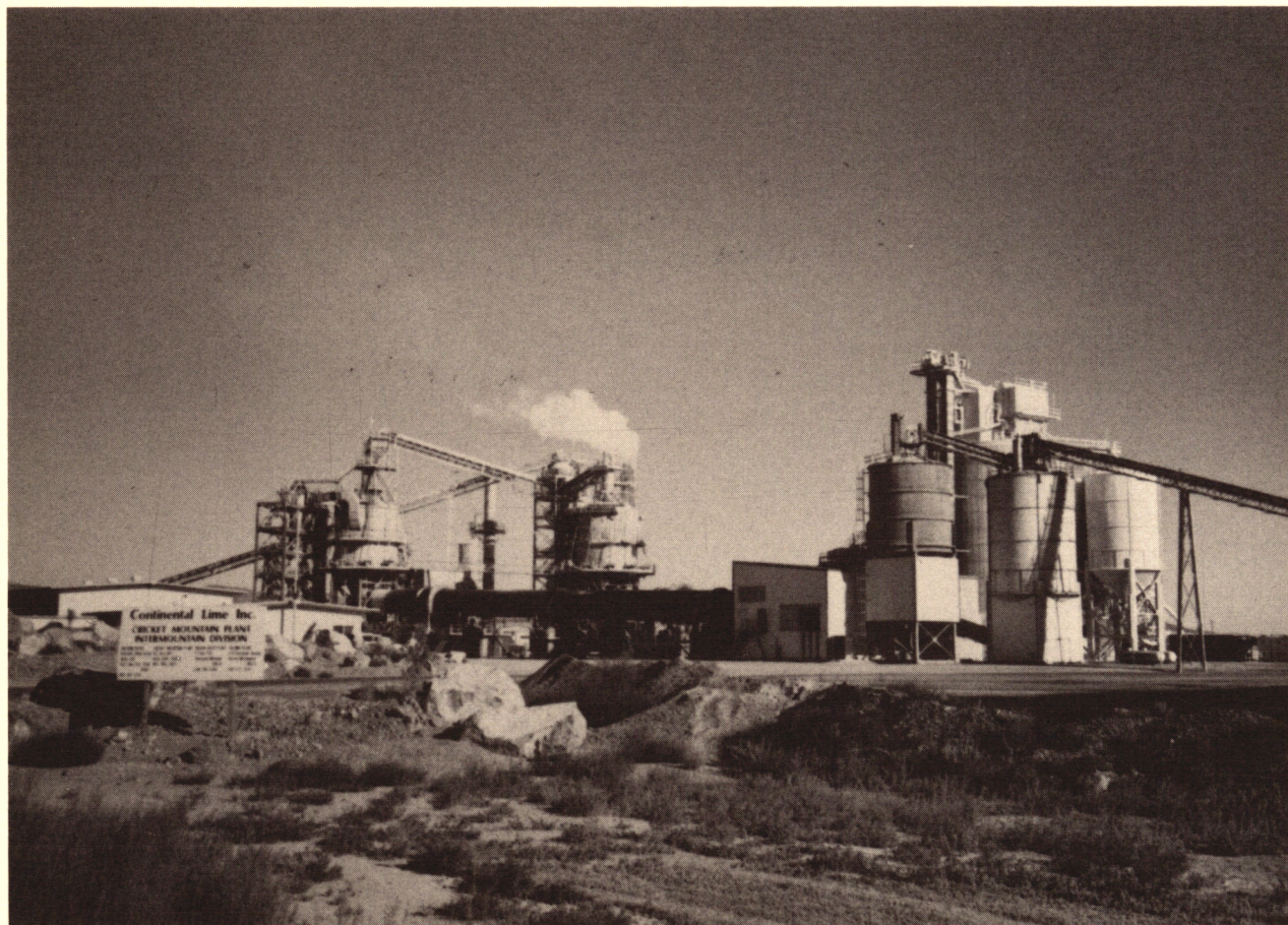


THE INDUSTRIAL ROCK AND MINERAL INDUSTRY IN UTAH, 1990

by
Bryce T. Tripp
Utah Geological and Mineral Survey



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CIRCULAR 82 **MARCH 1991**
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Note: The information presented in this publication was compiled for presentation as a talk at the Great Basin Industrial Minerals Conference held in Salt Lake City, Utah on May 30 and 31, 1990. The conference was organized by the U.S. Geological Survey with Edwin W. Tooker as chairman of the organizational committee. The conference was co-hosted by the Idaho Geological Survey, the Nevada Bureau of Mines and Geology, the Utah Geological and Mineral Survey, and the U. S. Bureau of Mines. The purpose of the conference was to assemble representatives from industry, academia, and government to discuss the current status, projected needs, and the future of the industrial rock and mineral industry in the Great Basin region. The results of the conference, including this article, will be published in a U.S. Geological Survey Bulletin.

INDUSTRIAL ROCK AND MINERAL PRODUCTION IN UTAH, 1990

Bryce T. Tripp

Utah contains a wide variety of industrial rocks and minerals. Mining of these commodities constitutes an important segment of Utah's economy with sales exceeding \$400 million in 1989 (Charles Berry, University of Utah, personal communication, 1990). The most important minerals according to U.S. Bureau of Mines production figures are construction sand and gravel, portland cement, halite, potassium salts, phosphate, crushed stone, limestone, clays and gypsum (Greeley and Gloyn, 1989).

SAND AND GRAVEL

The bulk of sand and gravel production in Utah comes from Pleistocene Lake Bonneville shoreline deposits along the Wasatch Front urban corridor from Provo in the south to Brigham City in the north. Sand and gravel production is divided into industrial sand, and construction sand and gravel operations. Three operators produce industrial sand in the Salt Lake City area. Salt Lake Valley Sand and Gravel Company produces engine-traction sand and mold-making sand for metal casting. Blackhawk Slag Products crushes smelter slag to produce grit for sand blasting. Union Pacific Resources processes slag into railroad ballast, road metal, and sand-blasting grit. The construction industry, however, uses most of the sand and gravel mined in Utah. Ten large operators and dozens of smaller operators produce construction sand and gravel.

There are four major sand- and gravel-bearing Lake Bonneville benches or deposits which mark long-lived, stable shorelines in the lake. The two highest benches, the Bonneville and Provo, provide most of the sand and gravel in the state. The Bonneville bench was deposited about 15,000 years ago at an elevation of 5090 feet (1551 m) above mean sea level, nearly

900 feet (274 m) above the current elevation of the Great Salt Lake. The Provo bench was deposited about 14,000 years ago at an elevation of 4740 feet (1444.7 m) above mean sea level (Currey and others, 1983).

Annual production of sand and gravel (figure 1) has increased at a steady rate for the last thirty years with some notable spikes apparently due to large construction projects. The extreme spike in 1957 and 1958 reflects the huge amount of sand and gravel used for the base of the Southern Pacific Railroad causeway across the Great Salt Lake during the reconstruction of the causeway. The spike starting in 1983 reflects the use of sand and gravel to construct flood-control dikes around the rapidly rising Great Salt Lake during a period of above-average precipitation. In 1987, about 21 million short tons were produced. This was the largest production since 1958. In 1988, 1989 and probably 1990, production has declined somewhat, in part due to decreases in new home building and highway construction; however, the long-term production trend is upwards.

PORTLAND CEMENT

Two operators now produce portland cement in Utah (figure 2): Ideal Basic Industries which was recently purchased by Holderbank and renamed Holnam, Incorporated and Ash Grove Cement West, Incorporated who purchased Martin Marietta's Leamington cement operation. A third operator, Portland Cement Company of Utah, recently suspended production at their 400,000 ton per year (TPY) Salt Lake City operation after 92 years of production at the same location.

Holnam, Incorporated in Morgan County uses limestone from the Jurassic Twin Creek Limestone, a natural cement rock, (figure 2) at its 350,000 TPY plant. Other materials utilized include silica from the Triassic-Jurassic Nugget Sandstone, gypsum from the Jurassic Arapien Shale, and iron ore from the Iron Springs mining district in Iron County. They have

