

March 12, 2002

Reference

AR

New Mexico Environment Department (NMED)
Ground Water Quality Bureau (GWQB)

NEW MEXICO STATE FY 01 CLEAN WATER ACT SECTION 106 FOR
WATER QUALITY MANAGEMENT, GROUND WATER PORTION

Executive Summary for Statewide Perchlorate Surveillance During FY 01

Introduction

Perchlorate ClO_4^- , a chemical associated with rocket fuels, explosives, and fertilizers, has been detected in ground water in New Mexico and elsewhere. Ammonium perchlorate is manufactured for use as a rocket fuel. Chilean nitrate deposits, that contain naturally occurring perchlorate, were mined extensively as a resource for nitrogen prior to the discovery of how to extract nitrogen from the atmosphere. Explosives, munitions and fertilizers made from Chilean nitrate also contain perchlorate.

Potential health effects of exposure to perchlorate in drinking water include acute thyroid dysfunction and thyroid cancer. While drinking-water standards for perchlorate have not been established, the State of California set an action level of 18 ug/L for public water supplies, and the U.S. Environmental Protection Agency calculated provisional clean-up or action levels of 4-18 ug/L.

Perchlorate investigations have been done previously at explosives and rocket-testing facilities in the state (Table 1). The New Mexico Environment Department (NMED), however, determined that statewide surveillance for perchlorate in ground water was necessary.

Methods

Sites where explosives may have been handled or disposed of, and sites where fertilizers may have contaminated ground water with nitrate, were identified and sampled for perchlorate. These sites included irrigated croplands, dairies, State and Federal laboratories and weapons testing facilities, a greenhouse, and nitrate contamination sites where the source had not been identified. Samples were delivered to the Scientific Laboratory Division (SLD) of the N.M. Department of Health in Albuquerque for analysis by ion chromatography. The specimens were run through a series of "On Guard" columns to remove other anions, and were injected into an "AS16" column designed to trap any perchlorate in the sample. The column was eluted with a 50% sodium hydroxide solution, and perchlorate concentrations were measured with a conductivity meter.



9865

Results

Perchlorate was detected in three of fifty-seven samples collected. An Excel spreadsheet containing the data from this project is attached.

A concentration of 4.81 ug/L was detected in a monitoring well in the Mountainview nitrate plume in the Albuquerque South Valley. Mountainview is a former vegetable farm that later underwent residential and industrial development. More than sixty private domestic supply wells have been contaminated with nitrate levels up to 500 mg/L as N.

A concentration of 4.51 ug/L was detected in the Des Moines Firehouse well. A level of 4.14 ug/L was measured in a blind-duplicate sample from this well. Des Moines is a rural ranching and farming community in northeastern New Mexico. The Firehouse well was selected for sampling because it had a history of high nitrate (slightly more than 10 mg/L as N on the day of perchlorate sampling).

Discussion and Conclusions

The source of nitrate at the Mountainview site is over-fertilization at the former vegetable farm. Fertilizers are also believed to be the source of perchlorate in Des Moines. The concentrations detected in Des Moines and Mountainview are relatively low and just above the SLD detection limit of 4 ug/L. Substantially higher perchlorate concentrations have been detected elsewhere in New Mexico at sites where explosives and rocket fuels were either used or disposed of (Table 1). It is significant, however, that Mountainview and Des Moines are the first documented cases of perchlorate ground-water contamination caused by agricultural fertilizers in New Mexico. NMED will continue to test for perchlorate at sites of known or suspected fertilizer contamination as they are discovered.

Table 1. Perchlorate Contamination of Ground Water in New Mexico.

LOCATION	FACILITY	SOURCE	WELL TYPE	MAX. CONC. (UG/L)
Alamogordo	Holloman Air Force Base	Rocket testing	Monitoring	40
Albuquerque	Mountainview	Fertilizer	Monitoring	4.8
Clovis	American Water Works	Unknown	Public supply	4
Clovis	Cannon Air Force Base	Unknown	Public supply	23.5
Des Moines	Firehouse well	Fertilizer	Supply	4.5
Gallup	Ft. Wingate Army Depot	Munitions disposal	Monitoring	2860
Los Alamos	Los Alamos National Laboratory	Explosives	Public supply	3
Los Alamos	Los Alamos National Laboratory	Explosives	Monitoring	1662
Melrose	Melrose Air Force Range	Explosives	Public supply	25
White Sands	White Sands Missile Range	Rocket testing	Monitoring	21000