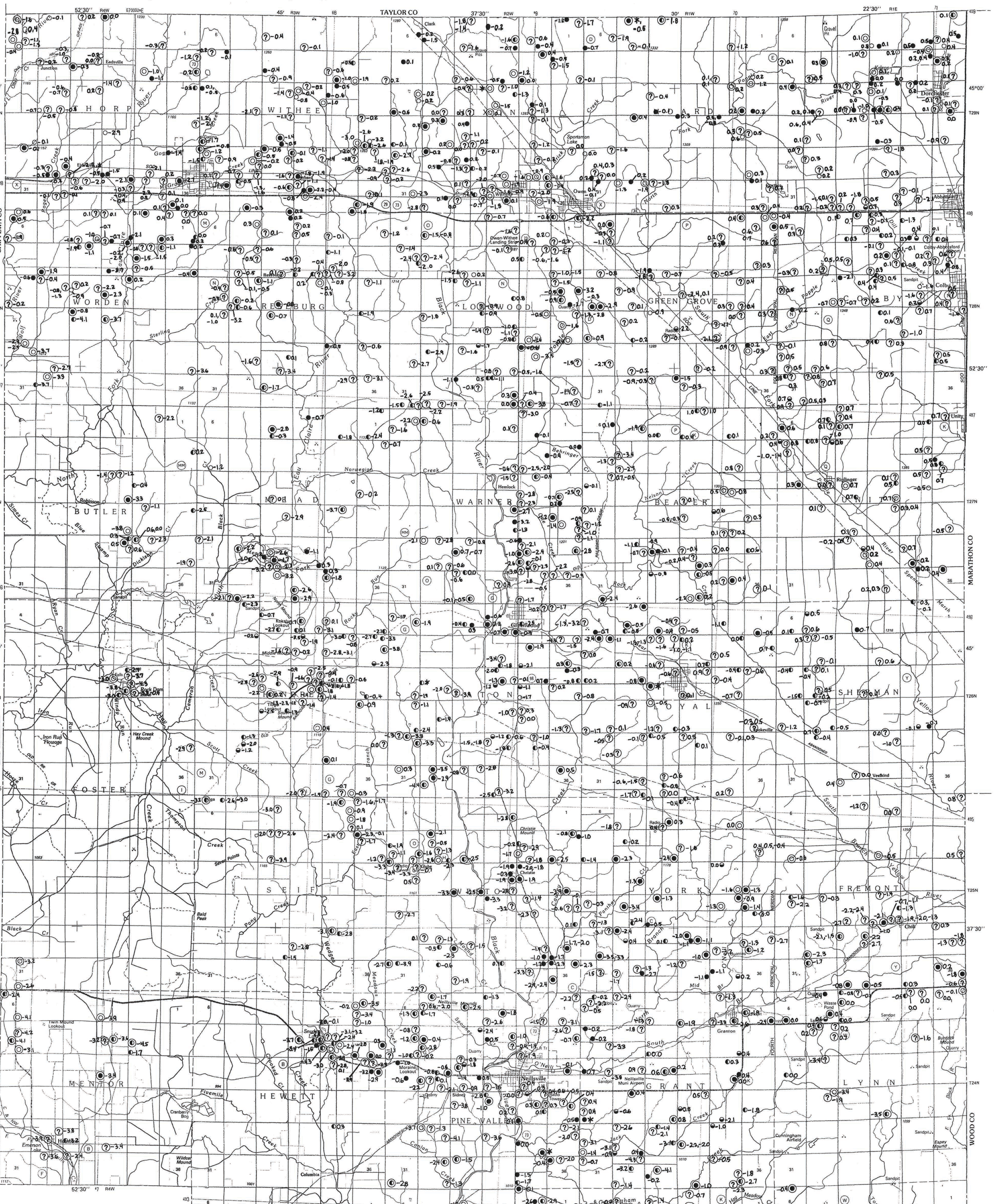
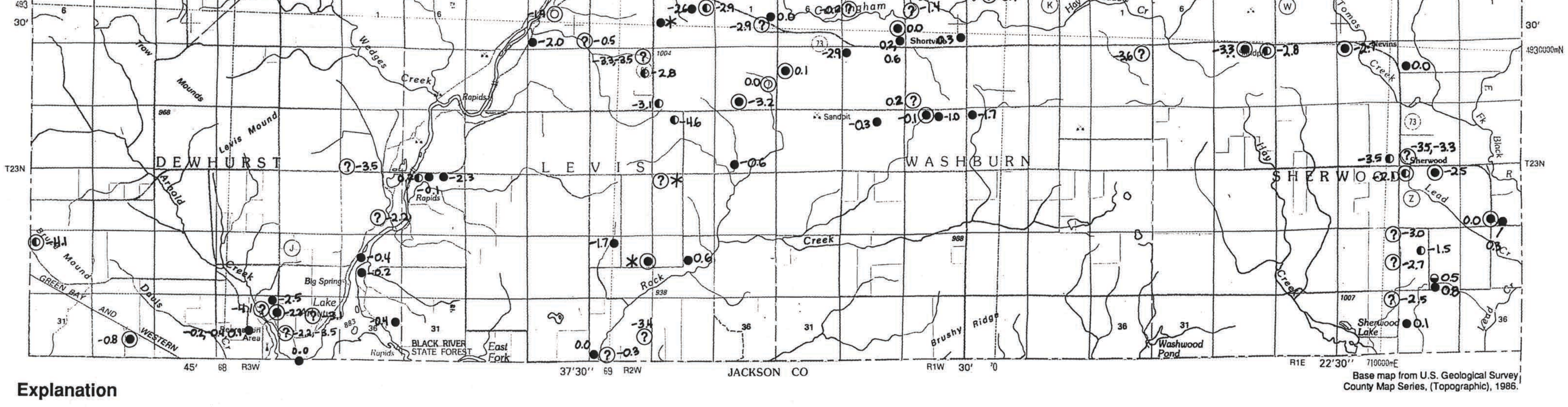
GROUNDWATER QUALITY INVESTIGATION OF CLARK COUNTY, WISCONSIN

