# The law of groundwater mixing zones in Montana

1. What they are
2. How they are used
3. What are the relevant parameters
4. Standard mixing zones

ENVIRONMENTAL QUALITY COUNCIL
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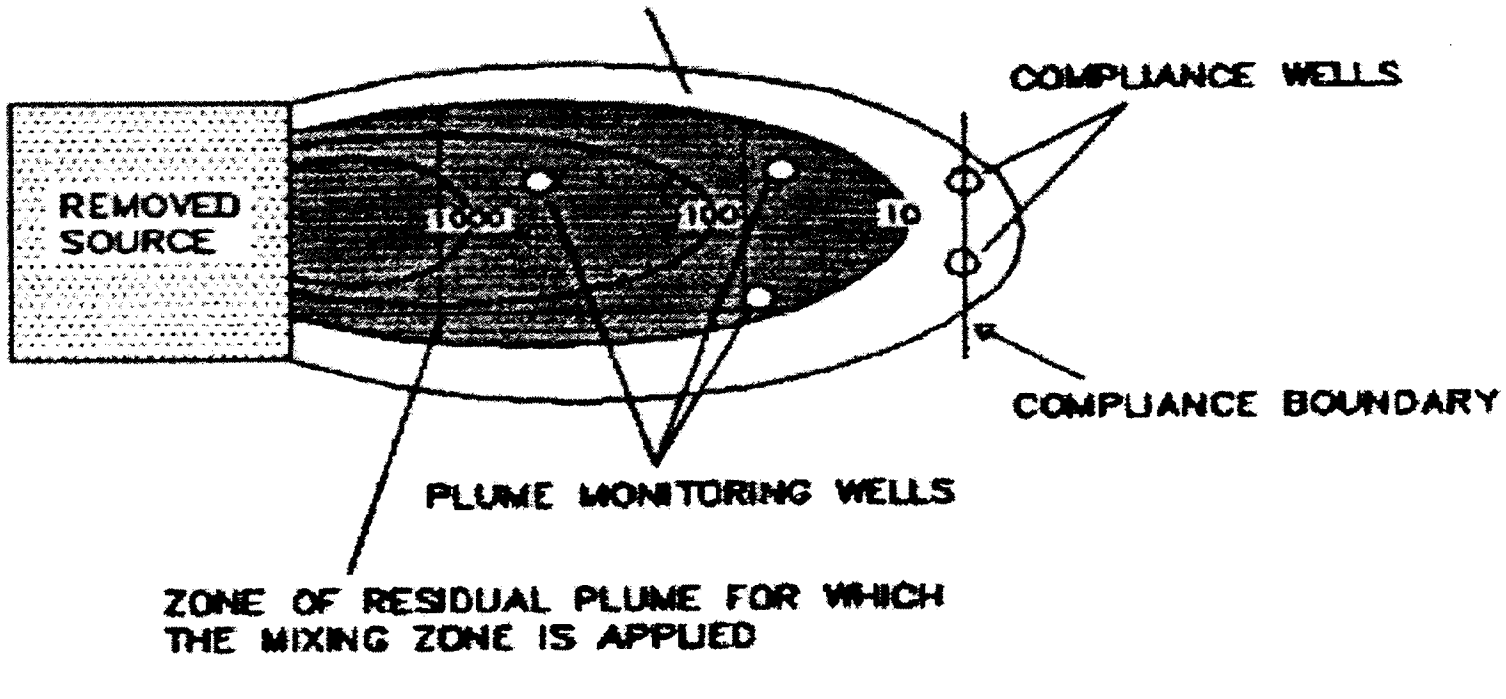
EXHIBIT 10