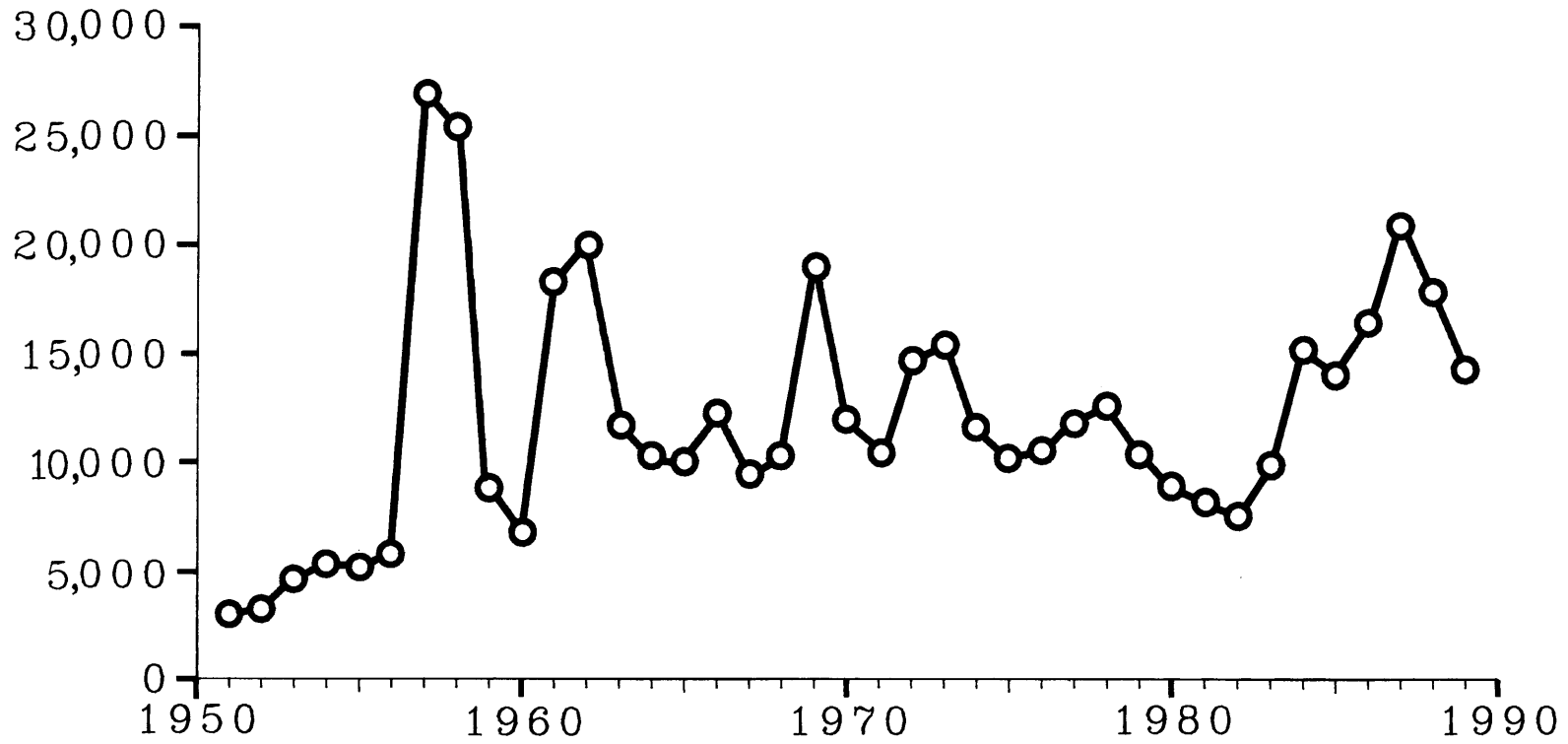
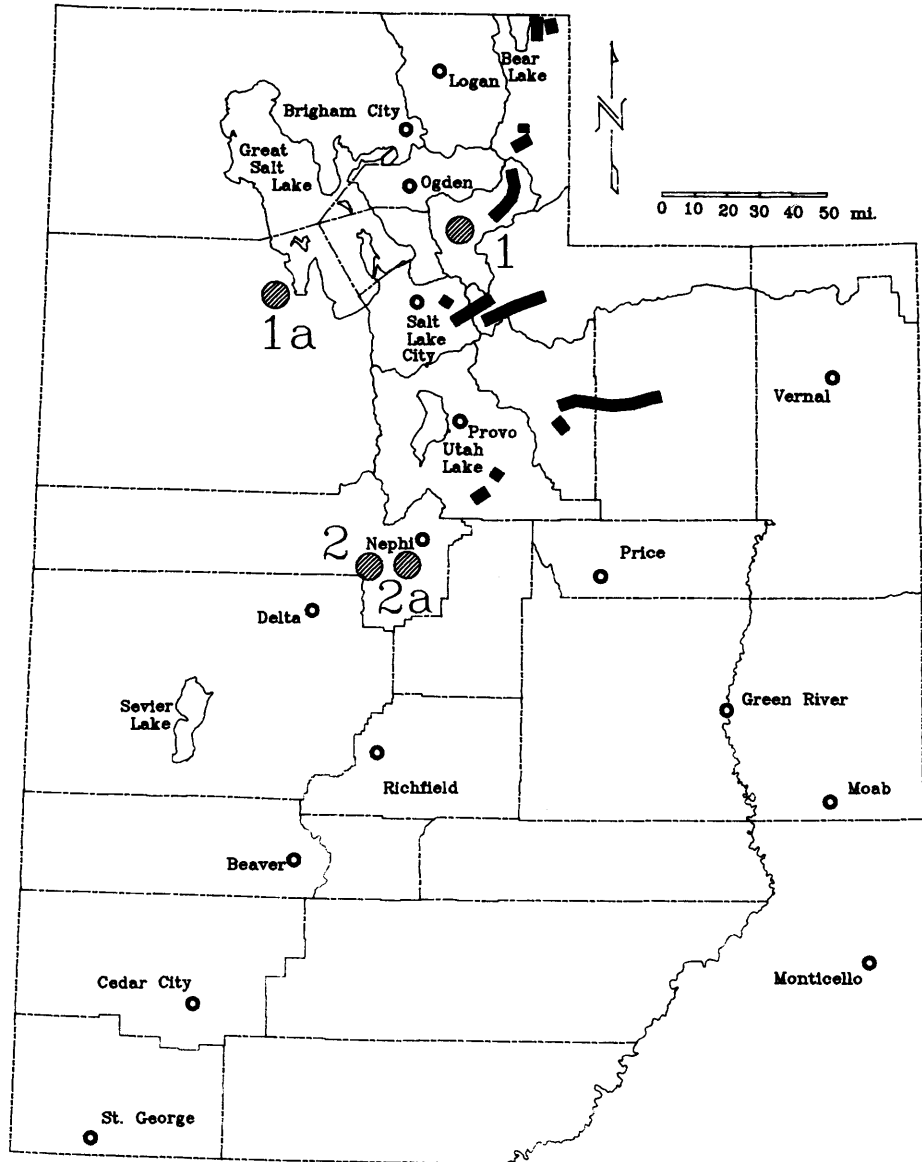


Figure 1. Annual sand and gravel production in Utah (in thousands of short tons per year, data from the U.S. Bureau of Mines).




- 1 --IDEAL BASIC INDUSTRIES INC.
- 1A--POVERTY POINT QUARRY
- 2 --ASH GROVE CEMENT WEST INC.
- 2A--NIELSON QUARRY
-  JURASSIC TWIN CREEK LIMESTONE

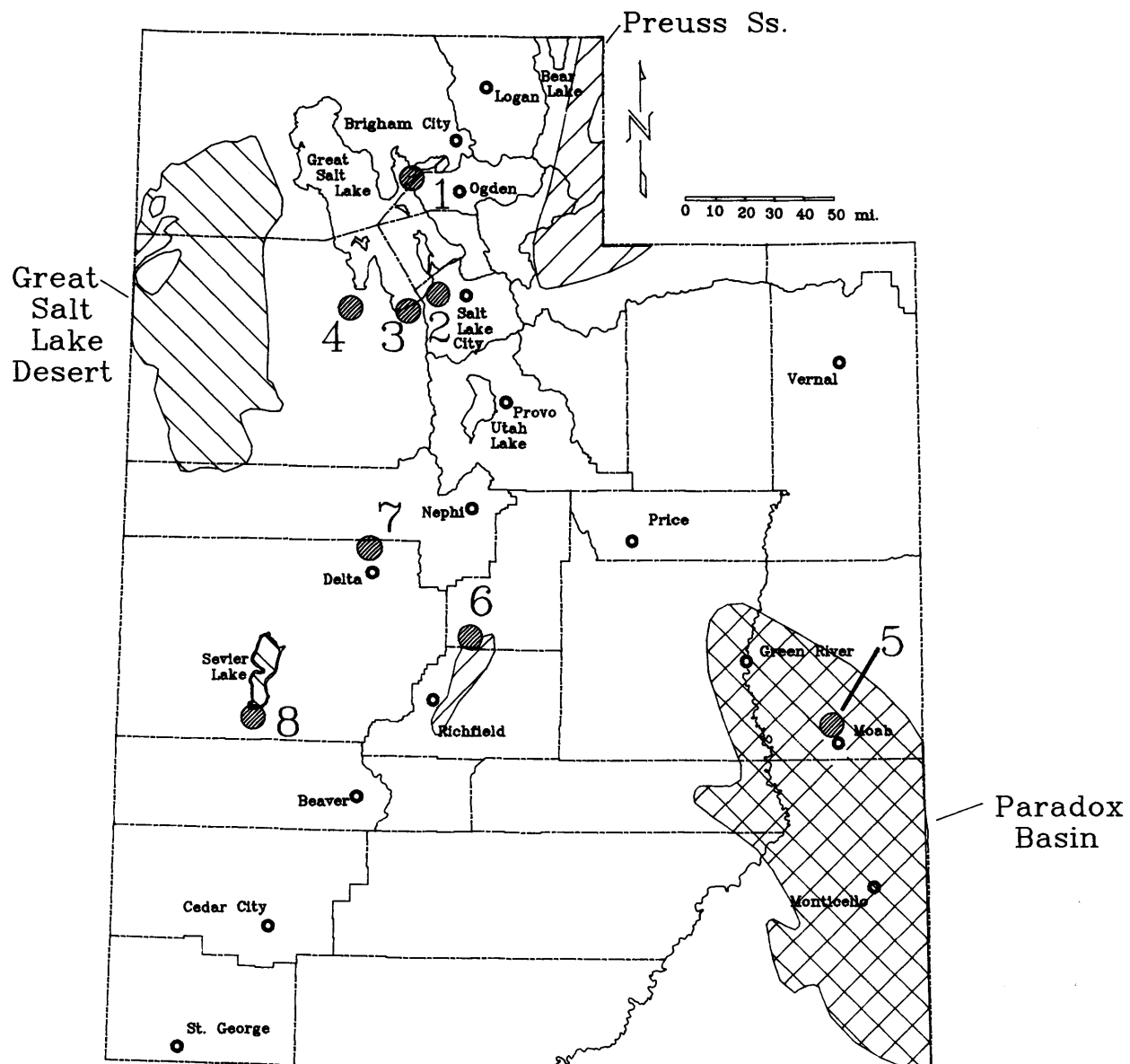
Figure 2. Cement rock occurrences and cement operations in Utah, 1990.

recently opened a limestone quarry at Poverty Point on the south end of the Lakeside Mountains. Material from this quarry presumably will be blended with the natural cement rock to produce a uniform product. Fuel used at their Morgan County plant is primarily natural gas with coal as a backup. Type 1 cement (a general construction cement) accounts for about 30 percent of their production and type 2 cement (a sulfate-resistant cement with a moderate heat of hydration) comprises about 50 percent. Holnam, Incorporated also produces several other types of cement.

Ash Grove Cement West, Incorporated uses limestone and shale from the Cambrian Ophir Shale located adjacent to their plant. Silica used in Ash Grove's cement is mined from the Permian Diamond Creek Sandstone(?) at the Nielson Quarry, a few miles east of Ash Grove's plant. Kennecott slag and Nucor mill scale are purchased to provide the necessary iron. Gypsum is obtained from the Jurassic Carmel Formation on the west flank of the San Rafael Swell. The 650,000 TPY plant is coal fueled.

HALITE

Significant halite resources occur at seven locations in Utah (figure 3): in the Paradox Basin; in the Jurassic Arapien Shale near Richfield; in salt domes in the Delta area; at Sevier Lake; in the Jurassic Preuss Sandstone in northeastern Utah; in the Great Salt Lake Desert; and in the Great Salt Lake. In the Paradox Basin near Moab, Moab Salt, Incorporated, a subsidiary of Texasgulf, Incorporated, recovers Pennsylvanian salt from a salt diapir. They employ solution mining followed by solar evaporation. In central Utah, Redmond Clay and Salt Company produces halite from underground mines in the Jurassic Arapien Shale for use as livestock salt and table salt. Near Delta, oil and gas drilling at the Argonaut well revealed the presence of a salt dome in Tertiary rocks. The saline section in this well is more than 5000 feet (1524 m) thick (Mitchell, 1979). No development of this deposit has taken place.



