

STUDY OF  
NITRATES IN THE GROUND WATER  
OF THE CHICO AREA  
BUTTE COUNTY

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## DISCUSSION OF RESULTS

The water level measurements made in shallow wells during the spring of 1983 and in November 1983 were used to develop ground water contours on Figures 8 and 9. These contours show similar patterns of ground water movement from the recharge areas east of Chico in a westerly and southwesterly direction. Although there was an average lowering of the water table of about 6 feet during the summer and fall, the November contours show neither large pumping depressions or reversals of flow due to heavy extraction or unusual aquifer leakage.

The lowering of the water table is the result of ground water extractions and movement of water out of the shallow zones. Ground water gradients indicate that waters in the shallow zones are moving both westerly and downward.

Nitrate data from the spring sampling showed three general areas where nitrate concentrations exceeded drinking water standards. Within these areas several well waters contained nitrates in excess of 60 mg/L. These areas are located north, west, and southwest of Chico (Figure 11). As no shallow zone wells could be located in central Chico that had well logs or were samplable, nitrate concentrations in that area are unknown. As that area is served by California Water Service Company wells pumping from the deep zone, it is unlikely that many new wells will be drilled to utilize the shallow zones in that area.

Data from the 31 wells retested for nitrate in November confirmed that there are three general areas of ground water with excessive nitrates and data from the 24 additional wells helped to better define the areal extent of these areas.

A comparison of nitrate data from the two surveys shows remarkably little change in nitrate concentrations. Of the 31 wells retested, 20 showed less than 5 mg/L nitrate change, 5 showed increases ranging up to 53 mg/L and 6 showed decreases ranging up to 47 mg/L. The remarkable consistency of the analytical results of the two surveys also show excellent reproducibility by the laboratory.

Each of the areas of high nitrate underlies unsewered residential areas and lies in the direction of ground water flow from urban development and drainage wells. In each of these areas there are numerous shallow wells and individual disposal systems which result in the recycling of ground water.

The EC patterns (Figure 10), which appear very similar to the nitrate patterns and indicate buildup of other dissolved salts in the same areas, provide evidence that ground water recycling is occurring in those areas.

Areas west of Chico which do not have excessive nitrates are generally near water-courses where recharge waters provide additional dilution and prevent salt and nitrate concentrations from accumulating to such high levels.

The higher than normal ground water table that existed in the shallow zone during the study period left little of the zone unsaturated. This condition probably minimized the effectiveness of the natural nitrate removal process