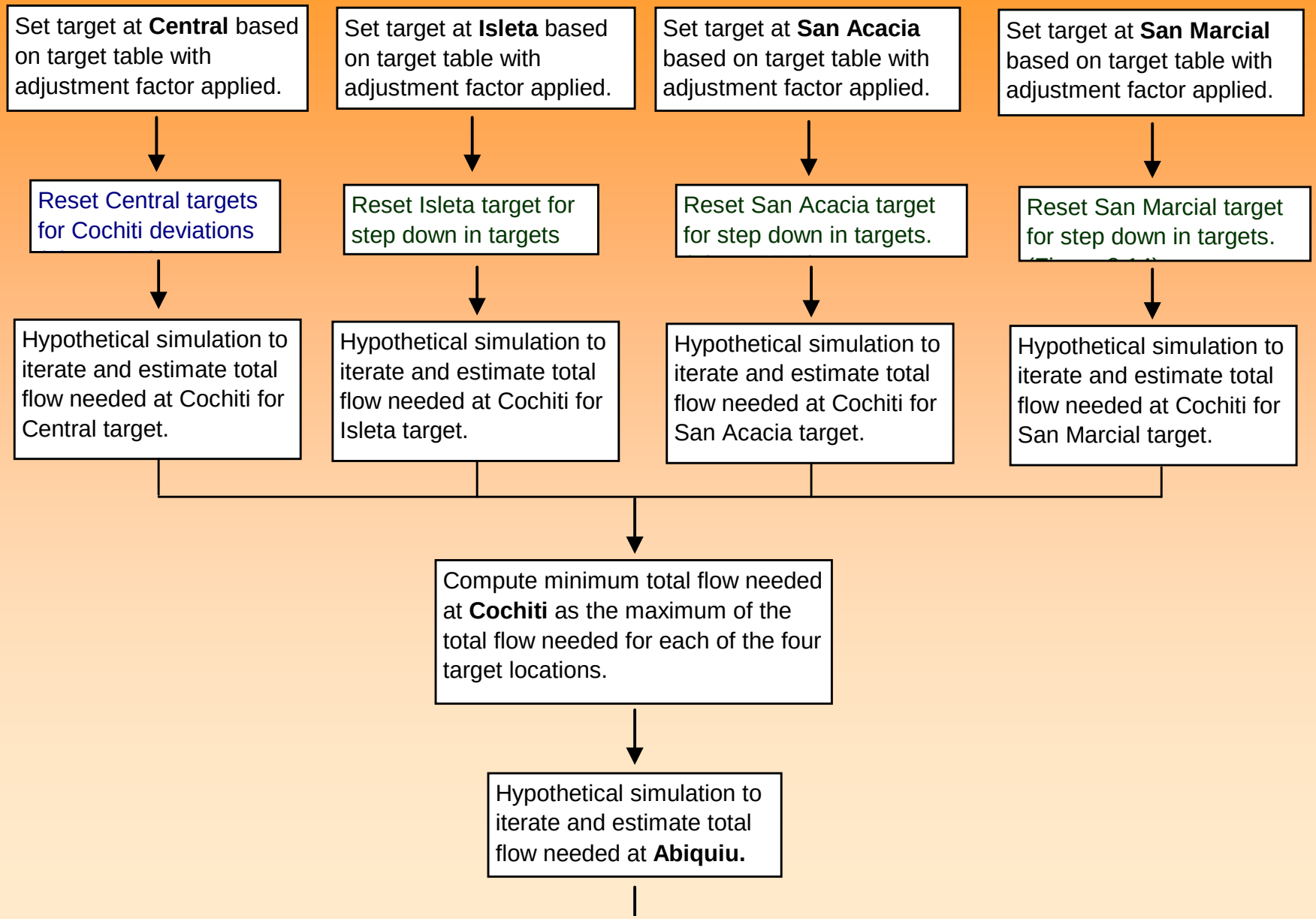
Flow Needed to Meet Targets

- Total flow needed at Cochiti at the next timestep (t+1) computed separately for each target
  - Needed flow calculated with separate side simulations of the entire Middle Valley system from Cochiti to the target location.
    - Flow needed based on physical losses using methods for different physical processes and operations in the Middle Valley.
    - Values for MRGCD and Albuquerque diversions set into the future based on the current estimate for diversions to assure all information is known for the modeled travel time to the target locations.
    - Tributary inflows assumed to be zero.
      - No ungaged local inflows to the Middle Valley are included in URGWOM.
      - Inflow to Jemez assumed to be bypassed.
- Minimum flow needed at Cochiti set to max of four separate computed min flows for four target locations.

Flow Needed to Meet Targets

- Total flow needed at Abiquiu at current timestep computed based on the minimum flow needed at Cochiti.
  - Needed flow computed based on a separate side simulation of the system from Abiquiu to Cochiti.
    - Rio Chama diversions, inflows from the mainstem, and ungaged local inflows below Abiquiu included.
- *Supplemental water* needed at Abiquiu computed as
  - that Total flow needed at Abiquiu minus
    - outflow of Rio Grande water minus
    - any release of MRGCD San Juan-Chama Project water minus
    - any letter water delivery minus
    - any release of SJC water to the Albuquerque diversion.

