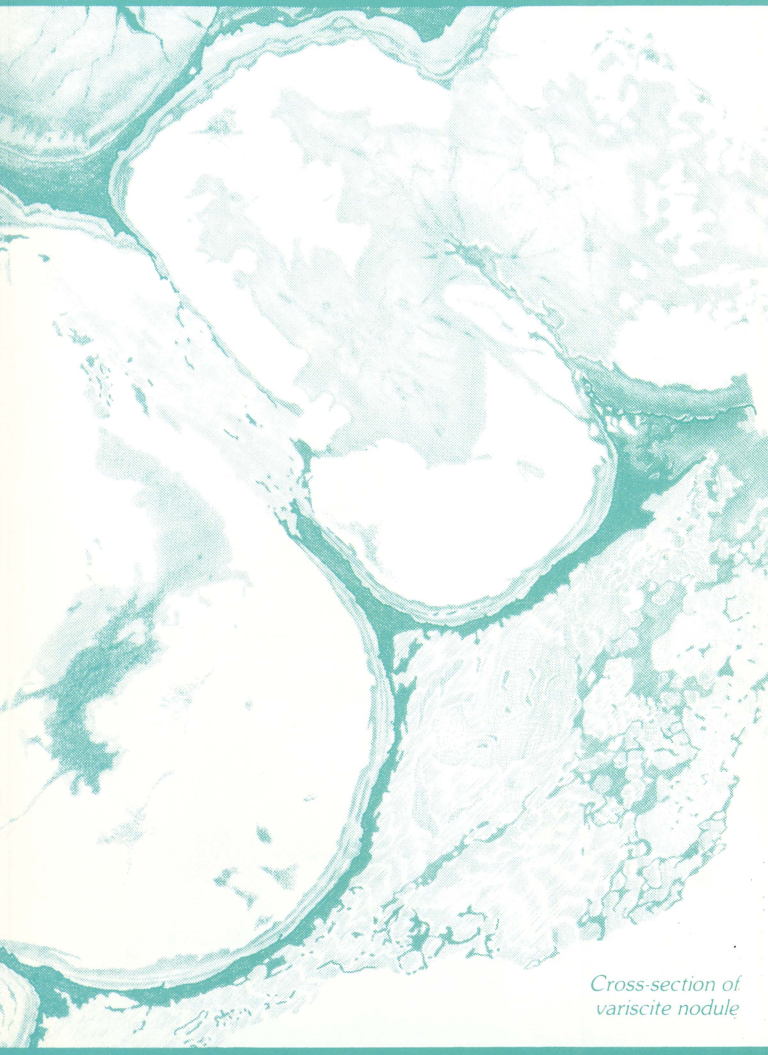
INDUSTRIAL COMMODITIES: Non-Metallic Resources of Utah

by Martha R. Smith



Cross-section of variscite nodule

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UTAH'S INDUSTRIAL COMMODITIES, NATURALLY...

Industrial commodities include all of the naturally occurring rocks and minerals that are not processed into metals or are not used as fuels or sources of energy. These commodities are widely distributed across the state and have a wide variety of uses. In terms of dollar value, these mundane materials often outstrip precious metals.

The construction industry uses huge quantities of sand and gravel, limestone and dolomite, dimension stone, crushed stone, gypsum, light-weight aggregate, clay, and asphalt rock (tar sand) for the construction of buildings, highways, and dams. These commodities are either used directly as sand, gravel, and stone, or are converted into cement, plaster, wall board, cinder blocks, brick and tiles and other materials. Utah has large resources of these commodities, mostly located very near their potential market areas.

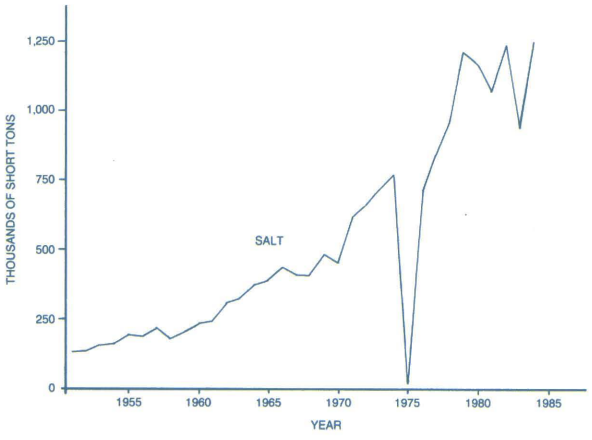
The chemical industry uses silica (quartz), common salt, gilsonite, sulfur (most of which is produced as a by-product of smelting and refining), fluorite, barite, and other minerals, while the fertilizer industry uses potassium salts (potash), phosphate rock, gypsum, sulfur, humate, and diatomite as fertilizers and soil conditioners.