- 1-GREAT SALT LAKE MINERALS AND CHEMICALS CO.
- 2-MORTON SALT CO.
- 3-AKZO SALT CO.
- 4-AMERICAN SALT, INC.
- 5-MOAB SALT CO.
- 6-REDMOND CLAY AND SALT CO.
- 7-ARGONAUT WELL
- 8-CRYSTAL PEAK MINERALS CORP.



-  BEDDED SALT
 SUBSURFACE BRINES

Figure 3. Halite occurrences and operations in Utah, 1990.

At Sevier Lake (dry through most of historical time), Crystal Peak Minerals Corporation is developing the shallow subsurface brines. They are now producing their first salt harvest and hope to add a potash plant. In northeast Utah, the Jurassic Preuss Sandstone contains a poorly known and presently undeveloped salt resource. In northwest Utah, the Great Salt Lake Desert contains a large salt resource in three subsurface aquifers; however, there is no current production of halite from these brines. In northwest Utah, the Great Salt Lake has long been the site of an important salt industry. Four operators now produce halite from surface brine of the lake: Great Salt Lake Minerals and Chemicals Company, Morton Salt Company, Akzo Salt, Incorporated, and American Salt Company. Salt is recovered through controlled solar evaporation in shallow harvest ponds. The lake consists of four separate brine bodies due to density stratification and the presence of the railroad causeway. Lighter brine floats on denser brine in both the north and south arms of the lake. The railroad causeway prevents the complete mixing of waters between the two arms of the lake. The lake brine contains commercial concentrations of sodium, potassium, and magnesium salts, but it is not particularly rich in other saleable commodities such as lithium, bromine, and boron (Sturm, 1980). One challenge faced by the Great Salt Lake brine industry is the historic variability in the elevation of the Great Salt Lake. A falling lake elevation strands salt operators miles from the edge of the lake, often requiring them to dredge canals to have access to the brine. As the lake rises, the salt resource is diluted and often severe damage is done to the dike systems around the solar ponds.

Salt production (figure 4) has shown strong growth in the past 30 years with more than a six-fold increase during that period.

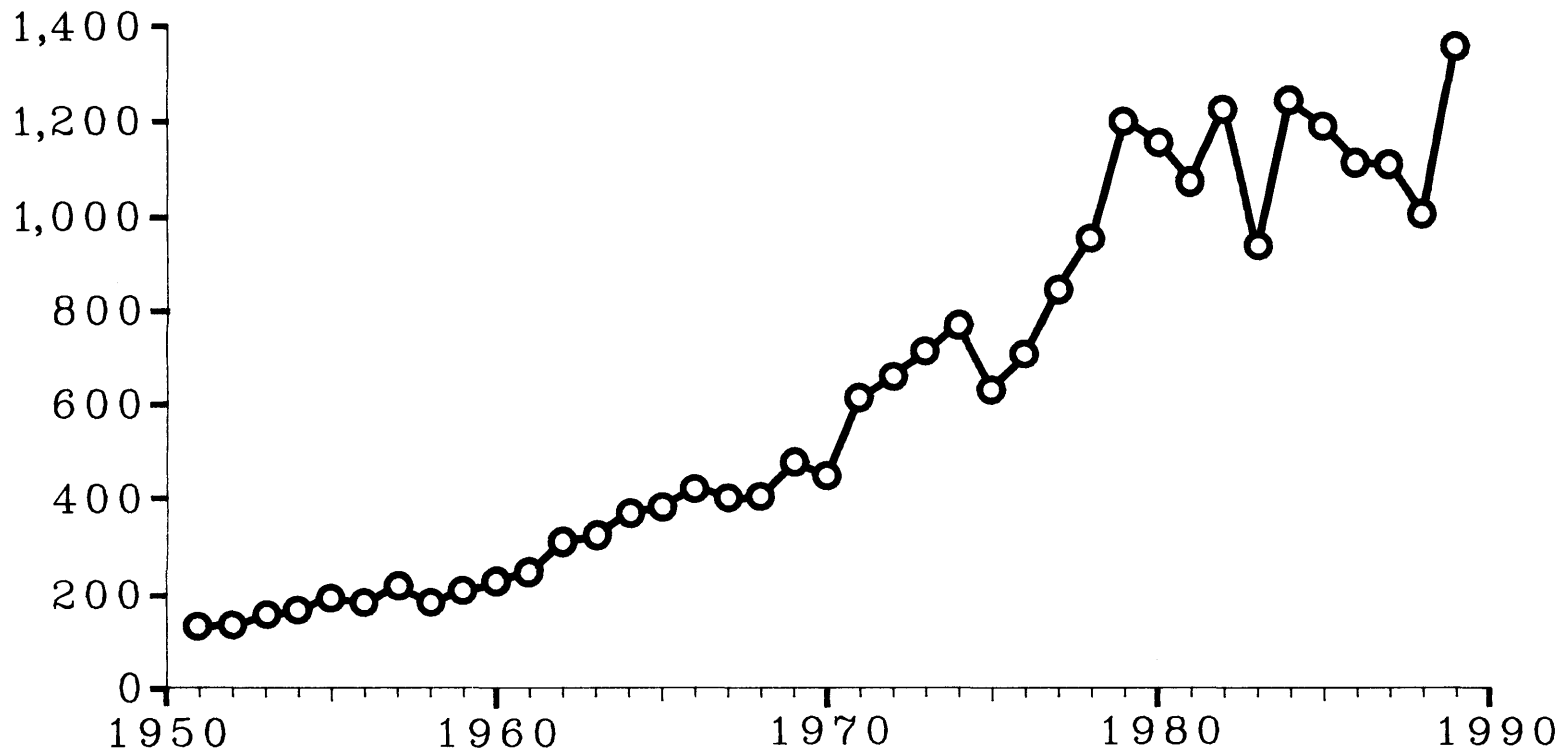


Figure 4. Annual production of halite in Utah (in thousands of short tons per year, data U.S. Bureau of Mines).

POTASH AND OTHER SALTS

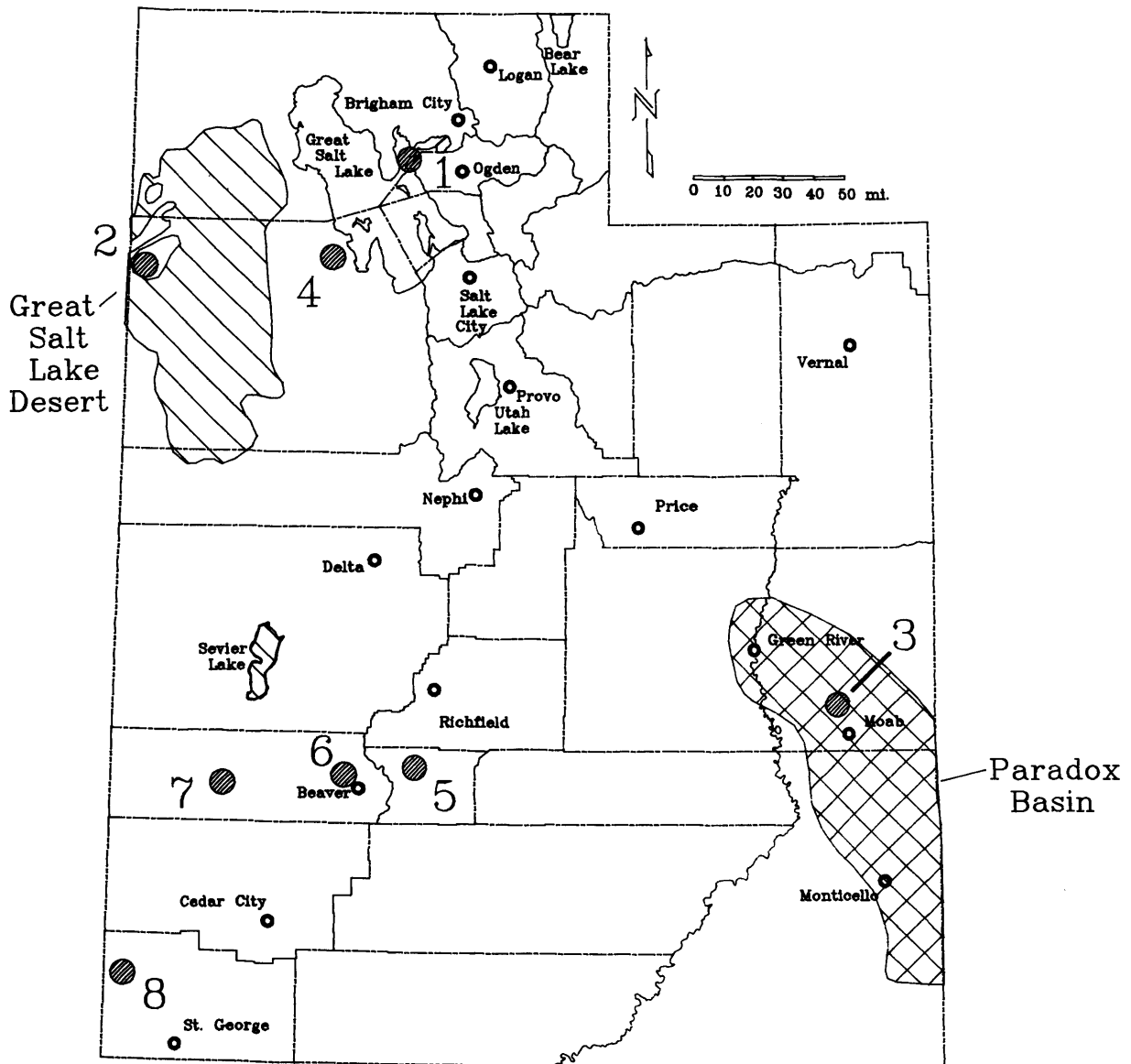
Four localities in Utah contain significant quantities of potassium and magnesium salts and sodium sulfate: the Great Salt Lake, the Great Salt Lake Desert, the Paradox Basin, and Sevier Lake. In addition, there are large alunite deposits in southwestern Utah that are potential sources of both potash and aluminum (figure 5).

GREAT SALT LAKE

The two Great Salt Lake operations that produce salts other than halite are: the Magnesium Corporation of America (Magcorp), which produces magnesium chloride brine for conversion to magnesium metal and chlorine gas, and Great Salt Lake Minerals and Chemicals Company, which produces potassium sulfate, sodium sulfate (salt cake), and magnesium chloride. An additional saline resource, buried at a shallow depth within the Quaternary sediments at the north end of the lake, consists of a bed of mirabilite, a hydrated sodium sulfate, which reaches a maximum thickness of about 32 feet (10 m). Construction crews discovered the mirabilite while building the original wooden trestle railroad causeway across the lake in 1903 (Hite, 1964).