Flow Needed to Meet Targets



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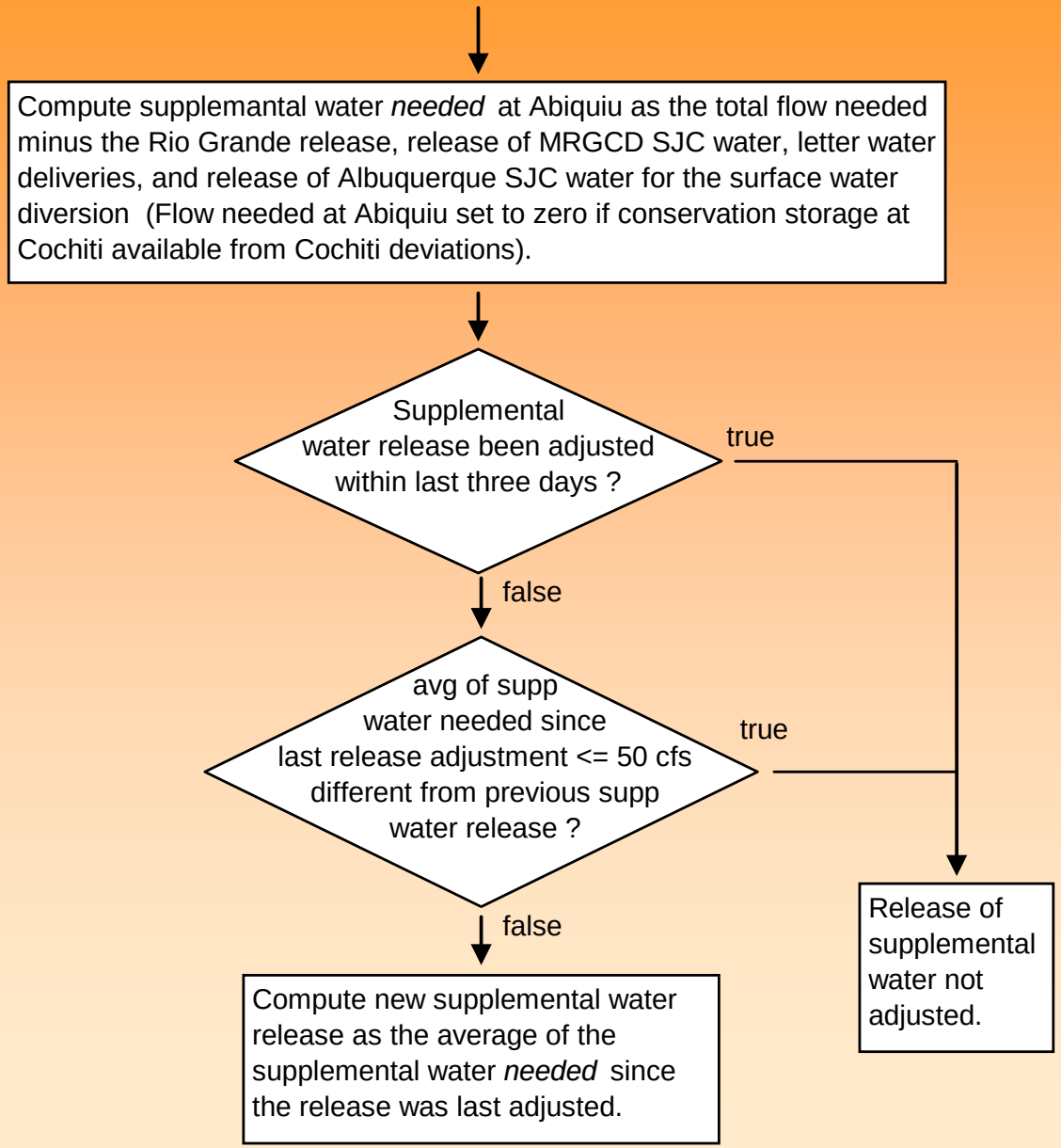


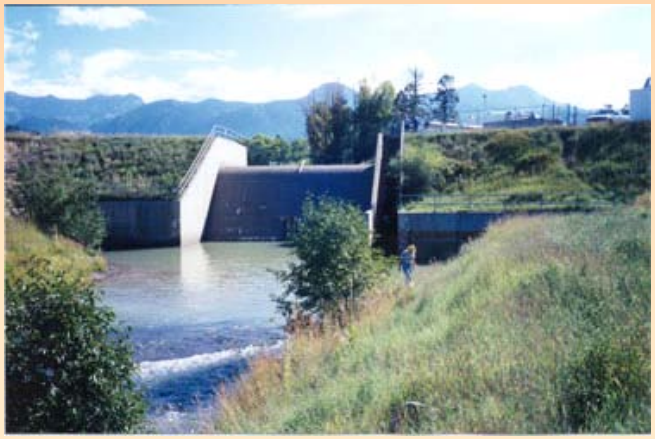
Inflows to Heron

- Inflows of native Rio Grande water from Willow Creek are input.
- Inflow of San Juan water from the Azotea tunnel are computed based on restrictions to diversions.