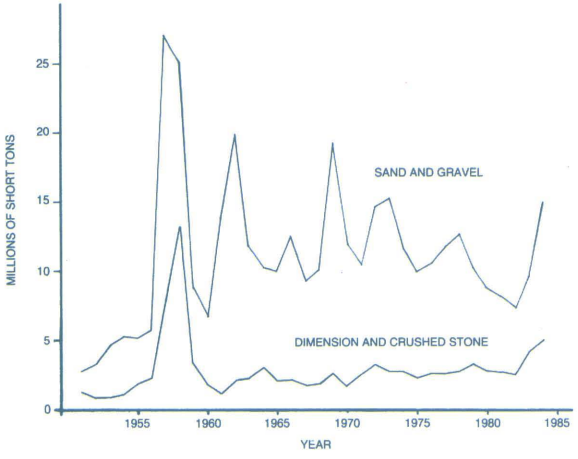
The economic importance of these minerals varies from year to year, depending on the demand. The value of the industrial commodities produced in the mid-1980s was close to 100 million dollars per year.

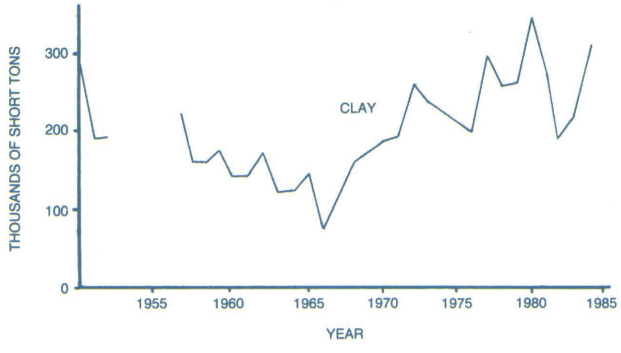
The two maps show the distribution of industrial commodities in Utah. Because sand and gravel are widely distributed, they are not included completely. The many gemstone localities are not shown for the same reason. Only those clay, stone, and limestone deposits which are or have been operated, are shown. Figure 1 shows the production history of several of the most important commodities: salt, clay, sand and gravel, stone, gypsum, and lime.

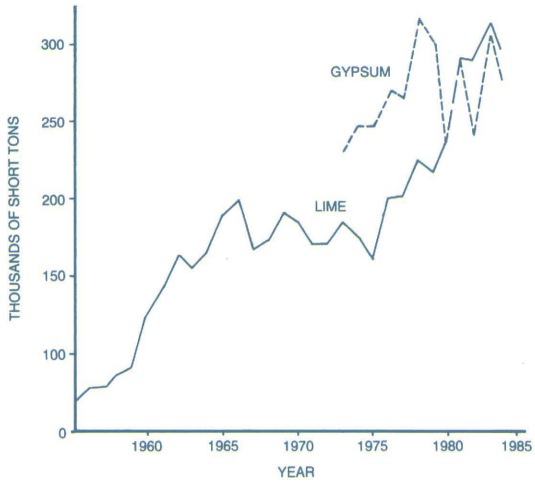
Each of the important or potentially important industrial commodities found in Utah is described in this brochure.

Quarrying stone near Salt Lake City in early 1900s (photo: Utah State Historical Society).









IMPORTANT INDUSTRIAL COMMODITIES FOUND IN UTAH

ALUNITE: a mineral containing aluminum, potassium, and sulfur. The largest resource in the United States is found as an alteration product of volcanic rock in Piute, Sevier, Beaver, and Washington counties. It was used as a source of potash during World War I. It has also been used as a source of alumina and for fertilizer.

