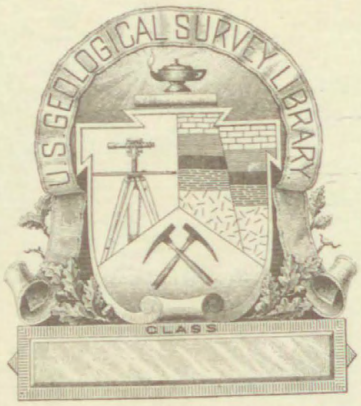

U.S. GEOLOGICAL SURVEY LIBRARY
CLASS

UNITED STATES DEPARTMENT OF THE INTERIOR

U.S GEOLOGICAL SURVEY

[Reports - Open file series]

# LITHIUM IN SURFACE AND GROUND WATERS OF THE CONTERMINOUS UNITED STATES

by

Barbara M. Anderson



Open-file report

1972

Contents



Illustrations

# LITHIUM IN SURFACE AND GROUND WATERS OF THE CONTERMINOUS UNITED STATES

by

Barbara M. Anderson

## INTRODUCTION

The accompanying map, which shows concentrations of lithium in surface and ground waters of the conterminous United States, was compiled at the request of Helen Cannon (U.S. Geological Survey) for use at the Workshop on Geochemical Environment in Relation to Health and Disease. The workshop was held February 6-12, 1972, in Pacific Grove, California. The lithium study group, led by Dr. Walter Mertz (U.S. Department of Agriculture), met to discuss the possible protective action of lithium (Livingston, 1970; Steinberg, 1970; Voors, 1969, 1970) against atherosclerotic heart disease. The map will be published in the findings of the workshop by the National Academy of Sciences, opposite a heart disease map compiled by Herbert I. Sauer (University of Missouri).

## DESCRIPTION OF MAP

The map was compiled using a U.S. Geological Survey 1:7,500,000-scale National Atlas Series base and then photographically reduced. Circles on the map represent ground-water sample sites including springs, wells, and infiltration galleries. Triangles represent surface-water samples including rivers, lakes, and reservoirs. Rectangles represent water samples from school supplies, sources

unknown. The analytical values are grouped into four classes, each represented by an appropriately shaded symbol; an open symbol represents 0.5 or less micrograms lithium per liter, a half-filled symbol represents 10 micrograms per liter or less but more than 0.5, a completely filled symbol represents 100 micrograms per liter or less but more than 10, and a completely filled and encircled symbol represents more than 100 micrograms of lithium per liter.

## SOURCES AND METHOD OF COMPILATION

With the kind permission of Dr. Marvin Skougstad (U.S. Geological Survey) a search was made of Water Resources Division Analytical Methods Research Laboratory file for water samples analyzed for lithium. This file contains analyses of water samples collected by many individuals and represents almost every State in the United States. Approximately one-half of the locations on the map are from this source.

One hundred locations were taken from Anderson (1971), and the analytical values for lithium from Durfor and Becker (1964) were substituted for hardness-of-water data. Six locations in South Dakota were supplied by Lewis Howells (written commun., 1972), of the U.S. Geological Survey in Huron, South Dakota. The remainder of analyses shown on figure 1 were taken from the various references listed in the bibliography.

Only analyses of water supplies used directly by man or animals were included in figure 1. Because published analyses were reported in parts per million, milligrams per liter, percent, and micrograms per liter, it was necessary to convert all analyses to a common measurement (micrograms per liter) for comparison purposes.