GREAT SALT LAKE DESERT

The Reilly Tar and Chemicals Corporation (Reilly Wendover Division) potash plant produces potassium chloride salt and magnesium chloride brine from brines of three subsurface aquifers at the Bonneville Salt Flats near Wendover. The shallowest aquifer, generally less than 20 feet (6 m) deep, provides most of the brine, which is gravity drained through canals toward the plant. Brine "elevators" raise the brine from the canals to the evaporation ponds for solar evaporation. A froth flotation circuit separates the valuable



- 1-GREAT SALT LAKE MINERALS AND CHEMICALS CO.
- 2-REILLY TAR AND CHEMICALS CORP.
- 3-TEXASGULF INC.
- 4-MAGNESIUM CORPORATION OF AMERICA
- 5-MARYSVALE ALUNITE
- 6-SHEEPROCK ALUNITE
- 7-WHITE MOUNTAIN ALUNITE
- 8-BEAUTY KNOLL ALUNITE



-  BEDDED SALTS
-  SUBSURFACE BRINES

Figure 5. Potash, magnesium chloride, sodium sulfate, and alunite occurrences and operations in Utah, 1990.

sylvite from the sylvinite (a sylvite/halite salt mixture) harvested from the solar ponds. Less-concentrated brine from a deep aquifer is produced from wells as deep as 2051 feet (625 m). Wells up to 200 feet (61 m) deep, in an alluvial-fan aquifer to the north of the Reilly plant, provide water used in the plant for processing sylvite (Bingham, 1980).

PARADOX BASIN

Bedded sylvite, carnallite, and associated subsurface brines underlie a large part of the Paradox basin. The potash resource occurs within 18 of 29 evaporite cycles in the Paradox Formation of the Hermosa Group; eleven of these contain significant amounts of potash (Hite, 1961). Texasgulf, Incorporated produces about 118,000 TPY of potash by solution mining the rooms and pillars of their former underground mine (Phillips, 1975). They produce potash from an 11-foot-thick (3 + m) sylvite bed in the fifth evaporite cycle down from the top of the evaporite sequence. This bed occurs at depths of less than 4000 feet (1220 m) (Hite, 1964). Water for the solution operation comes from the Colorado River.

SEVIER LAKE

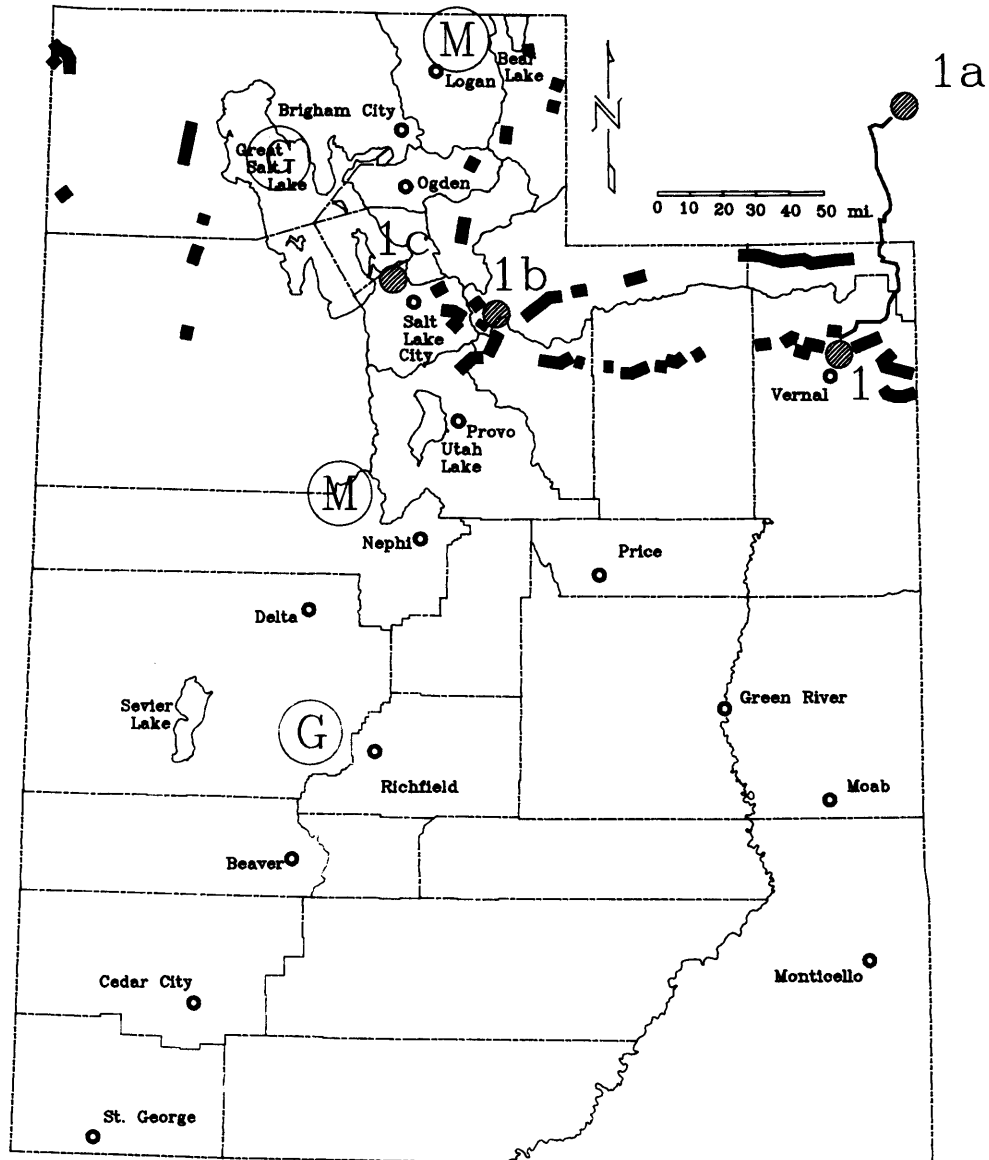
Sevier Lake, dry through most of historical time, contains subsurface brines comparable to those of the Great Salt Lake, although the Sevier Lake brines have a higher sulfate to chloride ratio and a lower magnesium content (Whelan, 1969). Crystal Peak Minerals Corporation is presently producing halite at the south end of the lake (figure 3) and hopes to enter the potash market as well.

ALUNITE DEPOSITS

The large alunite deposits of southwest Utah represent an unconventional potash and aluminum resource. These deposits are the largest of their type in the United States. The White Mountain replacement deposit contains an estimated resource of 232 million tons of ore containing 33 percent alunite with an additional 402 million tons of ore containing 28 percent alunite (Hall, 1978). A consortium of companies planned to produce aluminum and potash from this deposit in the 1970s but decided that the economics at the time were unfavorable. The Marysvale vein and replacement deposits were the sites of minor potash production in World War I and World War II. Locations for two other deposits are shown in figure 5.

PHOSPHATE

Three categories of phosphate deposits occur in Utah (figure 6): bird and bat guano, which accounted for minor early production; Mississippian phosphatic shales of the Delle Member of the Deseret Limestone and the Delle Phosphatic Member of the Little Flat Formation, which have not been exploited; and the phosphatic shales of the Intertongued Park City and Phosphoria Formations of Permian age. The only present commercial operation is Chevron Resources Company's Little Brush Creek mine on the south flank of the Uinta Mountains in the Park City Formation. In the past, trucks hauled phosphate concentrates from Chevron's operation to the Garfield plant at Salt Lake City for treatment with sulfuric acid from Kennecott Corporation. Concentrates were also hauled to the Phoston railroad terminal for shipment to Canada. In May of 1986, Chevron Resources Company completed a slurry pipeline through the eastern Uinta Mountains and now slurries their concentrates to Rock Springs, Wyoming for treatment with byproduct acid from the oil and gas fields of the area (Woody, 1986).



- 1 -CHEVRON RESOURCES CO., LITTLE BRUSH CREEK MINE
- 1a-ROCK SPRINGS PLANT
- 1b-PHOSTON TERMINAL (DEFUNCT)
- 1c-GARFIELD PLANT (DEFUNCT)




-  PERMIAN PHOSPHATE OUTCROPS
-  MISSISSIPPIAN PHOSPHATE LOCALITY
-  GUANO OCCURRENCE

Figure 6. Phosphate occurrences and operations in Utah, 1990.

CRUSHED STONE

Utah has nearly unlimited sources of high-quality rock suitable for crushed stone throughout the state. Paleozoic carbonates constitute the largest amount of material mined for this purpose. The importance of this resource will increase as sand and gravel deposits along the Wasatch Front are depleted, or made inaccessible by residential development.

Crushed stone production (figure 7) has increased slowly except during the construction of the Great Salt Lake railroad causeway in 1957-1958 and in 1983-1987 when it was used to raise the level of the causeway in response to the rising waters of the Great Salt Lake. An interesting footnote about the quarrying in 1957-1958 is that only two blasts at the railroad quarry on the north end of the Great Salt Lake generated a large part of the total production. On July 21, 1957, 1.8 million pounds of explosives produced 4 million tons of broken rock. On January 15, 1958, 2.14 million pounds of explosives produced 5.9 million tons of rock (Newby, 1980). Seismograph stations in California and Colorado measured the second blast as a magnitude 3 seismic event (William F. Case, Utah Geological and Mineral Survey, personal communication, 1990).