ANHYDRITE: anhydrous gypsum, see gypsum.

ARAGONITE: form of calcium carbonate; see limestone.

ASPHALT ROCK (also called tar sand): oil-impregnated porous sandstone or limestone, crushed for use in paving roads; also used for roofing, waterproofing, floor tiles, inks, etc. Found in the Uinta Basin near Vernal and Colorado Plateau near Thistle.

BARITE: barium sulfate is a heavy mineral that occurs in many places in western Utah as veins or replacements associated with igneous rocks. Used in drilling mud, pigments, fillers, ceramics, and as a heavy aggregate.

BRINES: see salines.

CALCITE: see limestones

CARBON DIOXIDE: intert gas produced from some wells originally drilled for petroleum. Used as a fire retardant, for dry ice, and recently has been increasingly in demand for secondary recovery of oil.

CLAYS: hydrous aluminum silicates, weathering products of rock or produced by hydrothermal alteration of volcanic rock. Clays are used for a variety of purposes, the use determined by the chemical properties and purity of the clay. Clays found in Utah include bentonite, bloating clays, common clay and shale, fireclay, fullers earth, halloysite, kaolinite, montmorillonite, and pyrophyllite. Most production is from altered Mississippian Manning Canyon Shale, found along the northern Wasatch Front.

Bentonite: derived from altered volcanic ash; used for drilling mud, lining ditches. Found in Sevier and Sanpete counties.

Bloating clay: expands on heating; used for light-weight aggregate. Comes from shale found in Summit and Utah counties.

Common clay: includes clays that have accumulated in the basin of Lake Bonneville; shales from the Manning Canyon Shale and other Paleozoic formations; clays associated with coal beds, and clays formed by hydrothermal processes. Used for construction purposes (brick, tile, etc.). Very large resources are available in the state.

Fire clay: used for low-temperature refractories, brick, tile, etc. Most production from Tooele and Utah counties.

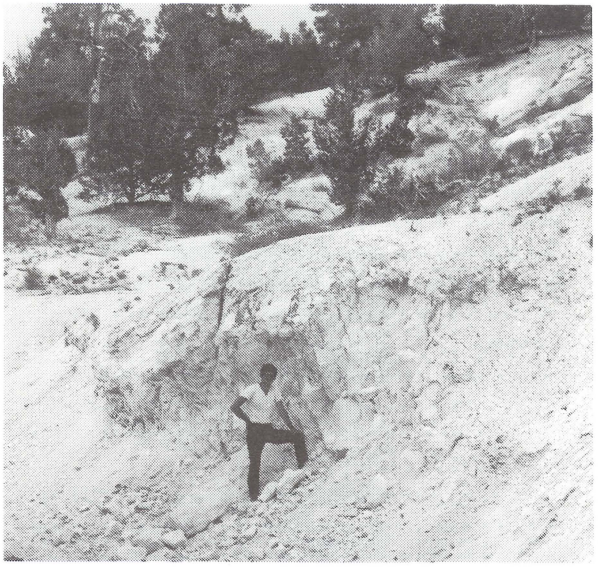
Fullers earth: altered volcanic rock or detrital alluvial material; used as an absorbent or filter. Found in Sevier, Sanpete counties.

Halloysite: a form of kaolin produced by hydrothermal alteration of limestone, used as a catalyst for refining oil and for production of light-colored brick. Most important deposit is near Eureka in Juab County.

Kaolinite: white clay (when pure) composed primarily of kaolin, formed by weathering or hydrothermal alteration. In its pure form used for making dinnerware and pottery and as a filler for paper. Might be produced from alunite from Piute County. No production reported at present.

Pyrophyllite: most frequently formed from hydrothermally altered volcanic rocks. Used for high-temperature refractories, ceramics, etc. Found in Utah County, southern and western Utah.

DIATOMACEOUS EARTH, DIATOMITE: siliceous skeletons of diatoms, minute one-celled organisms. Used as a filler in paint, paper and rubber, in pesticides, as a mild abrasive, as a drilling mud additive, etc. Extensive deposits of impure diatomite have been found in Lake Bonneville sediments and in ancient lake beds in Garfield County. Relatively small amounts have been produced.



