

Title: Evaluation of the Effect of Stormwater Disposal on Groundwater Quality
(Study No. 48)

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Period of Contract: July 16, 1987 to June 30, 1989

Objectives: To chemically characterize runoff at four sites with differing land uses, evaluate the impact of stormwater disposal on groundwater quality, and determine the effectiveness of drywells and the perforated tile system as a method of stormwater disposal.

Background/Need: Dry wells and perforated tile disposal systems are listed as Class V groundwater injection wells by the United States Environmental Protection Agency. Past research has shown high concentrations of sodium and chloride in runoff and groundwater samples resultant from stormwater disposal. Other toxic chemicals are common in stormwater runoff as well.

Methods: Runoff samples were collected in pails suspended from storm drain grates during selected major runoff events from October of 1987 through August of 1988. Monitoring wells were installed and sampled quarterly, beginning the last quarter of 1987 and continuing through the second quarter of 1989. Samples were transported to the laboratory in a cooler and analyzed for organic and inorganic contaminants including metals.

Results: Increased sodium and chloride concentrations displayed the most dramatic chemical impacts of stormwater runoff in groundwater. Winter and early spring evidenced the greatest sodium concentrations, ranging from 300 to 7300 mg/l at one site. Heavy metals were not found to severely impact groundwater. Volatile organic compounds (VOCs) occurred on a more regular basis in runoff samples than monitoring well samples. Polynuclear Aromatic Hydrocarbons (PNAs) were found in many of the samples analyzed. Concentrations were less than 100 micrograms per liter in most samples.

Conclusions:

Investigators concluded that sodium and chloride are the most prevalent contaminants of groundwater by stormwater runoff. VOCs and PNAs in runoff may result from petroleum products, though most volatile components evaporate before entering drains and reaching groundwater. The less volatile petroleum compounds, including PNAs, are potentially a greater groundwater threat.

**Recommendations/
Implications:**

Investigators suggest methods of stormwater disposal other than groundwater injection may be preferable for urban areas that depend on groundwater for water supply. Porous pavement may aid in runoff reduction. Drywells or storm drains provide a rapid conduit for potential groundwater contaminants, specially for spills or in an initial dispersing area. The chemical oxygen demand of a sample may be used as a relative indicator of total organics concentration. Further study of the effectiveness of treatment of a drainage system with increasing age and buildup of organic matter and fine soil particles would be useful. Further investigation of the occurrence and significance of PNA is recommended.

Availability of Report:

This report is available for viewing and loan at:

The Water Resources Center
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Key Words:

Chloride, drywell, polynuclear aromatic hydrocarbons, sodium, stormwater disposal, volatile organic compounds, wastewater

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