

Alternatives for Applying the use of Mitigation, Augmentation and AQUIFER RECHARGE in Montana.

Aquifer Recharge

Definition: Means either the controlled subsurface addition of water directly to the aquifer or controlled application of water to the ground surface for the purpose of replenishing the aquifer to offset adverse effects resulting from net depletion of surface water.

HOUSE BILL 831 SECTIONS

- **Section 16:** Aquifer recharge or mitigation plans in closed basins – minimum requirements
 - (g) a description of the process by which water will be reintroduced to the aquifer.
- **Section 19:** Water quality of return flows and discharges associated with aquifer recharge plan -- minimum requirements.
 - Treatment Standards and Cumulative Affects
- **Section 20:** Aquifer Storage And Recovery

AQUIFER RECHARGE

Ground Surface Application Methods

- Engineered infiltration basins
- Natural recreational ponds, wildlife refuges wetlands or aquatic parks
- Off channel diversions
- Riser dams
- Spray or drip application

Advantages

- Visible for monitoring
- Direct access for maintenance

Disadvantages

- Clogging
- Air born contamination
- Seasonal use
- Large area required, possibly restricted

AQUIFER RECHARGE CONTINUED

Shallow Subsurface Application Methods

- Buried trenches or drain fields
- Vadose zone wells

Advantages

- Year round use
- Limited access
- Land surface available for parks etc.

Disadvantages

- Clogging
- Difficult to observe and monitor
- Difficult maintenance
- Large area required

AQUIFER RECHARGE CONTINUED

Direct Injection through Well Recharge

- Individual well
- Multiple wells

Advantages

- Year round use
- Very limited access
- Very small area required

Disadvantages

- Clogging
- Greater potential for aquifer contamination
- Maintenance

KEY ELEMENTS TO A SUCCESSFUL AQUIFER RECHARGE SYSTEM

- HIGH QUALITY RECHARGE WATER
- PRE-TREATMENT OF RECHARGE WATER
- PROPER SOILS
- PROPER AQUIFER CHARACTERISTICS
- THOUROUGH MONITORING OPPERATRION AND MAINTENANCE PROGRAM
- REDUNDANCY
- EMERGENCY BACK UP PLANS

WATER QUALITY OF RETURN FLOWS AND DISCHARGES ASSOCIATED WITH AQUIFER RECHARGE PLAN

- TREATMENT STANDARDS
- CUMMULATIVE AFFECTS
- AQUIFER INJECTION



AQUIFER STORAGE AND RECOVERY

Definition: Means a project involving the use of an aquifer to temporarily store water through various means, including but not limited to injection, surface spreading and infiltration, drain fields, or another department-approved method. The stored water may be either pumped from the injection well or other wells for beneficial use or allowed to naturally drain away for a beneficial use.

- **AQUIFER STORAGE vs. AQUIFER RECHARGE**
- **RECOVERY**