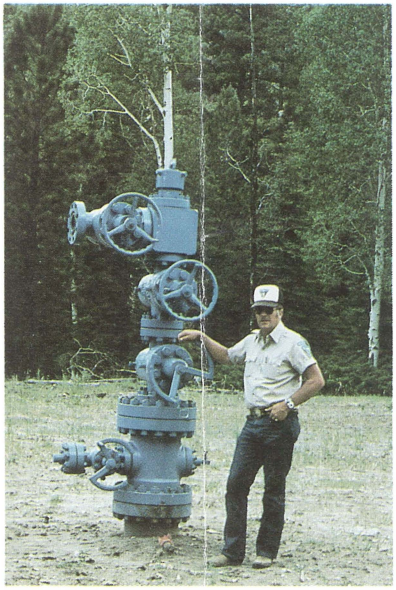
Pit cut into diatomaceous earth along Wedge of Paunsauguich Plateau (photo: H.H. Doelling).

DOLOMITE: see Limestone.

FLUORITE: calcium fluoride, found primarily in pipe-like replacement ore bodies in western Utah. Also occurs in numerous other areas including the Phosphoria Formation (black shales) of northern Utah and in iron mines in southwestern Utah as fluorapatite. Used in steelmaking, aluminum and uranium industries, glass making, and fluoridation of culinary water.

GEMSTONES: semiprecious minerals including variscite, agate, jasper, topaz, opal, amethyst, obsidian, garnet, etc. Collected primarily for ornamental uses. Gemstone localities are not shown on the map because of their wide distribution.

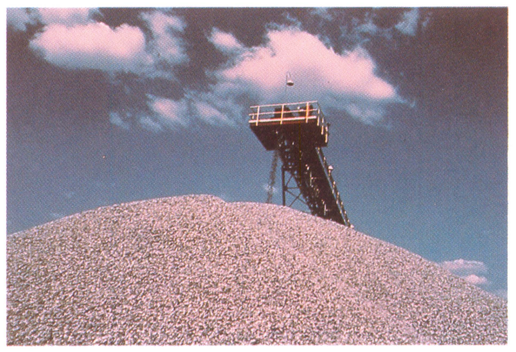
GILSONITE: a solid hydrocarbon found in veins in the eastern Uinta Basin; can be converted into coke and gasoline; also used in ink, paint, electrical insulation, floor tiles, etc. Utah is the only state that



CO_2 well head, Escalante Anticline, Garfield County, just north of Escalante (photo: Cynthia Brandt).

Potash plant at Cane Creek, near Moab (photo: H.H. Doelling).

Harvesting salt, Great Salt Lake (photo: P. Sturm).



Gravel from Lake Bonneville deposits (photo: UGMS archives).

Lime plant, near Stansbury Mountains (photo: J.W. Gwynn).

produces gilsonite. Because of its value for other purposes, it is not at present used as a fuel source.

GRAVEL: see Sand and Gravel.

GYPSUM: hydrated calcium sulfate, deposited from natural brines (see Salines). Alabaster is a fine-grained gypsum, and anhydrite is the dehydrated form. Principal uses are for plaster, wall board, as a soil conditioner, in making Portland cement, for mine dust, etc. Gypsum and anhydrite have been identified in many Utah formations; most production has been from Jurassic Arapien and Carmel formations in Sevier County. Large resources are also present in the Paradox Formation in southeastern Utah; *gypsite* dunes are found along the margins of the Great Salt Lake Desert.

HUMATE: a weathered coal used as soil conditioner, mined in southeastern Utah.

LIGHT-WEIGHT AGGREGATE: any natural mineral or rock processed to make an aggregate lighter in weight than sand and gravel in the production of cement. Materials used include bloating clay (see under Clay), diatomaceous earth, obsidian, perlite, pumice, shale, slag, vermiculite, volcanic cinders. Large reserves are available in Utah.

Obsidian: volcanic glass, found in western Utah.

Perlite: volcanic glass with high water content, expands on heating to produce a light, fluffy ash; also used for insulation. Produced in Millard, Beaver counties.

Pumice: volcanic glass that has turned to froth on violent expulsion from a volcano. Used for insulation as well as light-weight aggregate; found in Millard, Beaver, Utah counties.