LIMESTONE AND DOLOMITE

Cambrian to Mississippian formations provide most of Utah's carbonate production. Calcite veins and oolitic sands of the Great Salt Lake are other sources of present or past production. The nine operators shown in figure 8 produce a wide variety of products. Chemstar, Incorporated produces dolomitic lime from the Ordovician Fish Haven Dolomite for construction and water treatment use. The Utah Marblehead Lime Company quarry provides dolomite from the Cambrian Lynch Dolomite which is mined by a contract miner and burned at the nearby U.S. Pollution Control (USPCI) kiln to provide dead-burned dolomite for

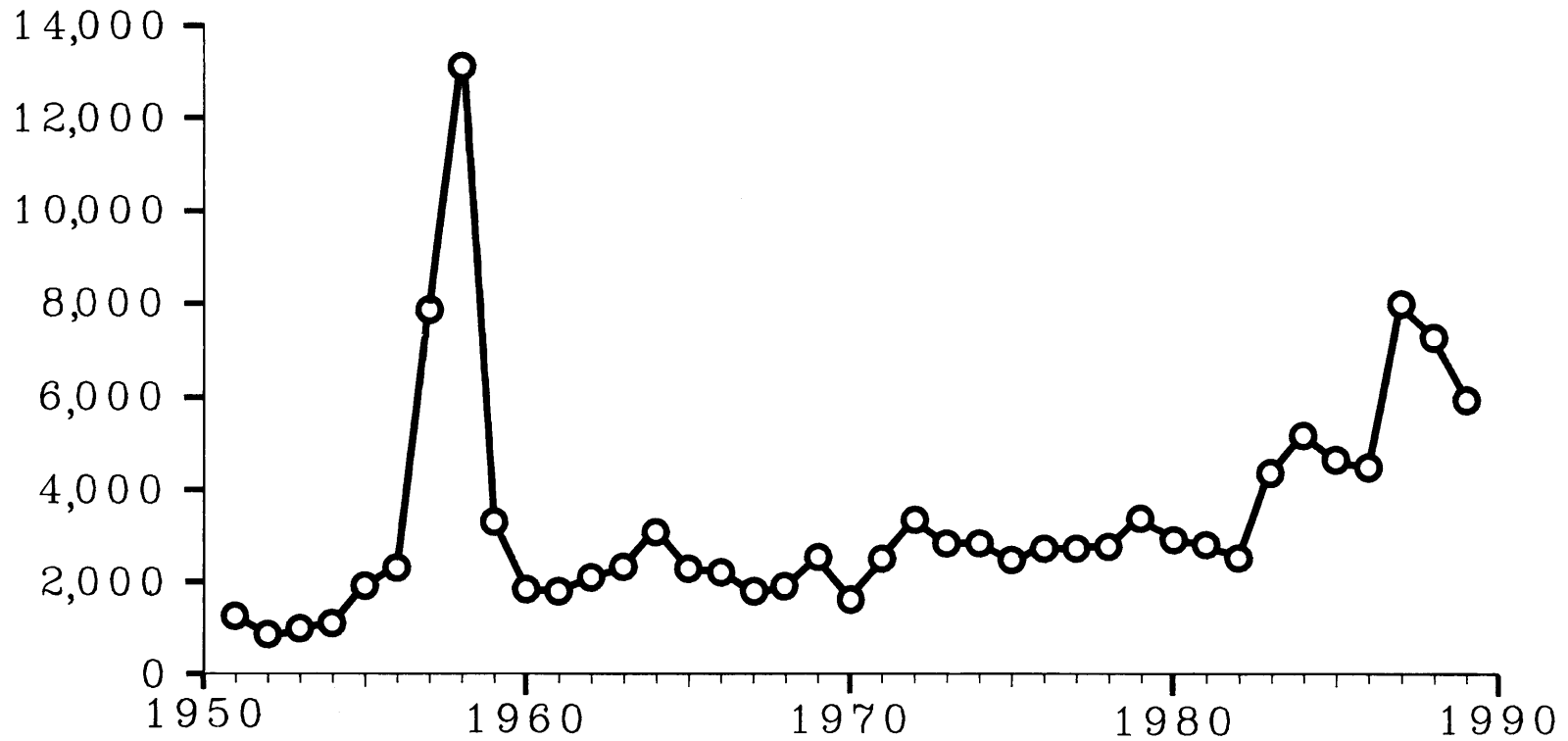
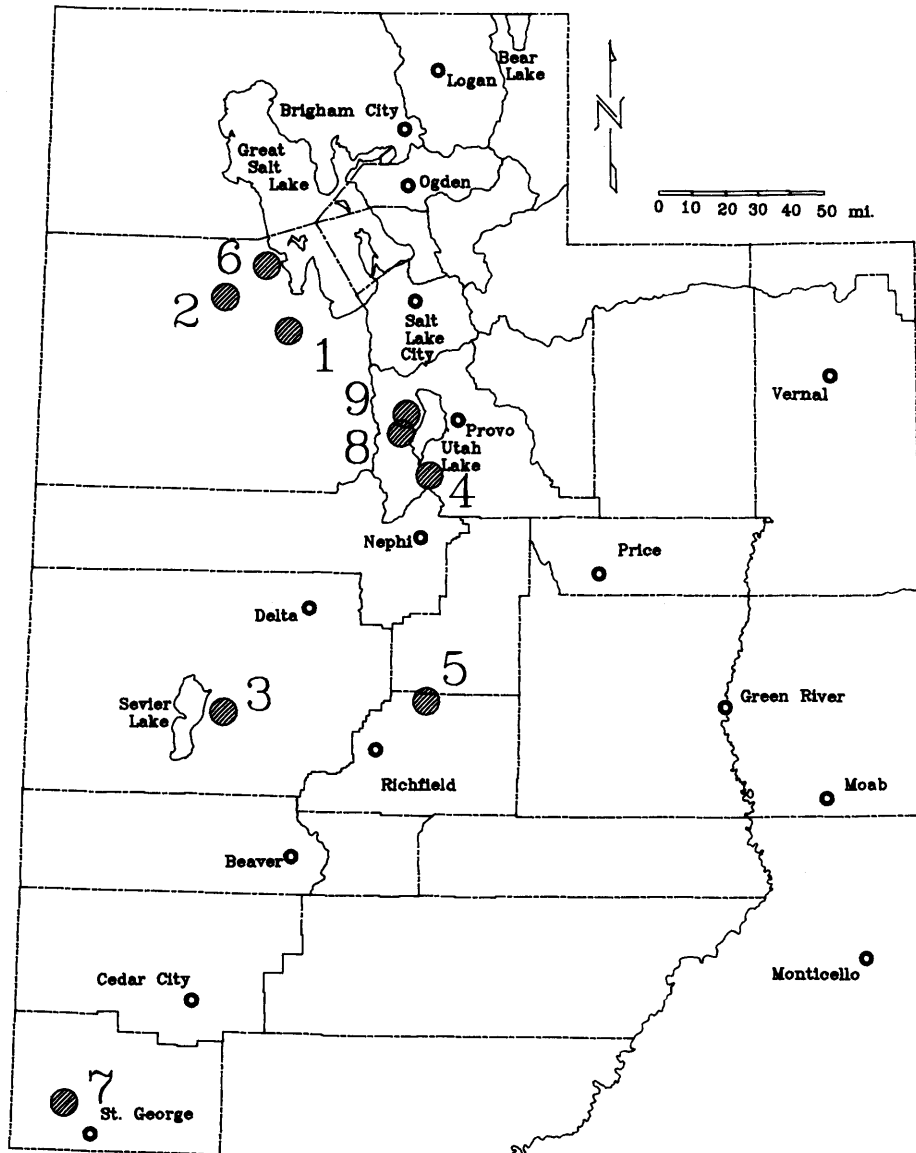


Figure 7. Annual stone production in Utah (in thousands of short tons per year; production figures include crushed and dimension stone prior to 1977, but only crushed stone after that date, data U.S. Bureau of Mines).



- | | |
|---------------------------|---|
| 1-CHEMSTAR, INC. | 6-MAGNESIUM CORP. OF AMERICA |
| 2-UTAH MARBLEHEAD (USPCI) | 7-L&M GENERAL ENGINEERING
AND CONSTRUCTION CO. |
| 3-CONTINENTAL LIME, INC. | 8-CEDARSTROM CALCITE AND CLAY |
| 4-GENEVA STEEL OF UTAH | 9-LARSEN LIMESTONE CO. |
| 5-WESTERN CLAY CO. | |

Figure 8. Active limestone and dolomite operations in Utah, 1990 (includes calcite producers, but not carbonates used for crushed stone, cement, or dimension stone).

refractory use at Geneva Steel and to provide dolomitic lime for waste stabilization at USPCI's waste-disposal facility. Continental Lime, Incorporated, located east of Sevier Lake, produces high-calcium lime from the Cambrian Dome Formation for a variety of uses including scrubbing of sulfur dioxide smokestack emissions from the Intermountain Power Plant near Delta, Utah. Geneva Steel of Utah quarries their own dolomite and limestone, from a Cambrian carbonate section, for use as flux at their Orem steel mill. Geneva also ships limestone powder to the coal mines of central Utah for rock dust (to coat floors and walls of mines to reduce the possibility of coal-dust explosions). Western Clay Company mines limestone from the Tertiary Flagstaff Limestone for coal-mine rock dust and for crushed stone. Magcorp uses oolitic sands from the shores of the Great Salt Lake as a stack-gas neutralizing agent in their process for making magnesium metal. L & M General Engineering and Construction apparently will begin producing lime for Hecla's Apex mine in Washington County if it reopens. Cedarstrom Calcite and Clay produces small amounts of vein calcite from an underground mine in the Mississippian Deseret Limestone and the Humbug Formation west of Utah Lake for poultry grit. Larsen Limestone Company produces limestone from the Deseret Limestone for sulfur dioxide scrubbing at the Bonanza power plant near Vernal.

Lime production (figure 9) has shown a steady increase over the last 30 years. Stockpiling by operators may explain the spike in 1985.

CLAYS

Utah has an assortment of sedimentary and hydrothermal clays including: bentonite, bloating clay, common clay, fuller's earth, halloysite, and kaolinite. The two largest clay producers in Utah are Interstate Brick Company and Interpace Industries, Incorporated (figure 10), both of which blend common clays from many quarries to produce brick. Redmond Clay

