EXHIBIT 14
DATE 1/19/05
HB 6, 8

Project 3: Assessment of the Interaction Between Ground Water and the Gallatin River Near Four Corners ($99,618)

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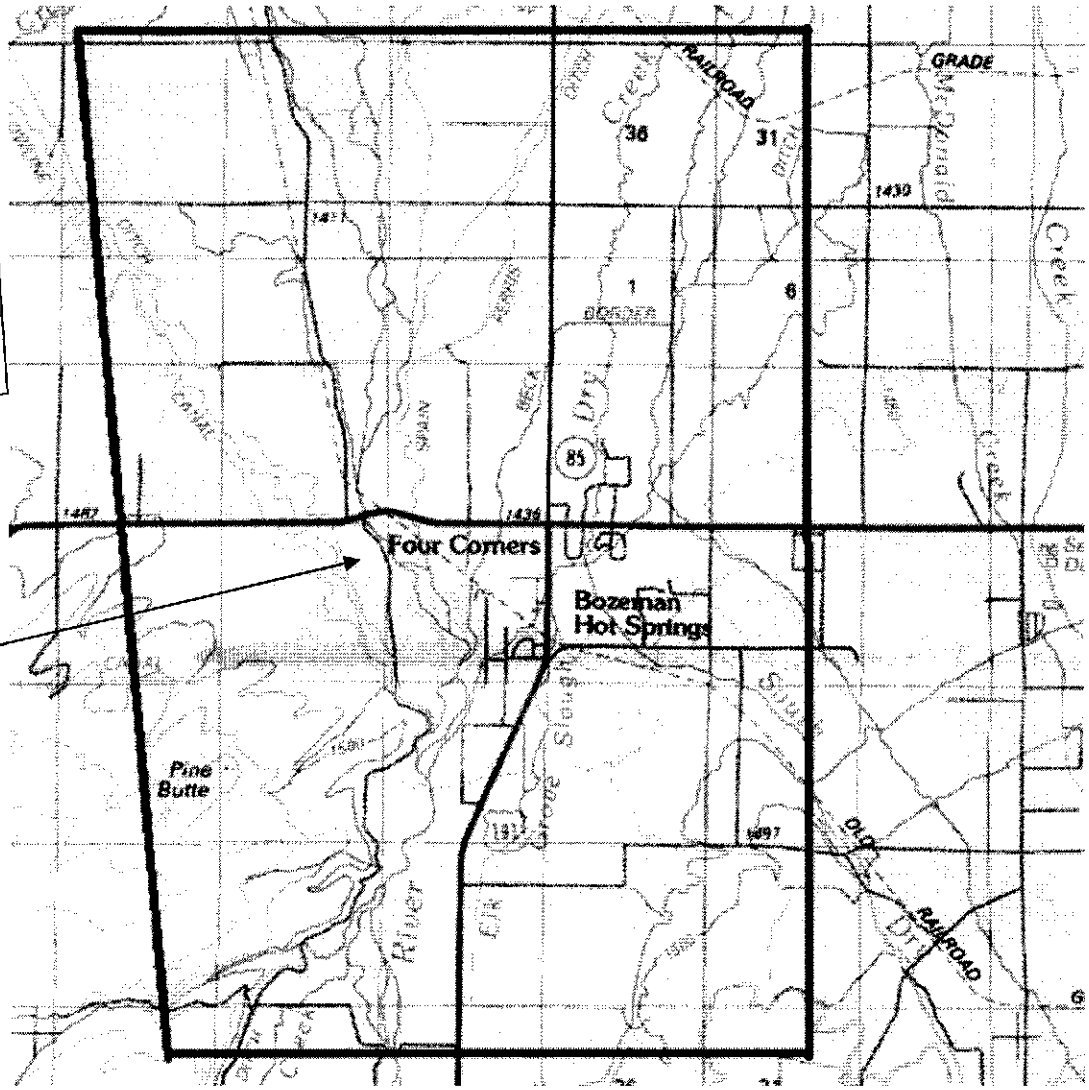
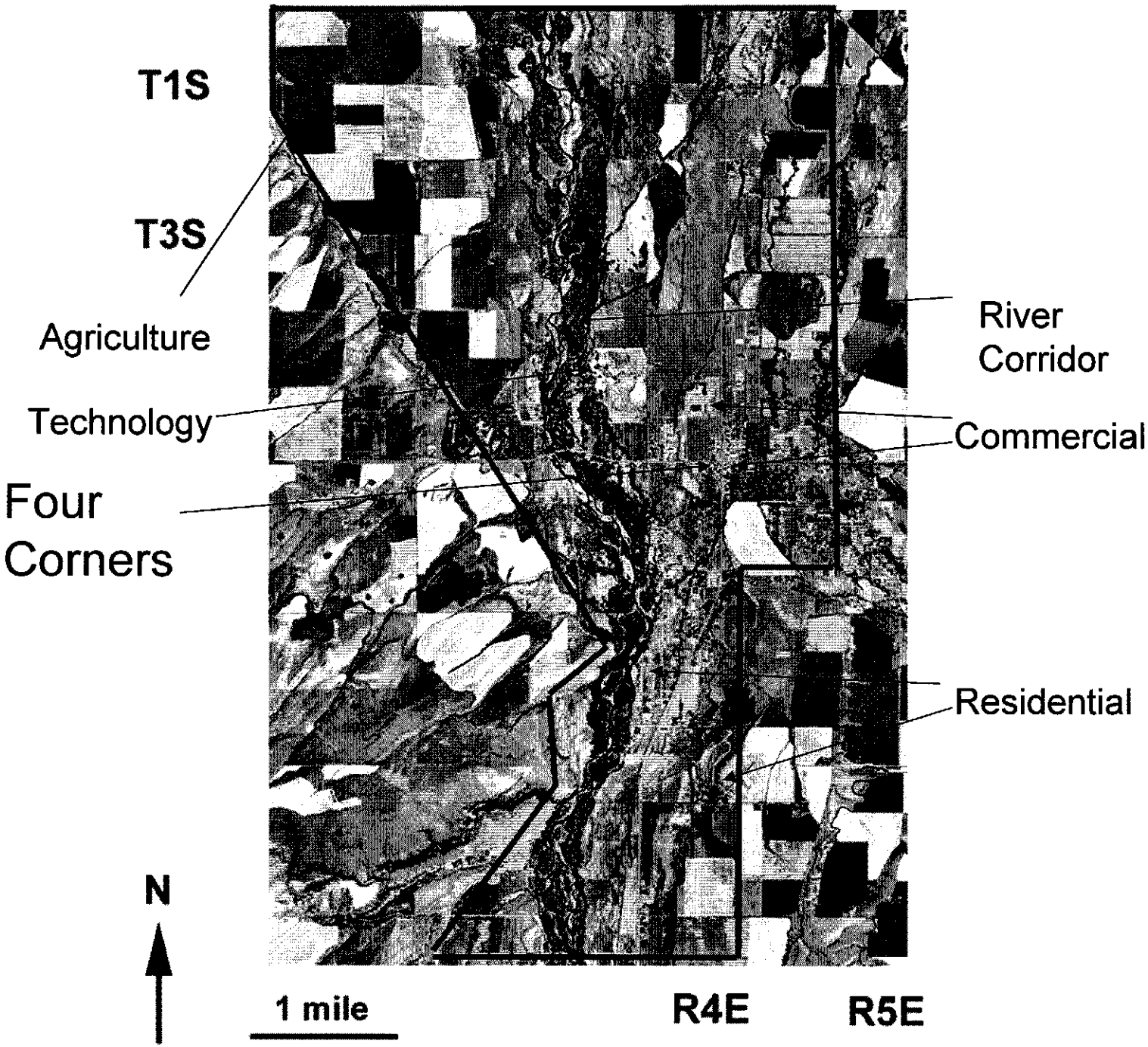
Four Corners is in Gallatin County (Belgrade is 7 mi N; Bozeman is 6mi E)

