LITHIUM BRINE ANALYTICAL DATABASE OF UTAH: SECOND EDITION

by

Andrew Rupke and Taylor Boden

Suggested citation:

Rupke, A., and Boden, T., 2023, Lithium brine analytical database of Utah, second edition: Utah Geological Survey Open-File Report 758, 3 p., <u>https://doi.org/10.34191/OFR-758</u>.



OPEN-FILE REPORT 758 UTAH GEOLOGICAL SURVEY UTAH DEPARTMENT OF NATURAL RESOURCES 2023

Blank pages are intentional for printing purposes.

DISCLAIMER

This open-file release makes information available to the public that may not conform to UGS technical, editorial, or policy standards; this should be considered by an individual or group planning to take action based on the contents of this report. The Utah Department of Natural Resources, Utah Geological Survey, and U.S. Department of the Interior, U.S. Bureau of Land Management, make no warranty, expressed or implied, regarding its suitability for a particular use. The Utah Department of Natural Resources, Utah Geological Survey, and U.S. Department of the Interior, U.S. Bureau of Land Management, shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to claims by users of this product.

BACKGROUND AND PURPOSE

The accompanying database is a compilation of analytical data from brine or water samples in Utah that includes lithium concentrations (figure 1). The data were collected from published and unpublished sources. This second edition is an update that includes data from the first edition (Rupke and Boden, 2020) and adds additional records. We also added some minor detail to previous records, particularly in relation to how units (e.g., ppm or mg/L) were recorded in source documents. Our intent is to continue to add additional analyses to this database as time allows and more data are discovered or become available. Users of this database should be aware that the quality of the analyses from source to source is likely to be variable and the data are presented "as is"; potential low-quality data were not removed. The database is in spreadsheet (Microsoft Excel and csv) and geodatabase formats. A description of the database fields is given below, and a shortened version of this explanation is attached to the spreadsheet. In the explanation below, the spreadsheet heading is shown first with the geodatabase heading in parentheses. Each field is not necessarily applicable to every sample record. Additional information on lithium resources in Utah can be found in Mills and Rupke (2023). Data from Great Salt Lake are not included in this database but can be found in the Utah Geological Survey's Great Salt Lake brine chemistry database: https://geology.utah.gov/docs/xls/GSL brine chem db.xlsx.

The database in its various forms can be downloaded from: <u>https://ugspub.nr.utah.gov/publications/open_file_reports/ofr-758/ofr-758.zip</u>.

Note: A (-) symbol indicates "less than" (<) in numeric fields.

EXPLANATION OF DATABASE FIELDS

Database ID (li_db_id) - unique identification number assigned by the UGS to each sample.

Sample (sample_id) – sample number, ID, or well name from publication or report. In some cases, the sample number was modified from the original source to make it more unique for the purposes of this database.

Bed No. (bed_no) – if the sample is linked to a specific bed or stratigraphic horizon, that information was included in this field.

Well Depth (well_dpth) - total depth of well, in feet.

Water Level (wat_lev) - depth to water level from land surface, in feet.

From (from) – sample starting depth in well, in feet.

To (to) – sample ending depth in well, in feet.

Density or Specific Gravity (den_sg) - density or specific gravity of water or brine.

Den./Sp. Grav. Note (d_sg_note) – this field indicates whether the value in the previous field is density or specific gravity; an "sg" in the field indicates specific gravity; units of mass per volume indicate density; this field also provides temperature information if available.

Li Concentration (li) – concentration of lithium.



Figure 1. Brine areas in Utah with anomalous lithium concentrations and locations of samples within the lithium brine analytical database. For this figure all lithium concentration units are assumed to be mg/L, but in the database some values are recorded as ppm.

Li Unit (li_unit) – unit of concentration recorded in original publication; units are mg/L or ppm; in many cases ppm may be indicative of mg/L, but if that is not specified in the original document we left units as ppm; in the event that ppm indicates mg/kg, conversion to mg/L requires knowing the water/brine density.

Na (na_g_l) – concentration of sodium in g/L unless noted in comments field.

Mg (mg_g_l) – concentration of magnesium in g/L unless noted in comments field.

K (k_g_l) – concentration of potassium in g/L unless noted in comments field.

Ca (ca_g_l) – concentration of calcium in g/L unless noted in comments field.

HCO₃ (hco3_mg_l) - concentration of bicarbonate in mg/L unless noted in comments field.

Cl (cl_g_l) – concentration of chloride in g/L unless noted in comments field.

 SO_4 (so 4 g l) – concentration of sulfate in g/L unless noted in comments field.

B (b mg l) – concentration of boron in mg/L unless noted in comments field.

Br (br mg l) – concentration of bromine in mg/L unless noted in comments field.

Si (si_mg_l) – concentration of silicon in mg/L unless noted in comments field.

Sr (sr_mg_l) – concentration of strontium in mg/L unless noted in comments field.

TDS (tds_g_l) – total dissolved solids concentration in g/L unless noted in comments field.

pH (ph) – measured pH of water or brine.

Drilling/Sample Date (samp_date) - date of drilling or sample collection.

Location Information (location) – general name of area where sample was collected.

Easting (utme 83) – easting coordinate in meters; coordinate system is UTM Zone 12 NAD83.

Northing (utmn 83) – northing coordinate in meters; coordinate system is UTM Zone 12 NAD83.

Location Quality (loc_qual) – qualitative estimate of the quality of coordinates for each sample. Quality is estimated as low, medium, or high.

Reference, short (reference) – abbreviated reference for sample data source.

Reference, full (ref full) – full reference for sample data.

Comments (comment) – general comments for sample record.

ACKNOWLEDGMENTS

Preparation of this database was funded, in part, by a U.S. Geological Survey National Geological and Geophysical Data Preservation Program grant (GS22AS00033). A previous version of this database was funded, in part, by the U.S. Bureau of Land Management.

REFERENCES

Mills, S.E., and Rupke, A., 2023, Critical minerals of Utah, second edition: Utah Geological Survey Circular 135, 47 p., <u>https://doi.org/10.34191/C-135</u>.

Rupke, A. and Boden, T., 2020, Lithium brine analytical database of Utah: Utah Geological Survey Open-File Report 730, 2 p., https://doi.org/10.34191/OFR-730.