Vermiculite: micaceous mineral, found in igneous rock, that expands on heating. Used for insulation and soil conditioner as well as light-weight aggregate. Found in Tooele and Box Elder counties.

Volcanic Cinders: Basaltic cinder cones west of Fillmore and south of Parowan in Millard and Iron counties and north of St. George in Washington County contain a large potential resource. Used for cinder block as well as light-weight aggregate.

LIMESTONE AND DOLOMITE: calcium and magnesium carbonate sedimentary rocks. Used for dimension stone, crushed stone, cement, lime, coal mine rock dust, smelting flux, acid neutralizers, refractories, etc. Limestone and dolomite resources are widespread and the map shows only the developed areas and the well-known undeveloped areas. Quality and purity determine use. Most production is from northwest Utah.

Aragonite: a form of calcium carbonate deposited by hot springs and ground water; used for building stone, poultry grit, landscaping stone; burnt to produce lime, etc. Found in north-central Utah.

Calcite: calcium carbonate, principal constituent of limestone, found in veins associated with limestones. Same uses as aragonite.

Travertine: calcium carbonate deposited from ground water as beds or cave deposits. Some solid deposits are susceptible to polishing and are called onyx or onyx marble.

Tufa: porous deposits of travertine from hot springs.

OZOKERITE: native mineral wax, used in electrical insulation, candle making, polishes, etc. Found near Soldier Summit; no production at present.

PEGMATITE MINERALS: found in dikes in igneous and metamorphic rocks, chiefly quartz, feldspar, and mica. Occasionally contain rare elements such as thorium and associated rare earths; found in Box Elder and Tooele counties. Pure feldspar is ground to make cleansers, crushed mica is used as insulation material.

PHOSPHATE ROCK: found in black shales of Phosphoria Formation in northern Utah; used as fertilizer and in the manufacture of phosphorous chemicals. Utah has a large resource; it has been mined from the Crawford Mountains in Rich County and is being mined in the southwest Uinta Mountains in Uintah County.

POTASH: see Salines

PUMICE: see Light-weight Aggregate.

REFRACTORIES: non-metallic minerals suitable for use in high-temperature furnaces to resist heat, abrasion, chemical attack, etc. Includes the minerals andalusite, kyanite, and sillimanite; magnesium minerals, and quartz (silica).

Andalusite, Kayanite, and Sillimanite: aluminum silicate minerals found in metamorphosed Precambrian shales in northwest Utah, used in high-temperature refractories. Utah has limited resources and limited production.

Magnesite: carbonate rocks enriched in magnesium by intruding igneous rocks; found in Beaver and Juab counties. Used as refractory lining for high-temperature furnaces. Only known production from Fish Springs Range in Juab County.

QUARTZ: see Silica.

SILICA (QUARTZ): silicon dioxide, is the most abundant mineral in the crust of the earth. It is very hard and is resistant to chemical reaction. Used in making glass, chemicals, fluxes, filters, abrasives, refractories, construction materials, electronics, etc. Utah has large resources of high-grade silica in sandstone and quartzite formations in western and northern Utah.

SALINES OR EVAPORITES: mineral salts precipitated from natural brines in salt seas or lakes by evaporation of the water. The most common salt is halite (sodium chloride); other valuable salts include potassium chloride, potassium sulfate, sodium carbonate, sodium sulfate, and salts of magnesium, lithium, bromine, and boron. Salines are currently the most valuable non-metallic resource extracted in Utah.

Halite: common salt or sodium chloride is produced by mining buried salt beds at Redmond, near the Sanpete-Sevier County in central Utah or near Moab in southeastern Utah, or by evaporation of natural brines from Great Salt Lake. Used for dietary consumption by humans and animals; ice removal, production of chlorine, etc. Utah has very large resources.

Potash: potassium chloride or potassium sulfate is produced from brines of Great Salt Lake and from the western Great Salt Lake Desert near Wendover, and from evaporite beds in the Paradox Basin near Moab in southeastern Utah. Used principally for fertilizer.