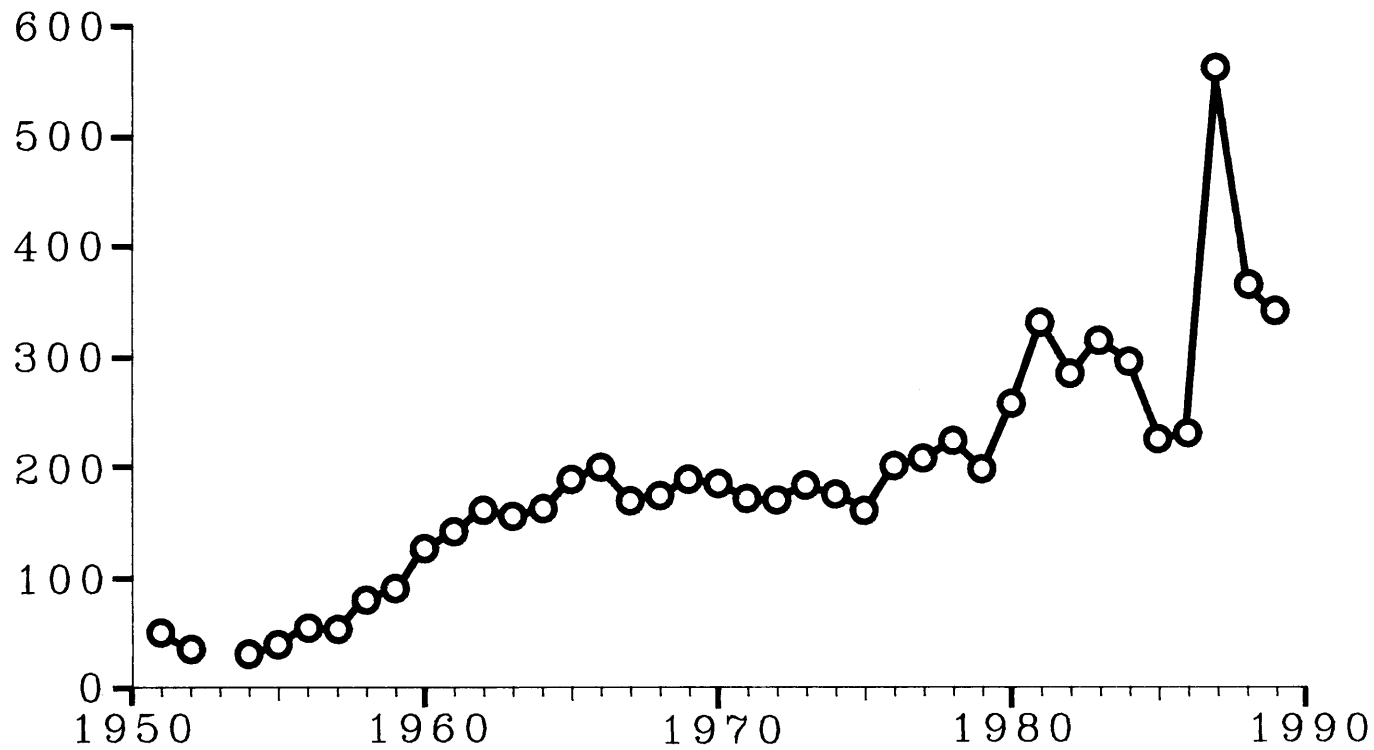
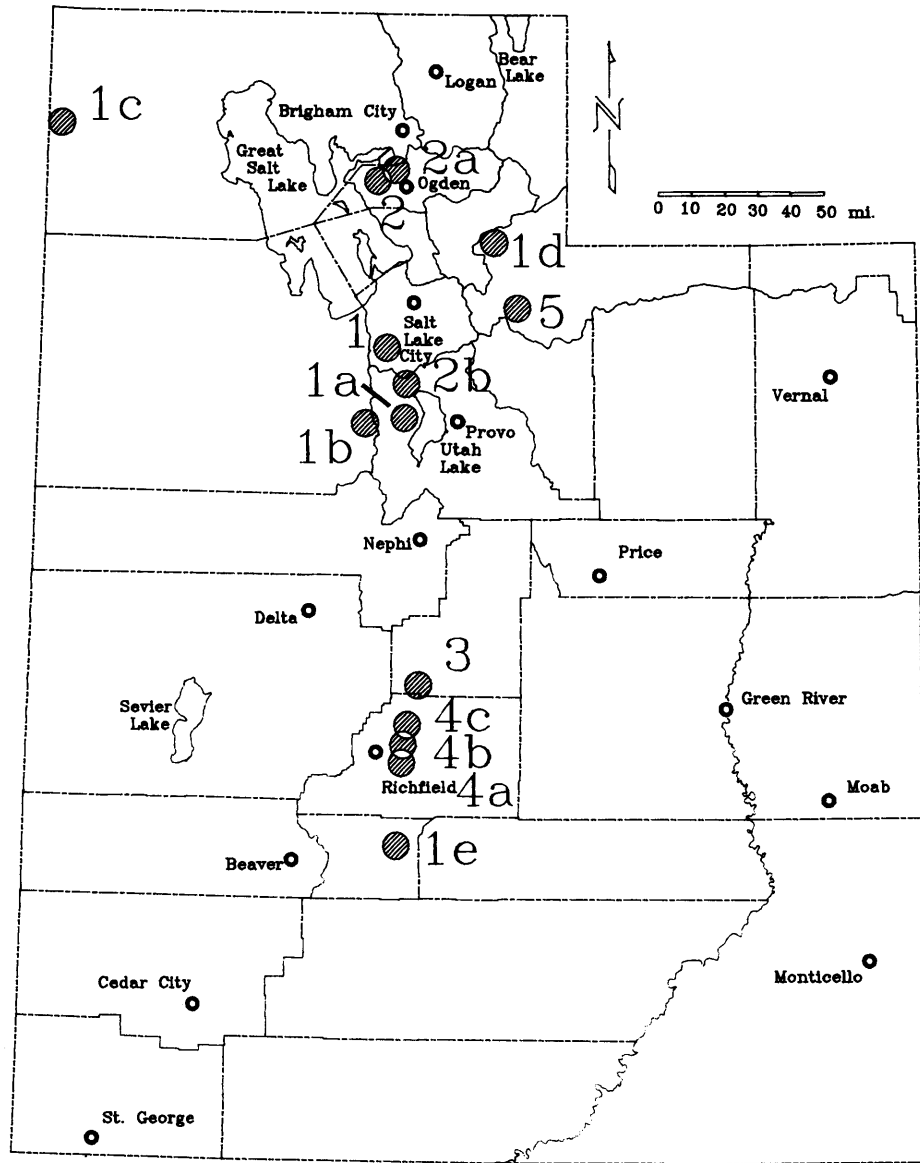


Figure 9. Annual lime production in Utah (in thousands of short tons per year, production figures withheld 1953, data U.S. Bureau of Mines).



- | | |
|--------------------------------|-------------------------------|
| 1 - INTERSTATE BRICK CO. PLANT | 2a - PLEASANT VIEW PIT |
| 1a - PELICAN POINT PITS | 2b - CLINTON PIT |
| 1b - FIVEMILE PASS PITS | 3 - REDMOND CLAY AND SALT CO. |
| 1c - MONTELLO PITS | 4a - WESTERN CLAY CO. MILL |
| 1d - ANDERTON PIT | 4b - AURORA PIT |
| 1e - KOOSHAREM PIT | 4c - REDMOND PIT |
| 2 - INTERPACE INDUSTRIES PLANT | 5 - UTELITE CORP. |

Figure 10. Active clay operations in Utah, 1990.

and Salt Company, Incorporated produces bentonite for construction use and for use in well-drilling fluids. Western Clay Company produces bentonite for construction use and fuller's earth for decolorizing and clarifying use. The Utelite Corporation mines the organic-rich Cretaceous Mancos Shale, which expands upon heating into a lightweight aggregate.

The erratic pattern of clay production (figure 11) reflects to a large degree the cyclical nature of the construction industry. Other factors affecting clay production include the demise of the fireclay industry in Utah, changing public taste in construction materials, and the capture of some of the commercial building market by the relatively new, large rebar-reinforced bricks.

GYPSUM

Utah has one of the largest gypsum resources in the United States. Withington (1964) estimated reserves of 2 billion tons of material averaging more than 85 percent gypsum in beds a minimum of 4 feet (1.2 m) thick within 30 feet (9 m) of the surface. While numerous geological formations contain gypsum (figure 12), the Pennsylvanian Paradox Formation of the Hermosa Group, the Jurassic Arapien Shale, the Jurassic Summerville Formation, and the Jurassic Carmel Formation contain most of the resource. Georgia Pacific Corporation produces gypsum from three quarries to supply their Sigurd plant which produces wallboard, plaster, and fireproof cores for doors. U.S. Gypsum Company mines Arapien Shale gypsum near their Sigurd plant for the manufacture of wallboard, plaster, and wallboard joint compound. T.J. Peck and Sons, Incorporated mines gypsum from the Arapien Shale near Nephi for export to a cement plant at Inkom, Idaho. H.E. Davis mines gypsum from the Arapien Shale near Levan for shipment to the Holnam, Incorporated cement plant in Morgan County. Lanny Jensen mines gypsum from the Jurassic Carmel Formation on the west flank of the San Rafael Swell for shipment to the Ash Grove Cement West plant at Leamington.