Four Corners




T1S
T3S
Agriculture
Technology
Four
Corners
River
Corridor
Commercial
Residential
N
1 mile
R4E
R5E

Problem

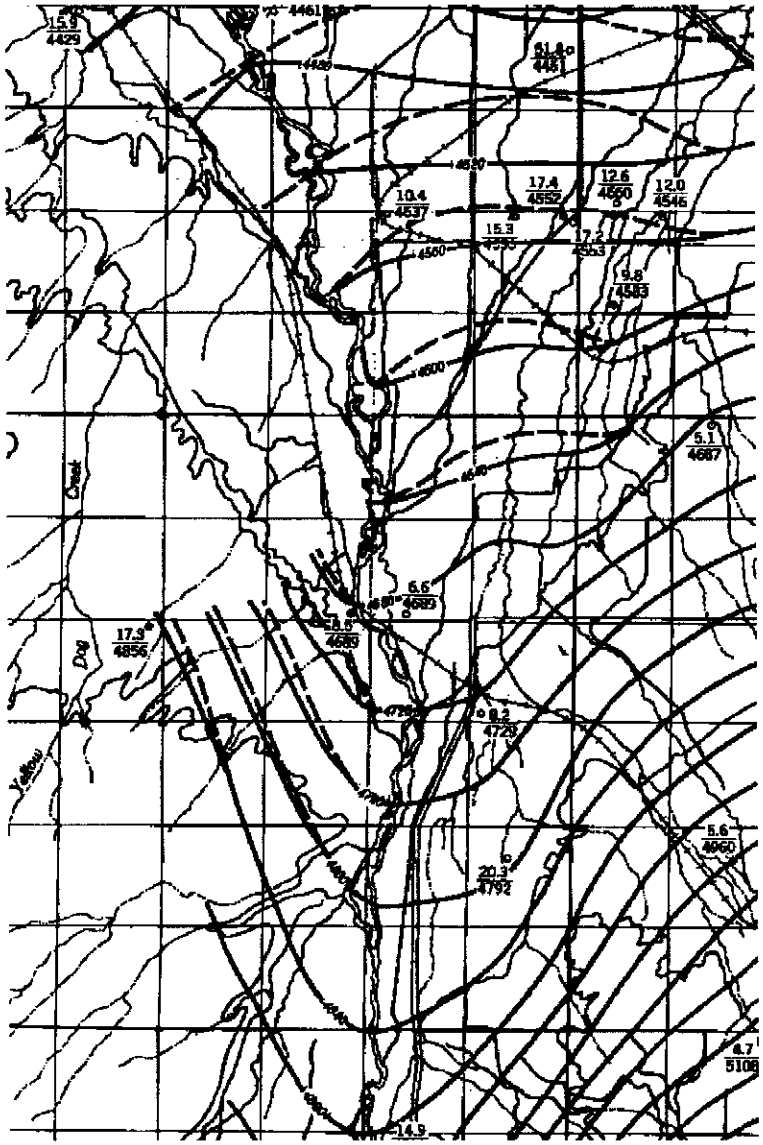
- Gallatin River is part of the Upper Missouri River Basin
- The basin is closed to further surface-water appropriations until adjudication is completed.