SAND AND GRAVEL: unconsolidated rock fragments moved and sorted by natural processes, separating fine particles of sand and silt from coarser gravel. Widely used by the construction industry as aggregate for concrete, in gardening, etc. Utah has abundant supplies in lake-shore, glacial, dune, and stream deposits. Sand and gravel can be found in most areas of the state, especially in Lake Bonneville deposits, and alluvial stream deposits along the bases of the ranges. Locations of sand and gravel deposits are not shown on the map because they are so widely distributed. Most production is from along the Wasatch Front.

STONE: (see also limestone) Utah has abundant resources of all kinds of stone, including aragonite, basalt, calcite, conglomerate, dolomite, fieldstone, granite, lava rock, limestone, marble, obsidian, onyx, quartzite, rhyolite, sandstone, schist, shale, slate, travertine, and tufa. Some is used as dimension stone; most is crushed or broken for construction uses, railroad ballast, concrete aggregate, riprap, etc.

SULFUR: found as metallic sulfides in metallic ore deposits and in natural petroleum and gas. Most of the sulfur production in Utah is recovered from smelting metallic sulfide ores and refining petroleum. A little native sulfur is found as hot spring deposits in Millard and Beaver counties. It could also be recovered from gypsum, anhydrite, and alunite. Has many chemical, fertilizer, and industrial uses.

TAR SAND: see asphalt

TRAVERTINE: see Limestone.

TUFA: see Limestone.

VERMICULITE: see Light-weight Aggregate.

VOLCANIC CINDERS, GLASS: see Light-weight Aggregate.

ZEOLITES: group of hydrous aluminum silicate minerals commonly found in Tertiary lake sediments and used as a molecular sieve, for ion exchange, etc. None of Utah's deposits have been developed.

SELECTED READING

Butler, B.S., and others, Ore deposits of Utah, 1920, U.S. Geological Survey Professional Paper 111.

Geology and mineral resources of various counties in Utah: published by the Utah Geological and Mineral Survey; ask for list of publications.

Mineral commodity summaries, published annually by the U.S. Bureau of Mines; lists all non-fuel minerals produced in the United States with prices, uses, etc.

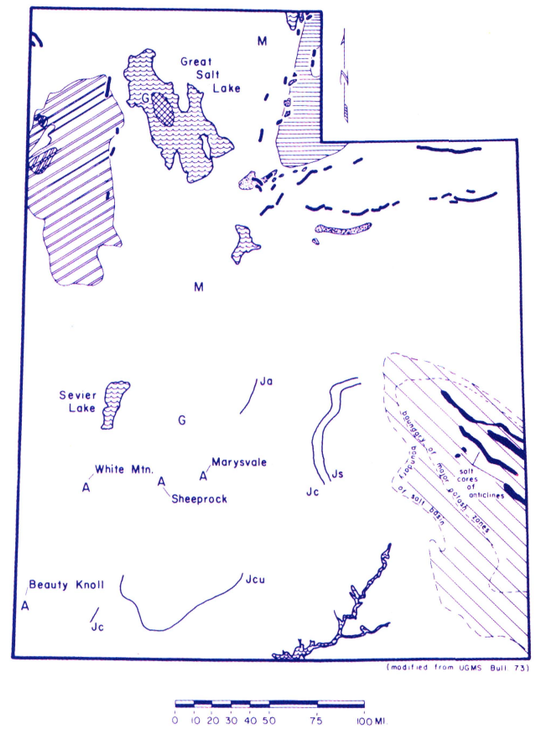
Smith, M.R., 1987, Semiprecious gemstones and ornamental stones found in Utah (in press).

Tripp, Bryce, Industrial commodities of Utah, 1985, Survey Notes Vol. 19 No. 3, Summary of Industrial Commodity Production in Utah.

United States Geological Survey, 1964, Mineral and water resources of Utah, Utah Geological and Mineral Survey Bulletin 73, discusses all mineral resources produced in Utah, localities, production history, etc.