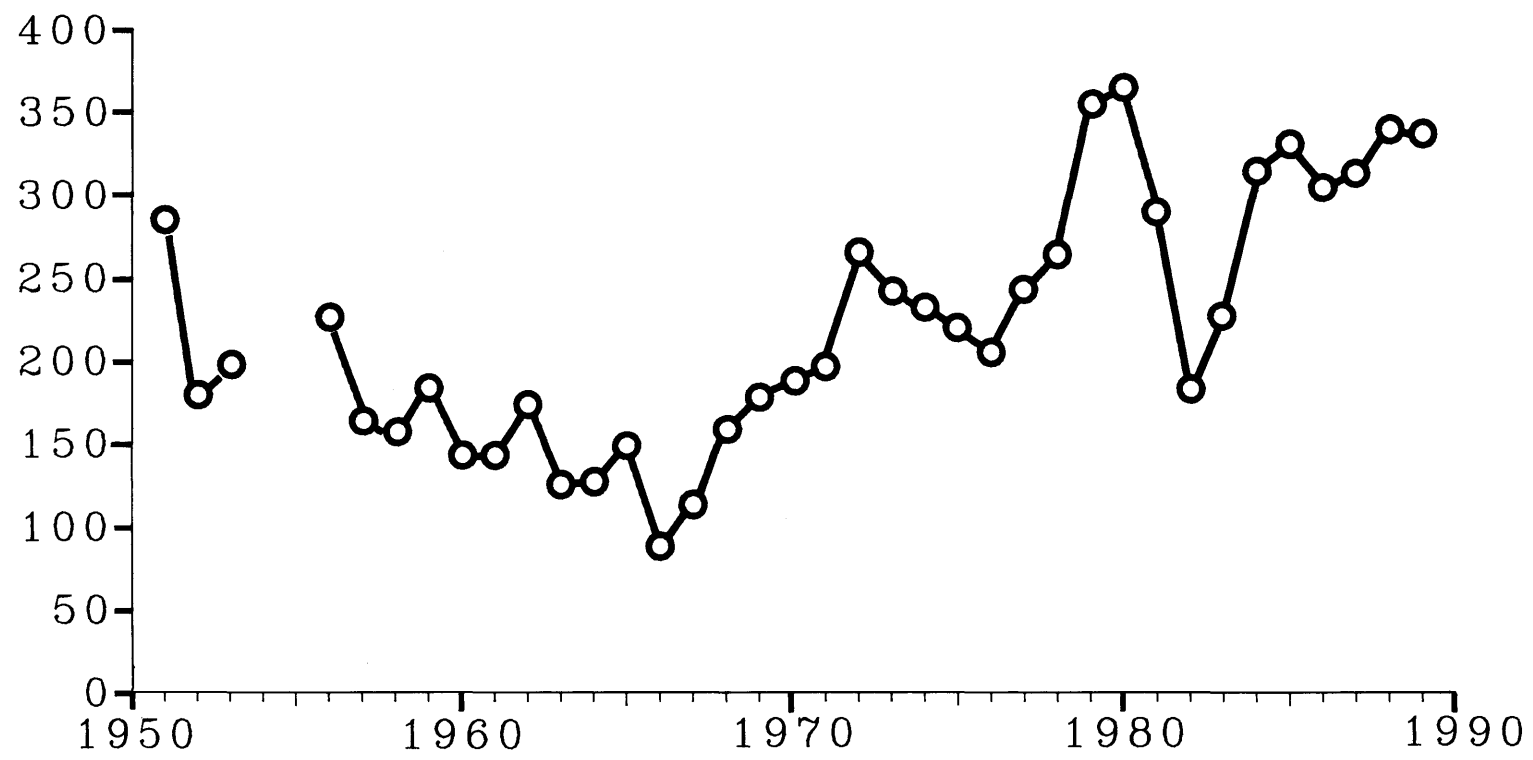
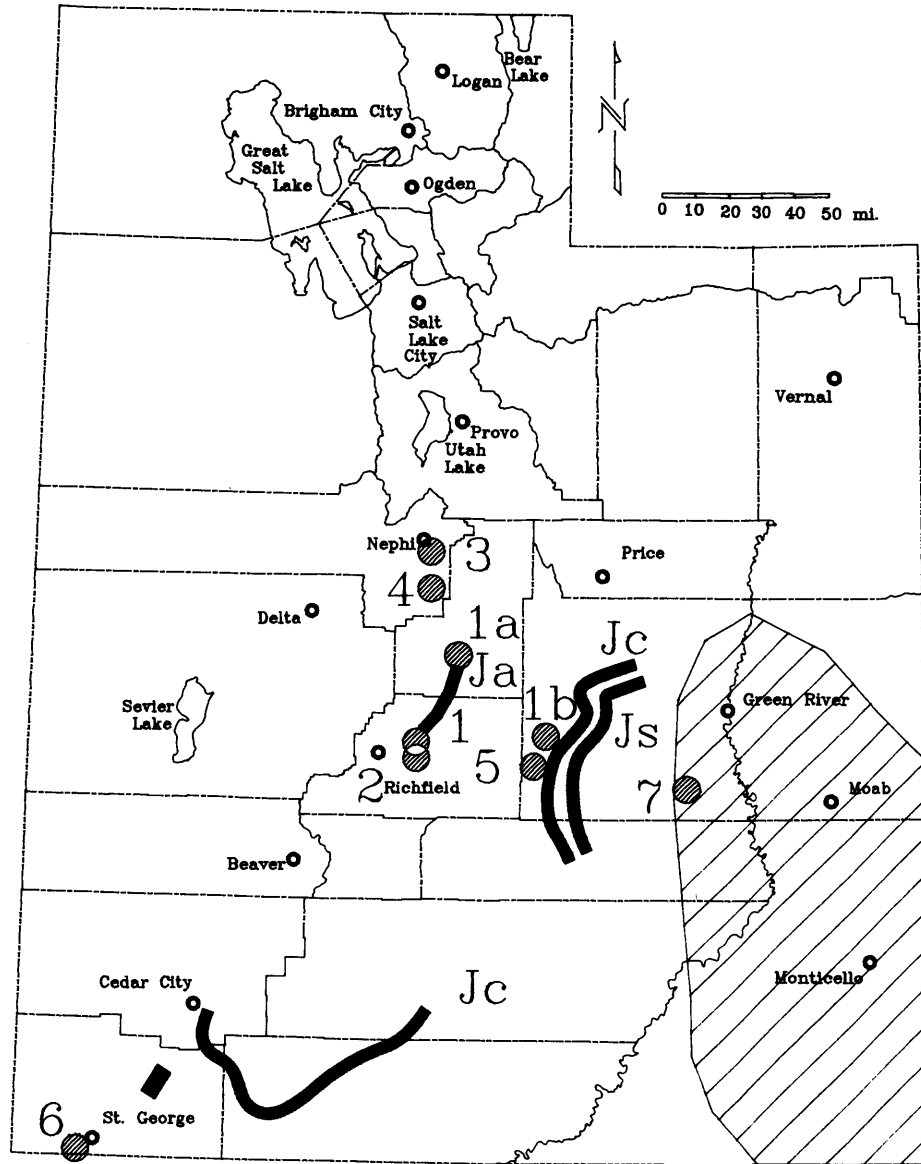


Figure 11. Annual clay production in Utah (in thousands of short tons per year, production figures withheld 1954–1955 and excludes one or more types of clay for most years, data U.S. Bureau of Mines).



- | | |
|---------------------------|------------------------------|
| 1 - GEORGIA PACIFIC CORP. | 4 - H.E. DAVIS |
| 1a - MAYFIELD QUARRY | 5 - LANNY JENSEN |
| 1b - SAN RAFAEL QUARRY | 6 - STANDARD GYPSUM PRODUCTS |
| 2 - U.S. GYPSUM CO. | 7 - WHITECLOUD CLAIMS |
| 3 - T.J. PECK AND SONS | |





-  PARADOX BASIN GYPSUM
-  Ja ARAPIEN SHALE GYPSUM
-  Js SUMMERVILLE FM. GYPSUM
-  Jc CARMEL FM. GYPSUM

Figure 12. Gypsum occurrences and operations in Utah, 1990.

Standard Gypsum Products, Incorporated mines gypsum, from the Jurassic Moenkopi Formation, in Washington County for export to the San Joaquin Valley of California for use in agriculture. The Whitecloud claims in Emery County recently produced a small initial tonnage of gypsum, probably from the Jurassic Carmel Formation; future development and marketing plans are not known.

Gypsum production in Utah (figure 13) has been erratic, but the general upward trend is recognizable. Production figures before 1973 were withheld to protect industry confidentiality.

MISCELLANEOUS COMMODITIES

Other industrial rocks and minerals that are lower in total dollar value than the nine commodities previously discussed but which are still important include: fluorspar, gemstones, silica, scoria, and dimension stone. Commodities present in significant quantities in Utah but not currently in production include: barite, diatomaceous earth, magnesite, perlite, pumice, wollastonite, and zeolites.

ACKNOWLEDGMENTS

The Utah Division of Oil, Gas and Mining (DOG M) and the U. S. Bureau of Mines (USB M) provided data essential to the production of this publication. The mining operation files of DOGM provided much information about current operations. Wayne Hedberg and Holland Shepperd, of DOGM, also provided important new data. Commodity production graphs were compiled from USBM Mineral Yearbook data.

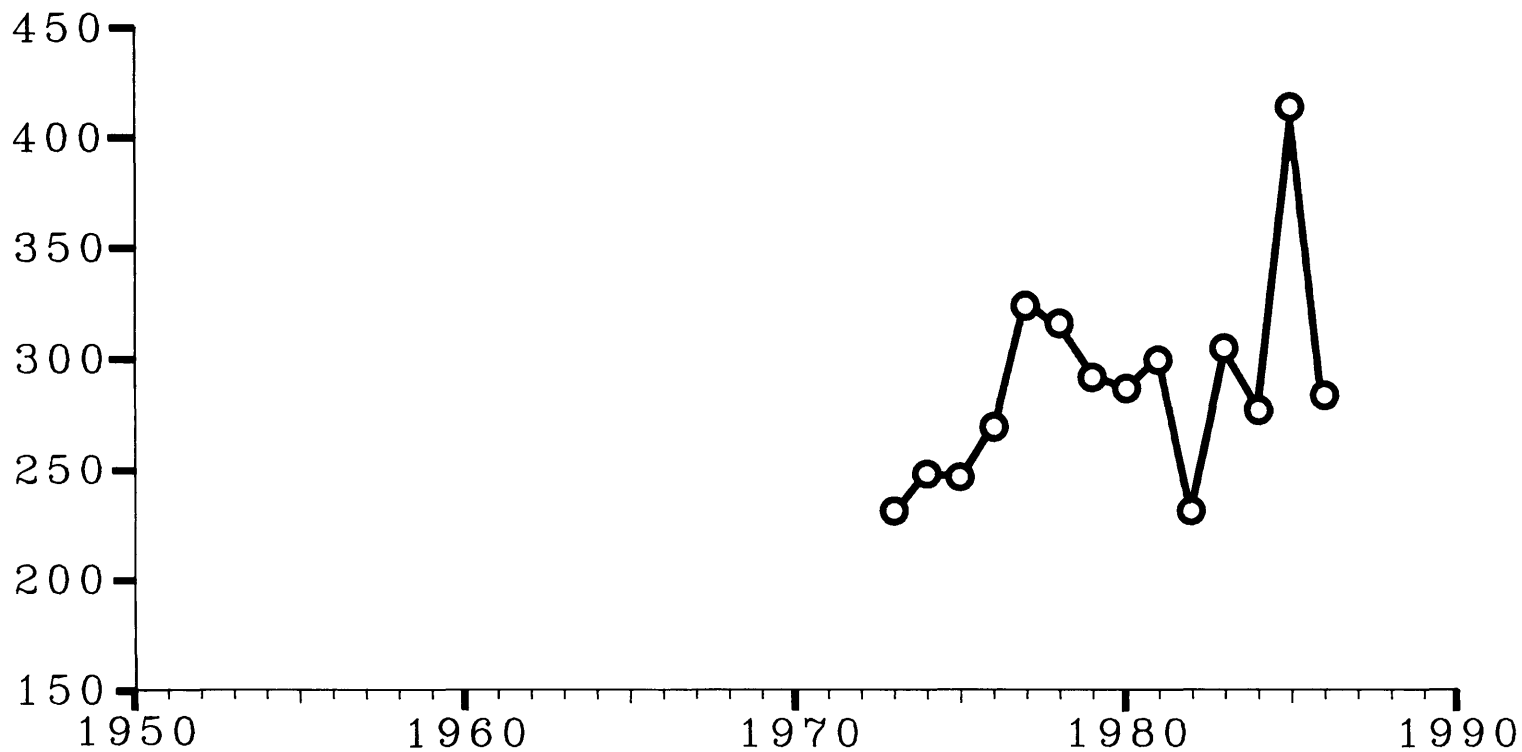


Figure 13. Annual gypsum production in Utah (in thousands of short tons per year, production figures withheld 1950-1970 and 1987-1988, data U.S. Bureau of Mines).

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APPENDIX A - SIGNIFICANT INDUSTRIAL ROCK AND MINERAL QUARRIES, PITS, AND PLANTS IN UTAH WITH RECENT PRODUCTION.

Location given in column five is township, range, and section of the cadastral land grid. Most locations are referenced to the Salt Lake Base and Meridian; however, one operation located within the Sixth Principal Base and Meridian (in Wyoming) is denoted by an (X) following the section number.