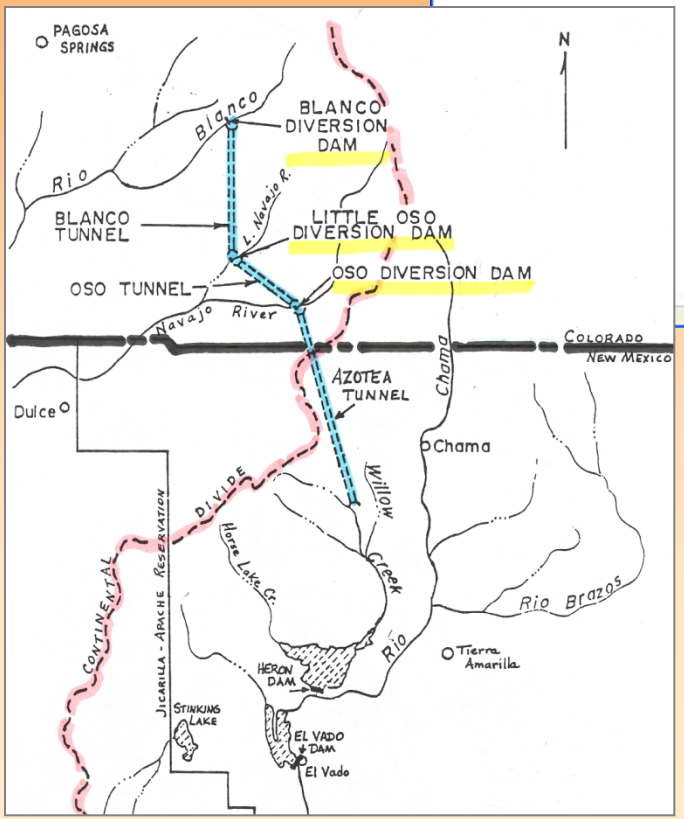
Diversions from the San Juan Basin

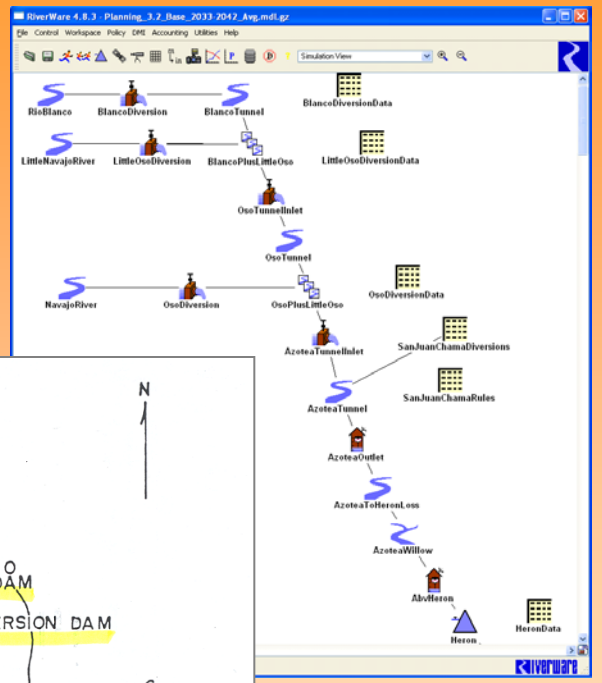
- San Juan-Chama Project Diversions

Little Oso Diversion



Oso Diversion





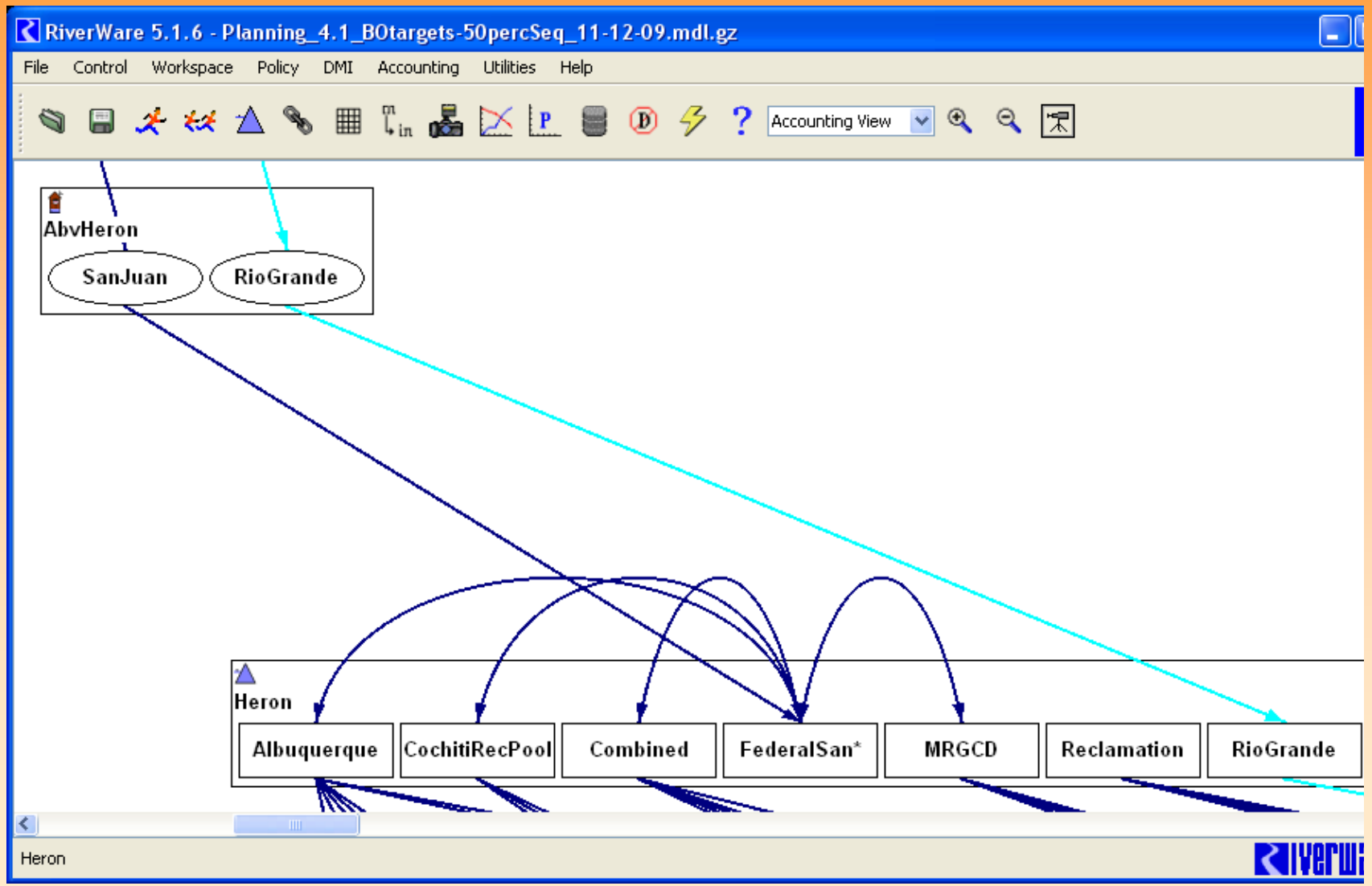
Diversions from the San Juan Basin

- Diversions set with consideration for
  - annual diversion limit (270,000 acre-ft),