Plate 7 Estimated Langelier Saturation Index (ELSI), A Corrosion-Potential Indicator

Miscellaneous Map Series





Base map from U.S. Geological Survey County Map Series, (Topographic), 1986.

Compiled by G.S. Steinhart
and I.D. Lippelt
1989

A part of the Clark County Groundwater Resource Investigation, a joint project of the Wisconsin Geological and Natural History Survey and the Clark County Board and its Land Conservation Committee

Development of this project was coordinated in Clark County by University of Wisconsin Extension agents Arv Dopp (Agriculture Agent) and M.E. (Mary Ellen) Sjolin (Home Economist), and former County Conservationist Keith Foye.

Samples were collected in April 1988 by the Clark County Extension Homemakers and community volunteers, under the direction of Linda Briski, Clark County Extension Homemakers' Housing Energy and Environment Chairperson. Samples were frozen for storage prior to analysis.

Chemical analyses were performed during April, May, and June 1988 by the laboratory of the Environmental Task Force at the University of Wisconsin-Stevens Point, under the direction of Byron Shaw and Richard Stephens.

Chris Mechenich of the Central Wisconsin Groundwater Center, UW Extension, at Stevens Point provided assistance with data analysis.

G.S. Steinhart examined available Department of Natural Resources Well Constructor's Reports and attempted to match constructor's reports to wells sampled wherever possible. The well information provided by the homeowner, the location of the well as reported by the well driller and the homeowner, land ownership information from various plat books, and locations of buildings as shown on United States Geological Survey 7.5 minute topographic maps were used during the matching process. None of the data were field checked.