# Groundwater mixing zones

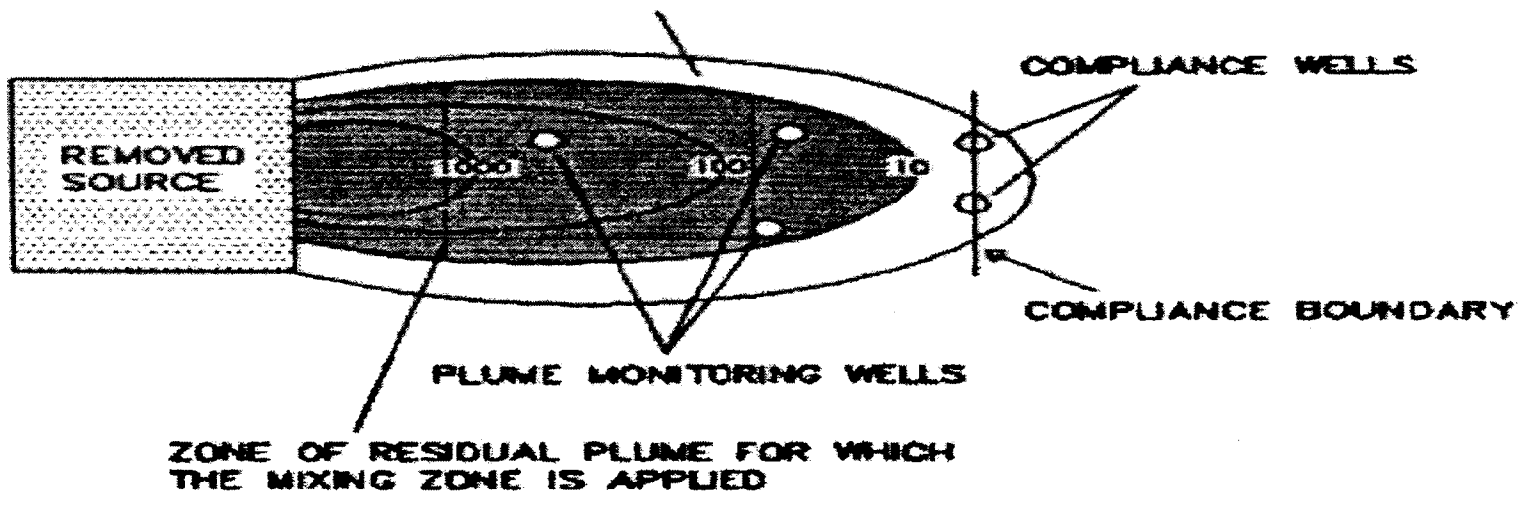
## - What they are

A mixing zone is a portion of an aquifer, where initial dilution of a discharge takes place and where water quality changes may occur and where certain water quality standards may be exceeded. ARM 17.30.502.



# Groundwater mixing zones
## - How they are used

- The boundary of the mixing zone is considered the point of discharge.
- Groundwater quality standards may be exceeded within the mixing zone. ARM 17.30.1005



# Groundwater mixing zones

## - Relevant parameters – receiving waters

- A mixing zone discharges into receiving water.
- The receiving water will have a beneficial use classification, just like surface waters in Montana. ARM 17.30.1006
- Water quality changes at the boundary must be non-significant. ARM 17.30.505

# Groundwater mixing zones

## - Relevant parameters – receiving waters

- Non-significant generally means an increase to the receiving waters of less than 10% of the allowed level, and the receiving water at less than 40% of allowed level. ARM 17.30.715
- Carcinogenic / toxic are different, for example, benzene at 5ppb.

# Groundwater mixing zones
## - Standard v. Source specific

- Montana has standard mixing zones, and source specific mixing zones.
- Standard mixing zones may be used with or without Department approval.
- Source specific mixing zones require Department approval.
- ARM 17.30.515

# Groundwater mixing zones
## General Rules

- Human health based standards must not be exceeded outside a groundwater mixing zone. ARM 17.30.508.
- The zone of influence of a water supply well may not overlap a mixing zone. ARM 17.30.508

# Groundwater mixing zones

## - Standard mixing zones

- Standard mixing zones may be used without approval of the Department. ARM 17.30.515(4).
- Parameters for standard mixing zones, ARM 17.30.517

# Groundwater mixing zones
## - Standard mixing zones

- A.R.M. 17.30.517(d)(viii)....
- (a) single family septic on lots less than 2 acres
- (b) single family septic on lots greater than 2 acres
- (c) subdivisions with central water service
- (d) any other source discharging into groundwater.

# Groundwater mixing zones
## - Standard mixing zones

- General conditions.
  - May not be appropriate in confined aquifers
  - Depth - Top of the water table to 15 feet below the water table.
  - Width – width of source, then 5 degree cone to end of mixing zone.
  - Length - 500 feet long. ARM 17.30.517

# Groundwater mixing zones
## Possible parameters Re: standard mixing zone associated with petroleum cleanup

- Mixing zone must be smallest practicable size, minimum effect on other users, defined boundaries. (ex. Mont. Code. 75-5-301, ARM 17.30.518.)
- Once concentrations at the boundary stabilize at levels meeting water quality standards, no further action required at the site.