  - 10-year cumulative diversion limit (1,350,000 acre-ft), and
  - space available at Heron (401,335 acre-ft capacity to max pool elevation of 7186.1).
- Specific calculations included for diversion at each separate diversion when diversions are limited.

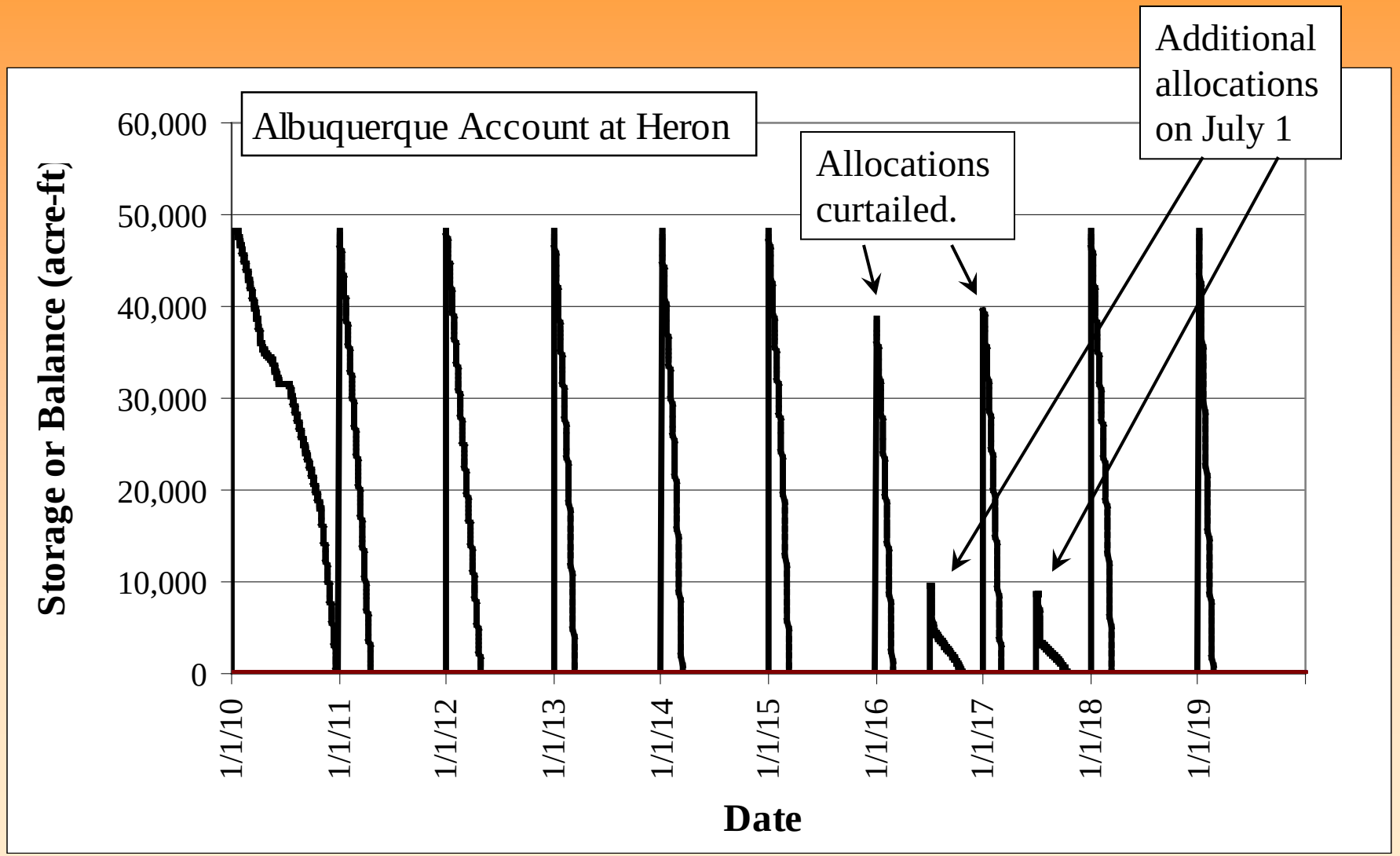
Allocating San Juan-Chama Project Water at Heron to Contractors

