Kansas Department of Health and Environment

Bureau of Environmental Remediation, Remedial Section

State Water Plan Contamination Remediation Program

Nitrate Contamination in the Sand Springs Study Area

Background:
In a May 3, 1994, letter, the City of Abilene requested that the Kansas Department of Health and Environment (KDHE) designate an area between Abilene and Solomon in Dickinson County, Kansas, a Critical Water Quality Management Area. City officials expressed concern about the water quality of the aquifer in the designated area, as levels of nitrate were consistently increasing in Abilene's public water supply wells located in the area.

KDHE responded to the City in a letter dated September 27, 1994, that KDHE would proceed with evaluation of the candidate area with the BER/Remedial Section taking the lead in the investigatory phase of the project. In that same letter, an Advisory Panel on the Sand Springs Critical Water Quality Management Area was to be established. The panel consisted of five members: two appointed by the City of Abilene, two appointed by the Dickinson County Commission, and a Chair who was a local citizen and equally acceptable to both urban and rural interests.

The area of concern lies between the cities of Abilene and Solomon in Dickinson County, Kansas, commonly known as the Sand Springs area. This area is characterized by highly permeable soil and dune sand deposits. The Sand Springs study area is a region that provides essential ground water recharge to water-bearing formations that supply much of the drinking water for both cities, several rural water districts, and individual farmsteads in the area. The study area encompasses approximately 28 square miles.

The BER/Remedial Section conducted a very extensive investigation working in close cooperation with the Advisory Panel which included the sampling of more than128 ground water wells, geoprobe sampling, test hole drilling, core sampling, surface water gauging, and soil sampling in potential source areas.

Nearly a third of the domestic water wells tested by KDHE in the Sand Springs area exhibited nitrate concentrations above the Maximum Contaminant Level of 10.0 mg/l nitrate-nitrogen. Several public water supply wells were also contaminated, and other existing and proposed water supply well locations were determined to be threatened by approaching plumes of contamination. Background water quality in the area was not found to exhibit nitrate contamination. KDHE's evaluation suggested that a variety of organic and inorganic nitrogen sources have contributed to the regional contamination problem.

The Sand Springs study identified numerous sources for the endemic and widespread nitrate contamination problem in the region. These sources include active and inactive feedlots, greyhound kennels, a horse ranch, domestic wastewater septic treatment systems, and commercial and domestic use of nitrogenous fertilizers are among the primary source types for nitrate contamination identified by the study. Everyday operations at individual farmsteads have also caused localized contamination problems across the study area. Indirect threats to water quality in the area include the presence of untold number of inadequately constructed and abandoned wells.

The study findings suggest that the chronic water quality problem cannot be ascribed to any one source type, operator, or historical practice in the district. Unregulated activities and practices integral to the history and health of the community have for decades contributed to the gradual accumulation of the nitrate contamination that now threatens human and animal health in the area. Many of the regional management practices associated with the generation of nitrate contamination in the area are common to rural communities throughout Kansas and the midwest.

Solution:
Following the investigation by the BER/Remedial Section in 1995, KDHE funds were used to set up the Dickinson County Water Improvement District. The program is governed by a five-member citizen board appointed by Dickinson County and the City of Abilene. A project administrator has been hired to coordinate the effort to reduce the amount of nitrates and other potential contaminants entering the Sand Springs aquifer and the environment. The program has already served to enhance the Sand Springs area by coordinating the following: creation of a new sewer benefit district to connect more than 100 homes to the City of Abilene sewer system; rewriting the county sanitary code; researching alternatives and ground water protection measures for dog kennels and private water wells; evaluating options for an improved sewer on a lakeside residential community in the Sand Springs area; construction of a new water treatment plant that will use the reverse-osmosis filtration method to remove 98-99% of all contaminants, including nitrates.

Benefits:

- **Public/State partnership was developed to assess and address the nitrate contamination problem.**

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