Drafted by G.S. Steinhart, 1989

Wisconsin Geological and Natural History Survey Map 89-4g

SCALE 1:100 000

KILOMETRES

MILES

Explanation

County-owned land

Symbol	Geologic materials contributing water to well
○	sand and/or gravel; from Well Constructor's Report†
◑	sandstone, shale, rock, and/or limestone, and up to 5 feet of granite (contribution to yield believed to be minor); from Well Constructor's Report†
◒	sandstone and more than 5 feet of granite; from Well Constructor's Report†
●	granite, and/or soapstone or soap rock; from Well Constructor's Report†
(?)	unknown; homeowner information either blank or ambiguous; no known Well Constructor's Report
◎	sand and/or gravel; homeowner information; no known Well Constructor's Report
(◑)	probably sandstone; homeowner indicated sandstone and/or limestone, and may have indicated sandstone and any one or more of sand, gravel, clay; no known Well Constructor's Report
(●)	granite, or granite and sandstone; homeowner indicated granite and may also have indicated up to two other types of geologic materials; no known Well Constructor's Report

†Well Constructor's Report represents the most probable match to the sampled well; match has not been field checked.

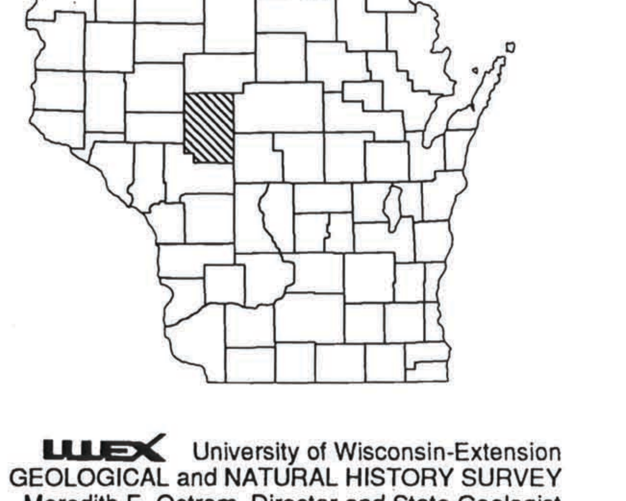
-2.3 calculated ELSI value of well sampled

* ELSI not determined

The Langelier Saturation Index (LSI) is a measure of the tendency of water to precipitate calcium carbonate ($CaCO_3$); LSI is often used to evaluate the tendency for corrosion of pipes to occur. The estimated Langelier Saturation Index (ELSI) is calculated from the laboratory pH, alkalinity, total hardness, and conductivity data, using an approximation of the Langelier equation. The ELSI is not a measure of corrosivity but rather an indication of whether or not corrosion is likely. There are many factors which determine whether or not plumbing pipes will corrode, and some of these factors are not considered when calculating the ELSI. The ELSI is a useful and cost-effective diagnostic procedure that may be used to evaluate whether or not further testing may be advisable.

If a thin layer of calcium carbonate is precipitated on the inside wall of a pipe or plumbing fixture, it keeps the water from contacting the pipe; this reduces the chance of corrosion. However, thick layers of calcium carbonate (sometimes referred to as lime or scale) are undesirable; they can result in loss of water pressure and can decrease the efficiency of water heaters.
LSI values greater than zero indicate that the water tends to precipitate calcium carbonate. If the LSI value equals zero, then calcium carbonate is neither precipitated nor dissolved. LSI values less than zero indicate that the water tends to dissolve solid calcium carbonate and that plumbing pipes may be unprotected. The more negative the LSI, the greater the tendency for corrosion to occur. Because ELSI values are calculated using laboratory pH measurements rather than field-measured pH, ELSI values are generally lower than LSI values. For these reasons ELSI values that are positive, but not greater than 1, are the most desirable.

For a more complete discussion of the LSI and of corrosion in general, please refer to the United States Environmental Protection Agency's report EPA 570/9-84-001, Corrosion Manual for Internal Corrosion of Water Distribution Systems, 1984, by J.E. Singley, B.A. Beaudet, and P.H. Markey.



UWEX University of Wisconsin-Extension
GEOLOGICAL and NATURAL HISTORY SURVEY
Meredith E. Ostrom, Director and State Geologist
3817 Mineral Point Road, Madison, Wisconsin 53705