- Available water is allocated to individual contractors on January 1 up to the annual allotment for each contractor (acre-ft/yr):
  - MRGCD: 20,900
  - Albuquerque: 48,200
  - Combined: 22,100
  - Cochiti Rec Pool: 5000
- If reduced allocations are made, allocations are reduced proportionally for all contractors (accounts).
  - Additional allocations would then be made on July 1 up to the annual allocation if the supply is then available at Heron.

Allocating San Juan-Chama Project Water at Heron to Contractors



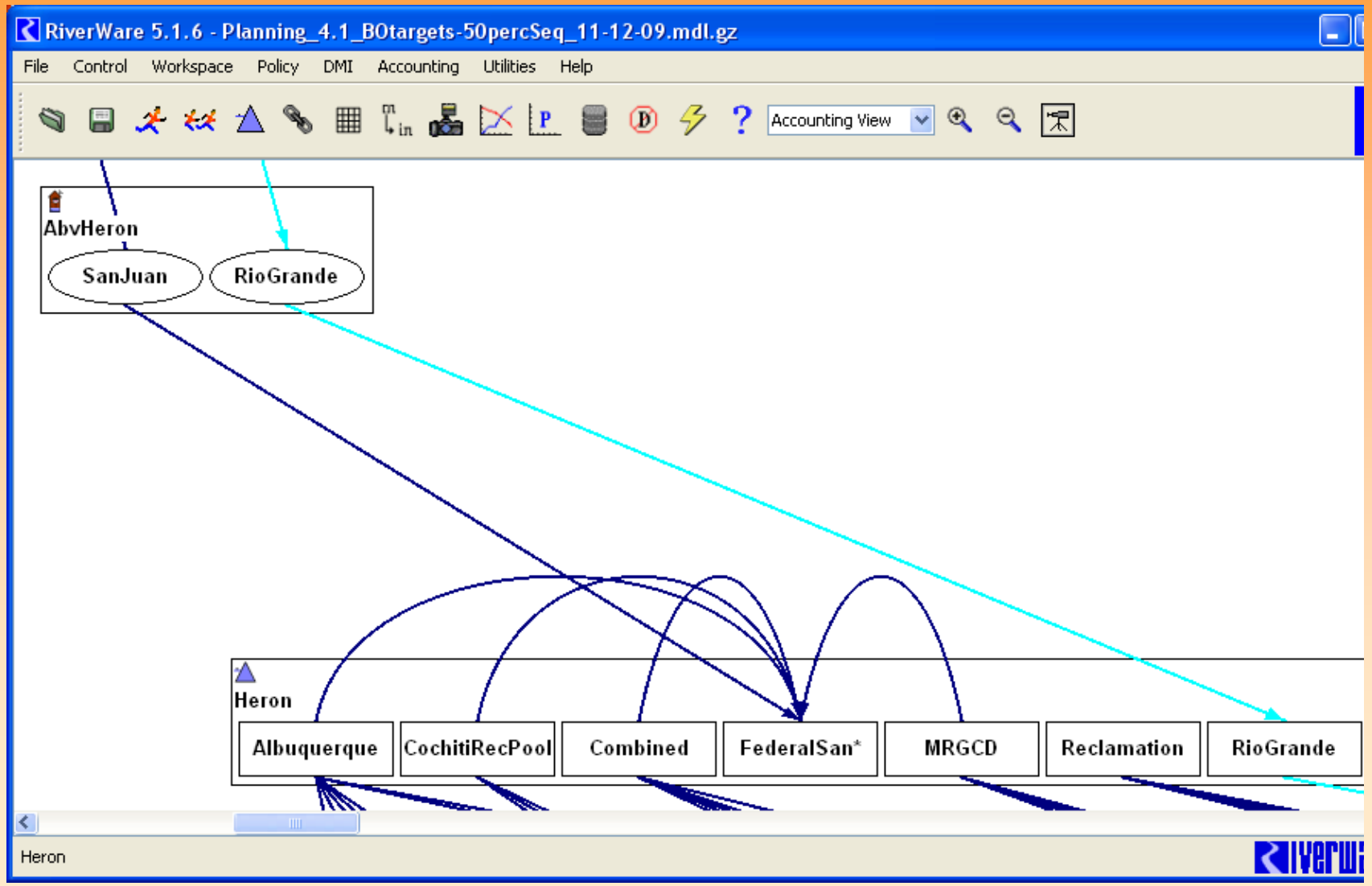
Sample Results for Allocations of San Juan-Chama Project Water at Heron