CEMENT

<u>Quarry, Pit, or Plant Name</u>	<u>Company Name</u>	<u>Commodity</u>	<u>County</u>	<u>Location (TWN,RNG,SEC)</u>	<u>Age/Formation</u>	<u>Use/Products</u>
Devil's Slide plant and quarry	Ideal Basic Industries, Inc.	cement rock, sandstone	Morgan	4N,4E,19	Jur. Twin Creek Ls Tri./Jur. Nugget Ss	cement
Poverty Point quarry	Ideal Basic Industries, Inc.	high-Ca limestone	Tooele	1N,8W,16	Miss. Great Blue Ls	cement
Leamington (Chaffin) cement plant and quarry	Ash Grove Cement West, Inc.	high-Ca limestone, shale	Juab	14S,3W,33	Camb. Ophir Fm	cement
Nielson quarry	Ash Grove Cement West, Inc.	sandstone	Juab	14S,3W,11	Perm. Diamond Creek Ss	cement

HALITE

<u>Quarry, Pit, or Plant Name</u>	<u>Company Name</u>	<u>Commodity</u>	<u>County</u>	<u>Location (TWN,RNG,SEC)</u>	<u>Age/Formation</u>	<u>Use/Products</u>
Great Salt Lake Minerals and Chemicals ponds and plant	Great Salt Lake Minerals and Chemicals Co.	sodium chloride	Weber	6N,3W,06	Recent surface brines	road salt, water softening livestock salt
Morton Salt ponds and plant	Morton Salt Co.	sodium chloride	Salt Lake	1S,2W,05	Recent surface brines	table salt, road salt, water softening salt
Akzo Salt ponds and plant	Akzo Salt Co.	sodium chloride	Tooele	1S,4W,34	Recent surface brines	table salt, road salt, water softening salt
American Salt ponds and plant	American Salt Co.	sodium chloride	Tooele	1S,6W,22	Recent surface brines	road salt, water softening salt, livestock salt
Moab salt plant	Texasgulf, Inc.	sodium chloride	Grand	26S,20E,24	Penn. Paradox Fm	road salt

LIMESTONE AND DOLOMITE

<u>Quarry, Pit, or Plant Name</u>	<u>Company Name</u>	<u>Commodity</u>	<u>County</u>	<u>Location (TWN,RNG,SEC)</u>	<u>Age/Formation</u>	<u>Use/Products</u>
Chemstar, Inc. quarry and kiln	Chemstar, Inc.	dolomitic lime	Tooele	1S,7W,25	Ord. Fish Haven Dol	masonry mortar, dolomitic lime
U. S. Pollution Control, Inc. kiln	U. S. Pollution Control, Inc.	- -	Tooele	1N,9W,02	- -	- -
Marblehead quarry	Utah Marblehead Lime Co.	dead-burned dolomite, dolomitic lime	Tooele	2N,9W,22	Camb. Lynch Dol	refractories, waste disposal
Cricket Mountain quarry and kiln	Continental Lime, Inc.	high-Ca lime	Millard	21S,10W,36	Camb. Dome Fm	flue-gas desulfurization, water treatment, metal smelting flux
Keigley quarry	Geneva Steel of Utah	dolomite, limestone	Utah	9S,1E,27	Camb. Bluebird Dol, Cole Canyon Dol, Herkimer Ls	metal-smelting flux, coal-mine dusting
Redmond quarry	Western Clay Co.	high-Ca limestone	Sevier	21S,1E,05,07,08	Tert. Flagstaff Ls	coal-mine dusting
Oolite claims	Magnesium Corporation of America	calcareous sand	Tooele	3N,6W,07,18,19,24 3N,7W,09,16,17,20,31	Recent oolitic sand	flue-gas neutralization
Beaver Dam quarry	L & M General Engineering	high-Ca limestone	Washington	43S,18W,02	Miss. Redwall Ls	gold heap leaching
Pelican Point calcite mine and mill	Cedarstrom Calcite and Clay	calcite	Utah	6S,1E,30,31	Miss. Humbug Fm, Deseret Ls, Great Blue Ls	poultry grit, livestock feed supplement
Pelican Point limestone quarry and mill	Larsen Limestone Co.	high-Ca limestone	Utah	6S,1E,31	Miss. Deseret Ls	flue-gas desulfurization

Redmond Clay and Salt pits and plant	Redmond Clay and Salt Co.	sodium chloride	Sanpete	20S,1W,14,23,24,25	Jur. Arapien Sh	livestock salt, table salt
Crystal Peak ponds and plant	Crystal Peak Minerals Corp.	sodium chloride	Millard	24S,12W,16	Quat. lake sediments	road salt, water softening salt

POTASH, MAGNESIUM CHLORIDE, AND SODIUM SULFATE

<u>Quarry, Pit, or Plant Name</u>	<u>Company Name</u>	<u>Commodity</u>	<u>County</u>	<u>Location (TWN,RNG,SEC)</u>	<u>Age/Formation</u>	<u>Use/Products</u>
Great Salt Lake Minerals and Chemicals ponds and plant	Great Salt Lake Minerals and Chemicals Co.	potassium sulfate sodium sulfate magnesium chloride	Weber	6N,3W,06	Recent surface brines	fertilizer detergent, paper making road dust suppression
Reilly Wendover ponds and plant	Reilly Tar and Chemicals Co.	potassium chloride	Tooele	1S,19W,14	Quat. lake sediments	fertilizer
Texasgulf mine, ponds, and plant	Texasgulf, Inc.	potassium chloride	Grand	26S,20E,24	Penn. Paradox Fm	fertilizer
Magcorp ponds and plant	Magnesium Corporation of America	magnesium chloride	Tooele	2N,8W,10	Recent surface brines	magnesium metal

PHOSPHATE

<u>Quarry, Pit, or Plant Name</u>	<u>Company Name</u>	<u>Commodity</u>	<u>County</u>	<u>Location (TWN,RNG,SEC)</u>	<u>Age/Formation</u>	<u>Use/Products</u>
Little Brush Creek mine and mill	Chevron Resources Co.	phosphate concentrates	Uintah	2S,22E,31	Perm. Park City Fm	fertilizer raw material
Phoston terminal (Defunct)	Chevron Resources Co.	--	Wasatch	2S,5E,06	--	--
Garfield plant (Defunct)	Chevron Resources Co.	--	Salt Lake	1S,3W,10	--	--
Rock Springs fertilizer plant	Chevron Resources Co.	phosphate fertilizer	Sweetwater,WY	18N,104W,9,15,16,17 (X)	--	fertilizer

CLAYS

<u>Quarry, Pit, or Plant Name</u>	<u>Company Name</u>	<u>Commodity</u>	<u>County</u>	<u>Location (TWN,RNG,SEC)</u>	<u>Age/Formation</u>	<u>Use/Products</u>
West Jordan plant	Interstate Brick Co.	--	Salt Lake	3S,2W,12	--	brick
Pelican Point pits	--	--	--	--	--	--
Powell pit	Interstate Brick Co.	common clay	Utah	6S,1W,03	Miss. Manning Canyon Sh	brick
Smoky Joe pit	Interstate Brick Co.	common clay	Utah	7S,1W,09	Miss. Manning Canyon Sh	brick
Jim Gay pit	Interstate Brick Co.	common clay	Utah	7S,1W,12,13	Miss. Manning Canyon Sh	brick
				7S,1E,07,18		
Black Shale pit	Interstate Brick Co.	common clay	Utah	6S,1W,36	Miss. Manning Canyon Sh	brick
Fivemile Pass pits	Interstate Brick Co.	common clay	Tooele, Utah	7S,3W,04,05	Miss. Long Trail Sh Mbr of the Great Blue Ls	brick
Montello pits	Interstate Brick Co.	common clay	Box Elder	9N,17W,07 9N,18W,12	Tert. Salt Lake Fm	brick
Anderton pit	Interstate Brick Co.	common clay	Summit	4N,4E,33	Cret. Henefer Fm	brick
Koosharem pit	Interstate Brick Co.	common clay	Piute	27S,2W,02,11	Tert. Dry Hollow Fm	brick
Harrisville plant	Interpace Corporation	common clay	Weber	6N,1W,06	--	brick
Pleasant View pit	Interpace Corporation	common clay	Box Elder	7N,2W,13	Prec./ Camb. weathered schist	brick
Clinton pit	Interpace Corporation	common clay	Utah	5S,1W,08,09	Miss. Manning Canyon Sh	brick
Redmond Clay pits	Redmond Clay and Salt Co.	bentonite	Sanpete	20S,1W,14,23,24,25	Jur. Arapien Sh	construction clay, drilling mud
Western Clay Co. mill	Western Clay Co.	--	Sevier	22S,1W,04	--	--
Aurora pit	Western Clay Co.	fuller's earth	Sevier	21S,1W,31	Tert. Bald Knoll Fm	filtration
Redmond pit	Western Clay Co.	bentonite	Sevier	21S,1W,02	Jur. Arapien Sh	construction clay
Utelite quarry and kiln	Utelite Corp.	bloating shale	Summit	1S,5W,05,08	Cret. Mancos Sh	lightweight aggregate

GYPSUM

<u>Quarry, Pit, or Plant Name</u>	<u>Company Name</u>	<u>Commodity</u>	<u>County</u>	<u>Location (TWN,RNG,SEC)</u>	<u>Age/Formation</u>	<u>Use/Products</u>
Georgia Pacific plant and pits	Georgia Pacific Corp.	gypsum	Sevier	22-23S,1-2W	Jur. Arapien Sh	wallboard, plaster, cores for fireproof doors
Mayfield quarry	Georgia Pacific Corp.	gypsum	Sanpete	19S,02E,30	Jur. Arapien Sh	wallboard, plaster, cores for fireproof doors

San Rafael quarry	Georgia Pacific Corp.	gypsum	Emery	22S,09E,19	Jur. Carmel Fm	wallboard, plaster, cores for fireproof doors
U.S. Gypsum plant and pits	U.S. Gypsum Co.	gypsum	Sevier	22S,1W,14,15,22,23 22S,2W,36 23S,2W,01	Jur. Arapien Sh	wallboard,plaster, wallboard joint compound
Nephi quarry	T.J. Peck and Sons	gypsum	Juab	12S,1E,27 13S,1E,03	Jur. Arapien Sh	cement retarder
Davis quarry	H.E. Davis	gypsum	Juab	14S,1E?	Jur. Arapien Sh	cement retarder
Welch quarry	Lanny Jensen (operator)	gypsum	Emery	22S,9E,29	Jur. Carmel Fm	cement retarder
Bloomington Hills quarry	Standard Gypsum Products	gypsum	Washington	43S,15W,17,18,19,20	Tri. Moenkopi Fm	agricultural gypsum
Whitecloud quarry	Sutherland Brothers	gypsum	Emery	24S,13E,15	Jur. Carmel Fm	?