INCOMPLETE HYDROLOGIC CHARACTERIZATION

Does not meet requirements per WS 35-11 -406 (b) (xviii) or WS 35-11 406 (n) (iii) or WAR Ch. 19 – Sec. 2 (a) (i)

- ***Sparse hydrologic data – for a "relatively complex groundwater system"***
- ***No site specific hydraulic data for overburden, underburden, Tongue River / Slater Creek alluvium***
- ***Absence of conceptual model that explains / interprets limited data***
- ***Large uncertainties associated with groundwater modeling – poor prediction capability***
- ***Very poor discussion of probable cumulative hydrologic impacts***

INCOMPLETE HYDROLOGIC CHARACTERIZATION

Does not meet requirements per WS 35-11 -406 (b) (xviii) or WS 35-11 406 (n) (iii) or WAR Ch. 19 – Sec. 2 (a) (i)

- ***Sparse hydrologic data – for a "relatively complex groundwater system"***
  - Data collection focused only on coal seams
  - Only 2 site specific hydraulic conductivity / storage values - from only one location
  - A single storage coefficient /specific yield and porosity value was used for entire extent of coal seams
  - Potentiometric maps for coal based on average values – limits interpretation – doesn't allow for seasonal variations, Figures D6.2-2 & D6.2-3 do not show effect of faults
  - For background - only 4 surface water locations & 3 non-coal wells - no data for SW locations from Oct. - March
  - Very old – pre-1973 –data for precip
  - No data for recharge

INCOMPLETE HYDROLOGIC CHARACTERIZATION

Does not meet requirements per WS 35-11 -406 (b) (xviii) or WS 35-11 406 (n) (iii) or WAR Ch. 19 – Sec. 2 (a) (i)

- ***No site specific hydraulic data for overburden, underburden, Tongue River / Slater Creek alluvium***
  - No monitoring wells in TR alluvium – no hydraulic parameters, saturated thickness data, water level data or water quality data
  - Did not monitor Slater Creek alluvium during aquifer tests
  - Potential impact alluvial aquifers (TR and SC) –will degrade AVFs
  - Per permit application most of 357 domestic /stock wells developed in non-coal portion of Ft. union Fm.

INCOMPLETE HYDROLOGIC CHARACTERIZATION

Does not meet requirements per WS 35-11 -406 (b) (xviii) or WS 35-11 406 (n) (iii) or WAR Ch. 19 – Sec. 2 (a) (i)

- ***Absence of conceptual model that explains / interprets limited data***
  - Inadequate characterization of Slater Creek – intermittent, base flow
  - No discussion of recharge –discharge to Tongue river alluvium
  - No discussion / interpretation of hydraulic relationship between Tongue River and TR alluvium
  - No water quality or flow data for TR near permit boundaries
  - No explanation of great variation in water chemistry in coal samples and transmissivity values for coal
  - No discussion of which vertical intervals / lithologies are being used by 357 domestic wells
  - Inadequate understandings /data for groundwater recharge / discharge
  - Where does GW go to SE?

INCOMPLETE HYDROLOGIC CHARACTERIZATION

Does not meet requirements per WS 35-11 -406 (b) (xviii) or WS 35-11 406 (n) (iii) or WAR Ch. 19 – Sec. 2 (a) (i)

- ***Large uncertainties associated with groundwater modeling – poor prediction capability***
  - Emperical data for only one of 4 hydraulic parameters required by model
  - Overburden / underburden modeled as homogenous
  - Did not account for stock/domestic aquifer use – did not include water levels in model
  - Poor water budget
  - No data based conclusion that TR is a losing river thru model domain

INCOMPLETE HYDROLOGIC CHARACTERIZATION

Does not meet requirements per WS 35-11 -406 (b) (xviii) or WS 35-11 406 (n) (iii) or WAR Ch. 19 – Sec. 2 (a) (i)

- ***Very poor discussion of probable cumulative hydrologic impacts***
  - CBM drawdowns
  - Draining of TR alluvial aquifer due to Bighorn Coal mining near T-1
  - Impact of cumulative decline in discharge from Ft. Union to TR alluvium
  - Long term recovery of water levels - decline of 10 ft plus
  - Changes to groundwater flow system due to infilling of highwall excavations
  - Some impacts cannot be mitigated

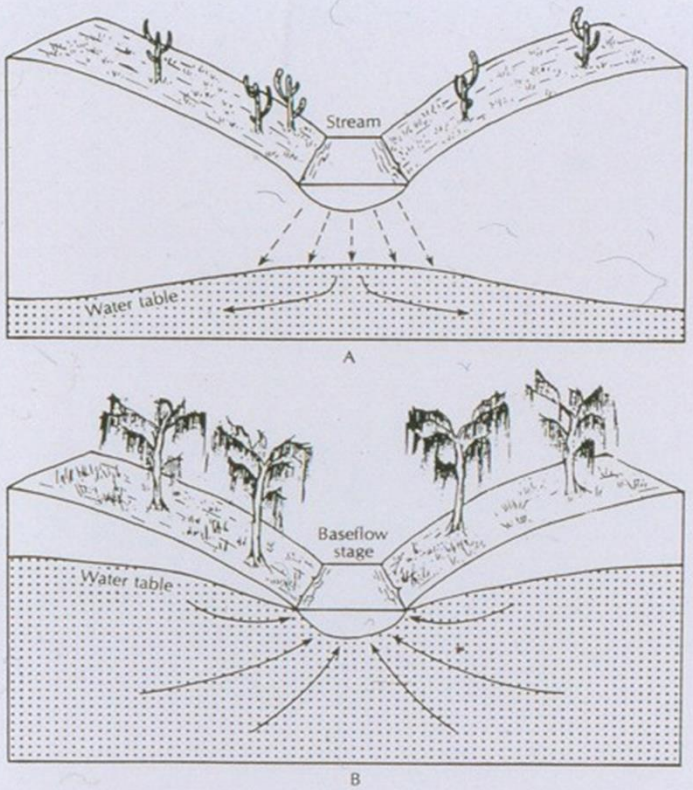

FIGURE 3.8 **A.** Cross section of a losing stream, which is typical of arid regions, where streams can recharge ground water. **B.** Cross section of a gaining stream, which is typical of humid regions, where ground water recharges streams.

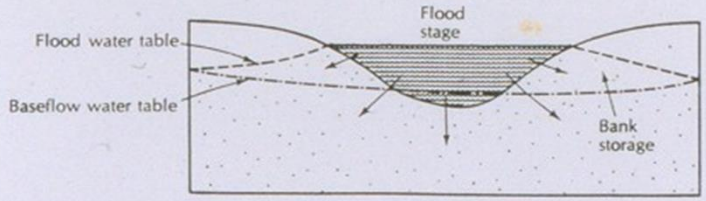

FIGURE 3.9 A stream that is gaining during low-flow periods can temporarily become a losing stream during flood stage.