San Juan-Chama Project Water Reverted back to the Federal Pool

- San Juan-Chama Project water would be reverted back to the Federal pool on December 31st.
  - Contractors would have allocated water remaining at Heron if allocated downstream storage space was full.
    - Downstream storage a function of water needs versus current supply.
- Reclamation *may* issue waivers allowing allocated water in storage at Heron to remain in storage until Sept 30th.
  - Waivers always issued in URGWOM for the Albuquerque, Combined, and MRGCD accounts.
    - Waiver water delivered to fill downstream storage space as space becomes available.
  - Waiver balance on Sept 30th reverted back to the Federal pool.

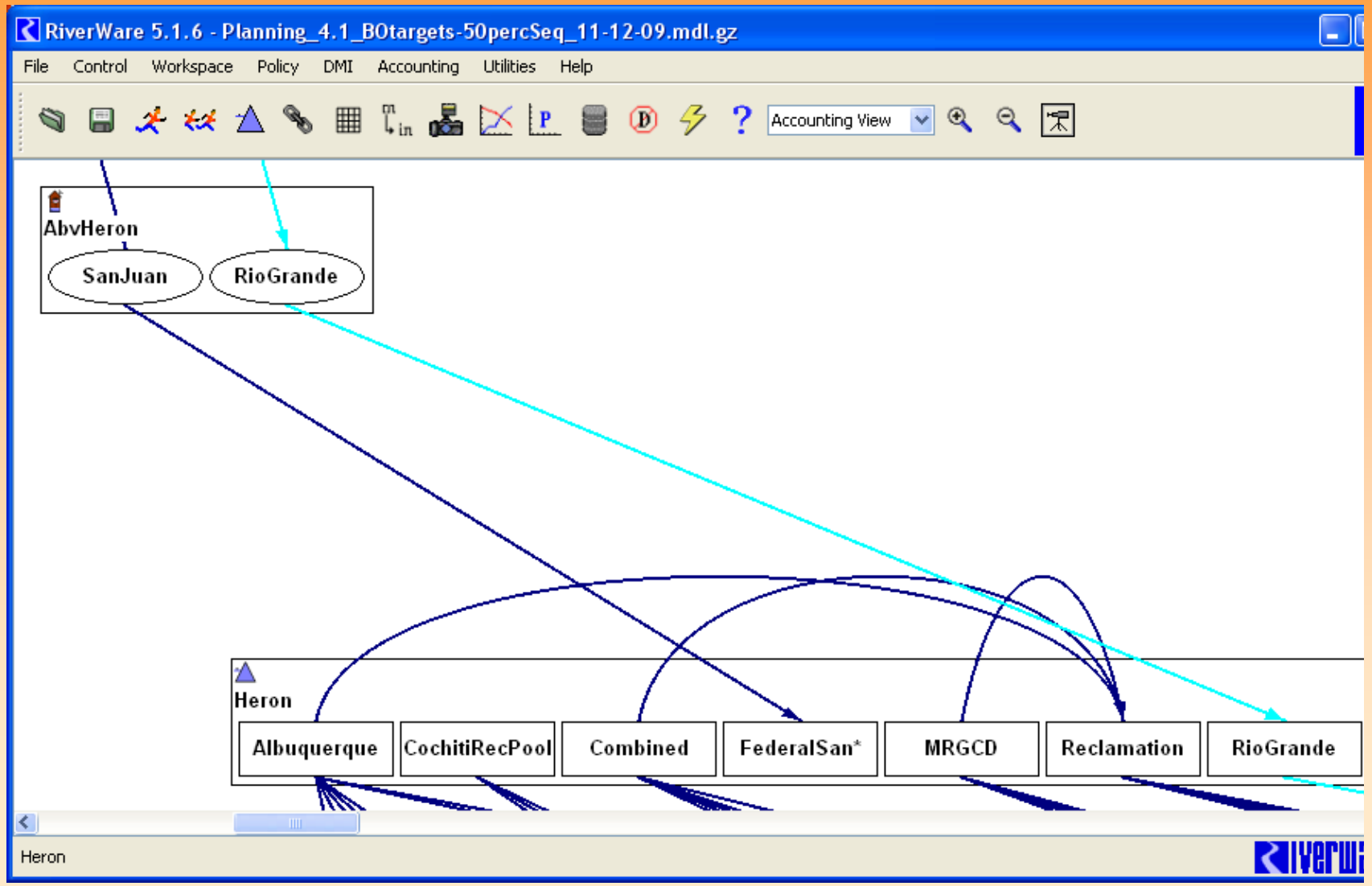
San Juan-Chama Project Water Reverted back to the Federal Pool