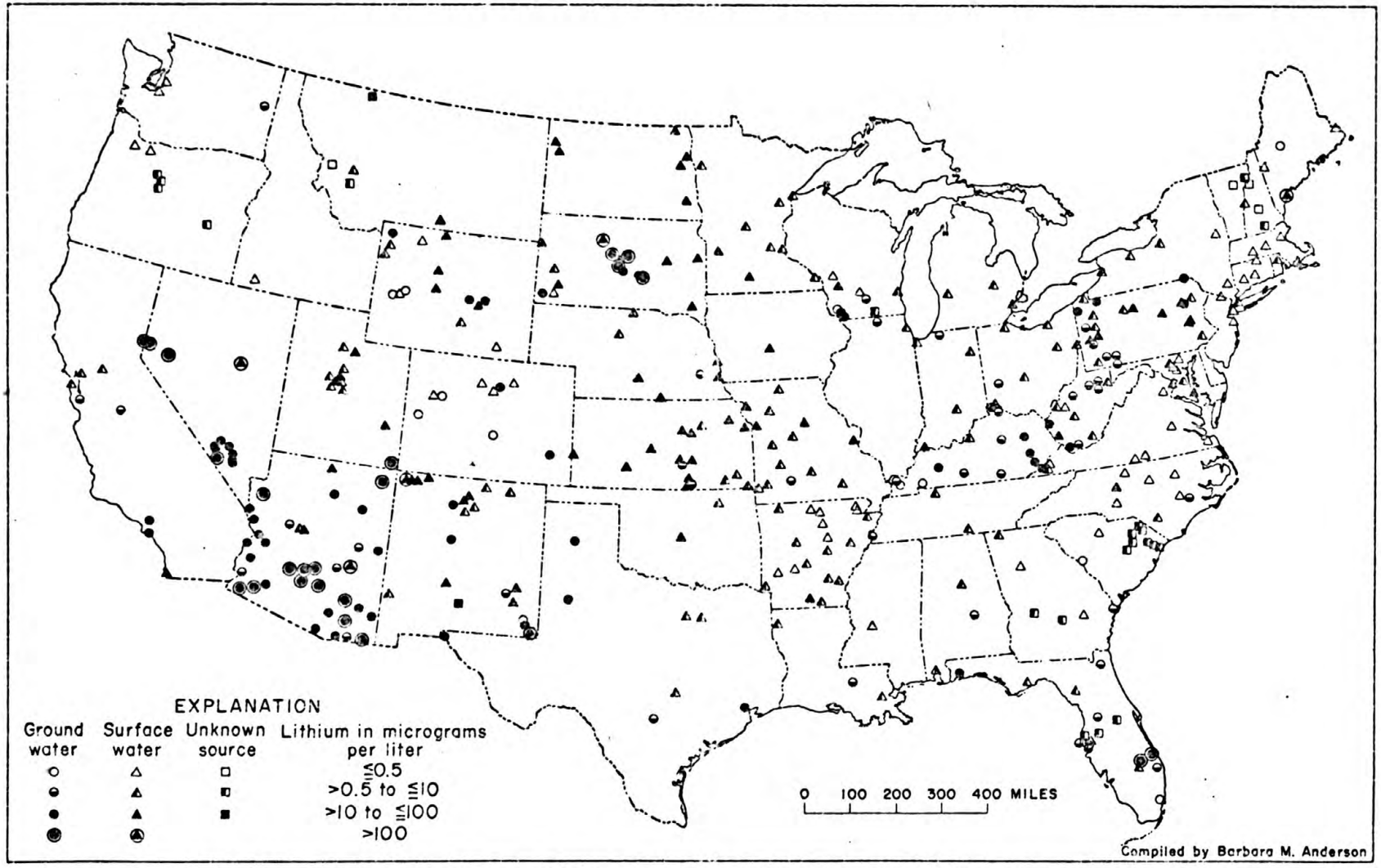



Figure 1.-- Map showing concentrations of lithium in surface and ground waters of the conterminous United States

Analyses were sorted by States and plotted on State base maps. After assigning appropriate symbols, all locations were transferred to the U.S. base map.

Some lithium values in Nevada and Arizona, for reasons of clarity, represent averages of samples from several close locations. On the whole, however, each location is represented by one analysis. The analyses of water samples from school supplies could not be included in either ground- or surface-water groups because the source was given only as tap water.

## BIBLIOGRAPHY


Anderson, B. M., 1971, Calcium-carbonate hardness of public water supplies in the conterminous United States: Geol.Soc. America Mem. 123, 3 p.

Durfor, C. N., and Becker, Edith, 1964, Public water supplies of the 100 largest cities in the United States, 1962: U.S. Geol. Survey Water-Supply Paper 1812, 364 p.

Dutt, G. R., and McCreary, T. W., 1970, The quality of Arizona's domestic, agricultural, and industrial waters: Arizona Univ. Agricultural Experiment Station Report 256, 83 p.

Heidel, S. G., and Frenier, W. W., 1965, Chemical quality of water and trace elements in the Patuxent River Basin: Maryland Geol. Survey Rept. Inv. No. 1, 40 p.

Livingston, H. D., 1970, Lithium depletion and atherosclerotic heart disease: The Lancet, 2 p.

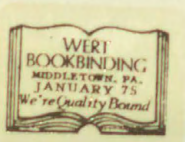
Steinberg, J. S., 1970, Lithium content of water in United States cities: Jour. Amer. Med. Assoc., v. 211, no. 6, 1 p.

Voors, A. W., 1969, Lithium content of drinking water and ischemic heart disease: New England Jour. Medicine, v. 280, no. 20, 2 p.

_____, 1970, Lithium depletion and atherosclerotic heart disease: The Lancet, 1 p.

_____, 1970, Lithium in the drinking water and atherosclerotic heart death: epidemiologic argument for protective effect: Amer. Jour. Epidemiology, vol. 92, no. 3, 8 p.

Walker, G. E., and Eakin, T. E., 1963, Geology and ground water of Amargosa Desert, Nevada-California: Nevada Dept. Conserv. and Nat. Res., 45 p.


WERT
BOOKBINDING
MIDDLETOWN, PA.
JANUARY 75
We're Quality Bound