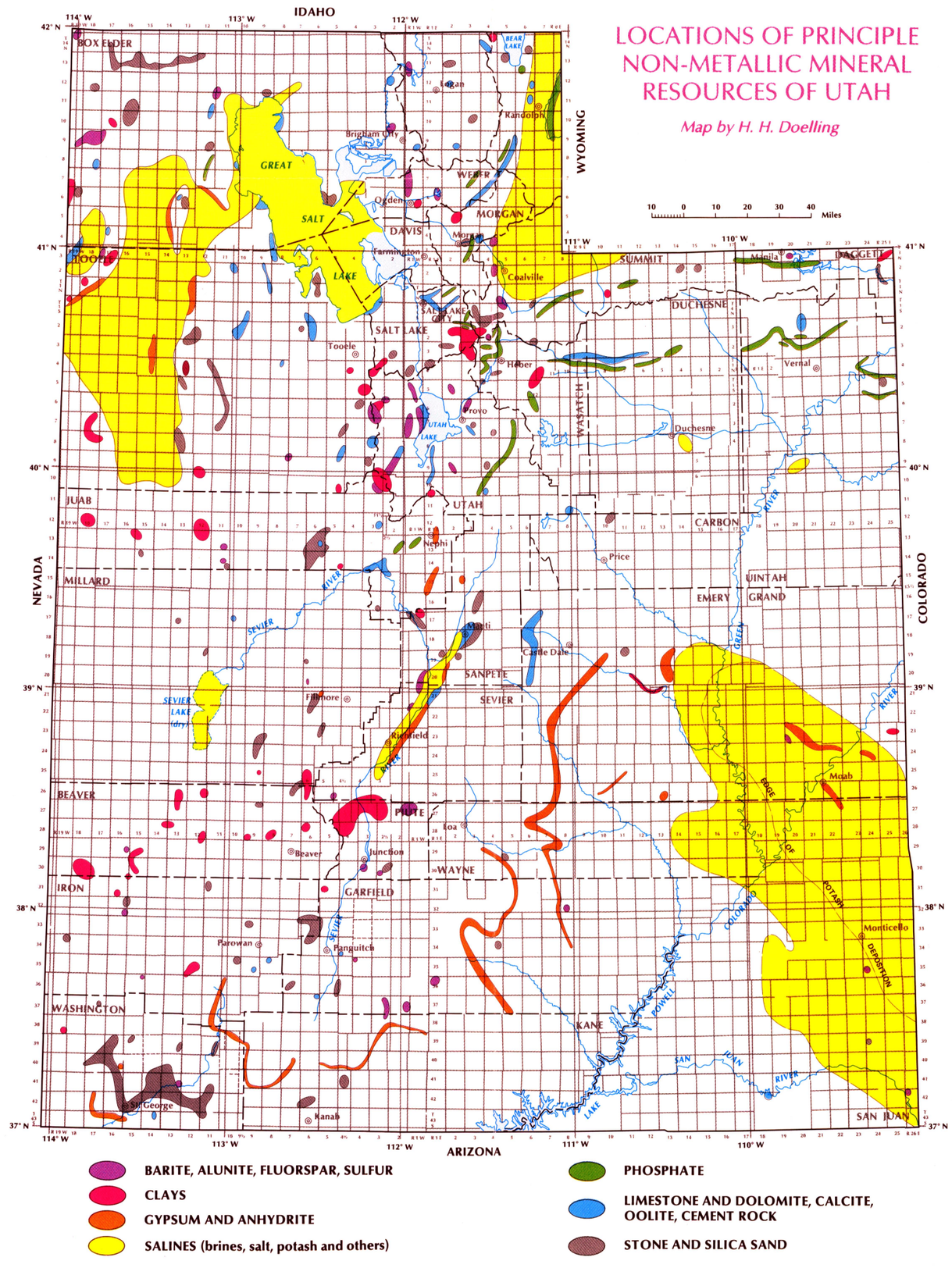
Utah Historical Quarterly, Summer 1963, Vol. 31, No. 3, series of articles on the history of Utah's mineral industry.

SELECTED INDUSTRIAL AND ROCK MINERAL AREAS



LOCATIONS OF PRINCIPLE NON-METALLIC MINERAL RESOURCES OF UTAH

Map by H. H. Doelling



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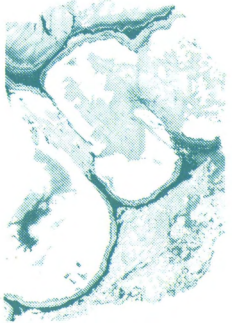

Miscellaneous Publication 87-4