Leases of San Juan-Chama Project Water

- Reclamation may lease San Juan-Chama Project water to use to meet target flows.
- Within URGWOM, this just shows up as a transfer from the leaser's account to Reclamation's account.
- Transfer can be made from leaser's storage account to Reclamation's account at Heron, El Vado, or Abiquiu.
  - Transfers are made based on daily input schedule.
    - Not conditional on the status of the system or supply.
    - No alternate schedule if water not available at input transfer time.
  - For PHVA runs, transfers included just from the Combined account at Heron on January 2nd of each year
    - 8000 acre-ft – 1st five years and 5000 acre-ft – last five years
    - Transfers always implemented.

Leases of San Juan-Chama Project Water



Adjustment (350 acre-ft) for Evap/Rec

- End-of-year adjustment included as a transfer of 350 acre-ft from the Rio Grande account to the Federal pool for San Juan-Chama Project water
  - per Water Rights file no. 1545 and 1699.
    - 347 acre-ft to replace impact of storage of Rio Grande water on evap losses to San Juan-Chama Project water (and 3 acre-ft for Recreation).

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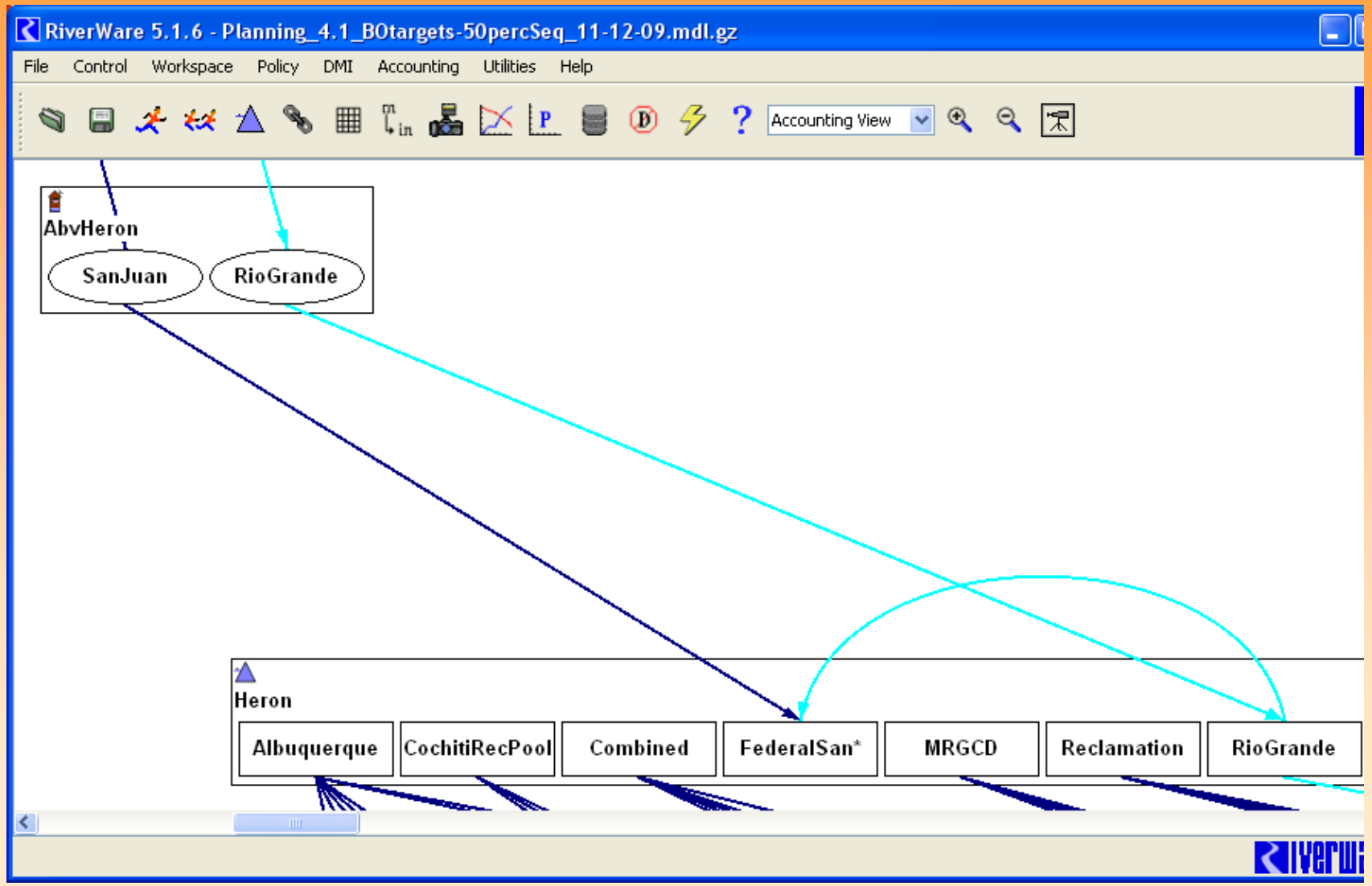
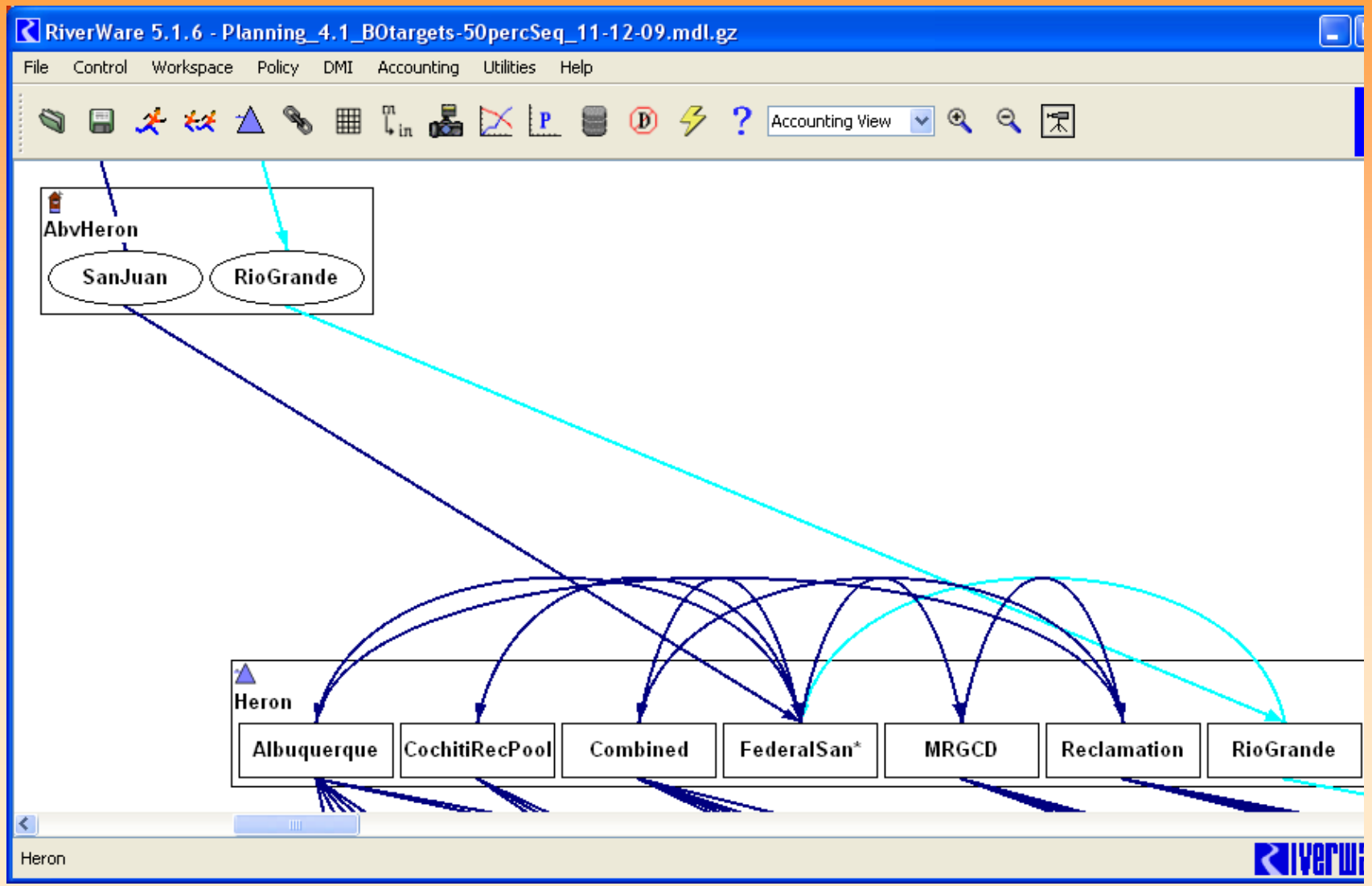


All Transfers at Heron



Priorities for Rule Execution

- Priorities

  For Each Dam:

  1. Preparatory Rules – Identify the Required Release to Meet Demands
     - Compute Release of San Juan Water and Rio Grande Water

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     - Final Outflow set, and Rio Grande and San Juan Release Reconciled
  3. Accounting Supplies Set based on Reconciled San Juan and Rio Grande release
     - to payback debts, fill storage accounts, or pass-through to a downstream destination.