Many Groups are Concerned

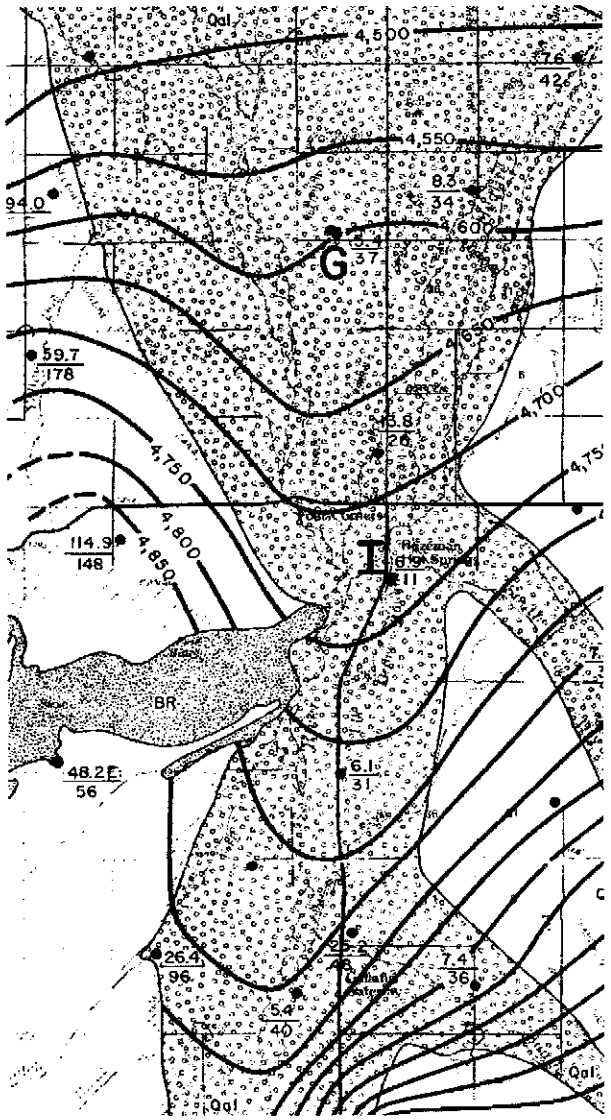
- Area Residents – Worried about future water quality and quantity.
- Developers – Worried about availability of water but cannot infringe on surface water rights.
- Conservation Organizations – Worried about flow for fish, wildlife, and recreation.
- Agriculture and the Gallatin County Conservation District – Worried about infringement on existing surface-water rights
- Gallatin County Commission- Worried about sound decisions that protect water resources.
- DNRC needs solid data for models to make informed water-rights decisions.

There is little data in the river corridor

Hackett et al 1960



Slagle 1995



Different Shape of Lines of Equal Water Level Elevation

Few Wells in River Corridor To Control Lines

Data to be collected for future model

Aquifer Adjacent to River

- Hydraulic Conductivity
- Gradient vertical and horizontal
- Flux
- Flux Direction
  - (To/From River)
- Storage (Bulk Density)
- Monitoring
  - Ground-Water Level
    - Adjacent to River
    - Adjacent to Ditches
  - Ground-Water Temperature

River Bed

- Hydraulic Conductivity
- Gradient vertical and horizontal
- Spatial Flux Distribution
- Flux direction
  - Into/Out of River Bed
- Storage (Bulk Density)
- Monitoring
  - Stage (elevation of flow)
    - River
    - Irrigation Ditches
  - River and Bed Water Temperature

Project will experiment with stream-bed temperature

- Stream-bed temperature has been shown to be useful for mapping areas of ground water gain and loss to and from sand-bed Rivers in other states.
- Stream-bed temperature has been shown to be useful for estimation of hydraulic conductivity in sand-bed streams in other states
- Stream-bed temperature may be a useful tool for gravel-bed rivers in Montana.

Objectives

- This project will test stream-bed temperature as a tool to identify where ground water is entering or exiting the river bed and the quantity.
- This project will collect hydraulic data in the river corridor for future modeling.
- This project will expand ground-water monitoring in the stream corridor for this area in collaboration with the LWQD.
- This project will **not** model the impact of a specific development or a specific agricultural interest or a specific individual in the Four Corners Area
- Data will help the DNRC build a future numerical model