**GROUND WATER INVESTIGATION PROGRAM**

**Flathead Valley Deep Aquifer, Flathead County**

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**Geologic Setting**

The Flathead Valley is underlain by a thick package of sedimentary rocks. The deep aquifer is coarse material and a highly productive aquifer. The confining unit separates it from the shallower systems. The shallow systems are most recent and may in places be prone to pollution. The relationship between the deep aquifer and surface water is not known at this time.

**Aquifer responses to precipitation**

**Preliminary evaluation of likely recharge areas**

On the monitoring map, wells are color coded to show inferred relationships with precipitation.

- **Red** - Little direct response to precipitation trends. Wells tend to be on the west side of the valley, indicating less regional recharge likely occurs on this side.
- **Yellow** - Intermediate response to precipitation trends. Wells marked in yellow are more central in the valley, and likely are influenced by recharge to the east.
- **Green** - Flashy, immediate response to precipitation trends. Wells on the east side of the valley, near the Swan Mountain front, indicate this is likely a major area of precipitation rates to the east, mountain front recharge, and a lack of a competent confining unit along the mountains.

**Barometric efficiency**

Barometric efficiency provides an insight into the effectiveness of confining units. Higher barometric efficiencies indicate more effective confining units. Investigating the deep aquifer includes critical evaluation of the overlying confining unit which can:
- Block recharge due to its low ability to transmit water
- Protect the deep aquifer by separating it from the shallow systems
- Control discharge direction

**The figures show:**

- Alluvial well with no barometric response – as expected for a water table aquifer
- Deep aquifer well 148188 with 55% barometric efficiency – typical for a confined aquifer
- Deep aquifer well 148194 with no barometric response – not typical for a confined aquifer

**Preliminary interpretations:**

- The confining unit is missing or relatively transmissive in the area of 148194.

**Methods**

- Correlate groundwater level changes
- Surface water flow and stage
- Spring discharge
- Precipitation
- Barometric pressure
- Drill
- Lithologic investigations
- Aquifer test sites

**Discussion**

- The Deep Aquifer
  - Very productive aquifer
  - Partially protected by confining unit
  - Unknown isolation from surface water

- The Confining Unit
  - Fine grained till
  - Deposited on uneven scoured surface
  - Not uniform across the valley
  - Ability to separate shallow and deep systems is not well documented