INTRODUCTION

The Great Basin of the western United States encompasses most of Nevada and western Utah (fig. 1). The climate of the region is semiarid to arid, with most precipitation falling as winter snow. The region is characterized by internal drainage (generally no hydrologic outlet to the ocean). Water resources in the region are limited and nearly all reliable surface-water sources have been allocated for use. The most commonly used aquifers are sand-and-gravel basin-fill deposits in structural basins of the region. In many basins, pumpage from the basin-fill aquifers is as much as (or more than) the safe yield.

Consequently, aquifers other than basin fill are being assessed in the eastern Great Basin to determine where and how much additional ground water is present and what might be the effects of development. This study was part of the Nevada Carbonate Aquifers Program, in cooperation with the State of Nevada, Las Vegas Valley Water District, City of North Las Vegas, and the Bureau of Reclamation.

This atlas presents a conceptual model of the geologic and hydrologic features of structurally extended terrains in the eastern Great Basin. First, the model is described and major structural features are compared with regional ground-water flow patterns. Second, the validity of the conceptual hydrogeologic model is evaluated using geophysical data and geologic models derived from geophysical profiles.

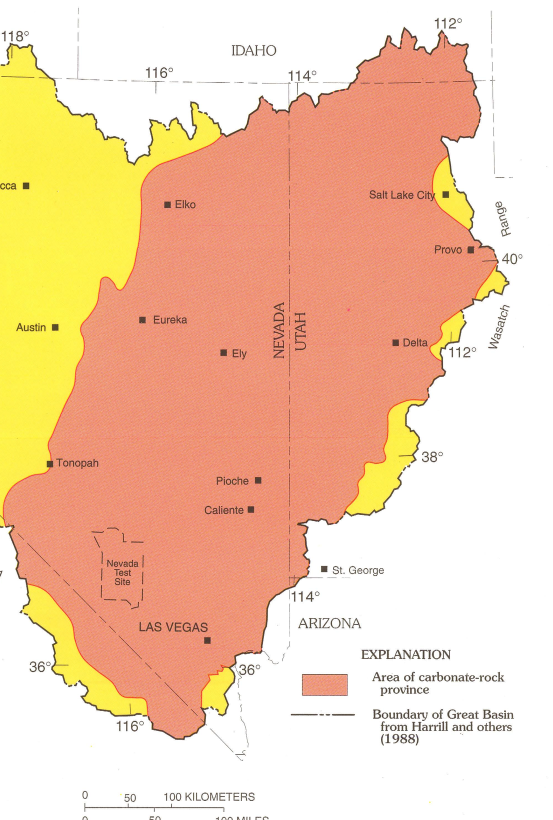


Figure 1. Location of carbonate-rock province in eastern Great Basin.

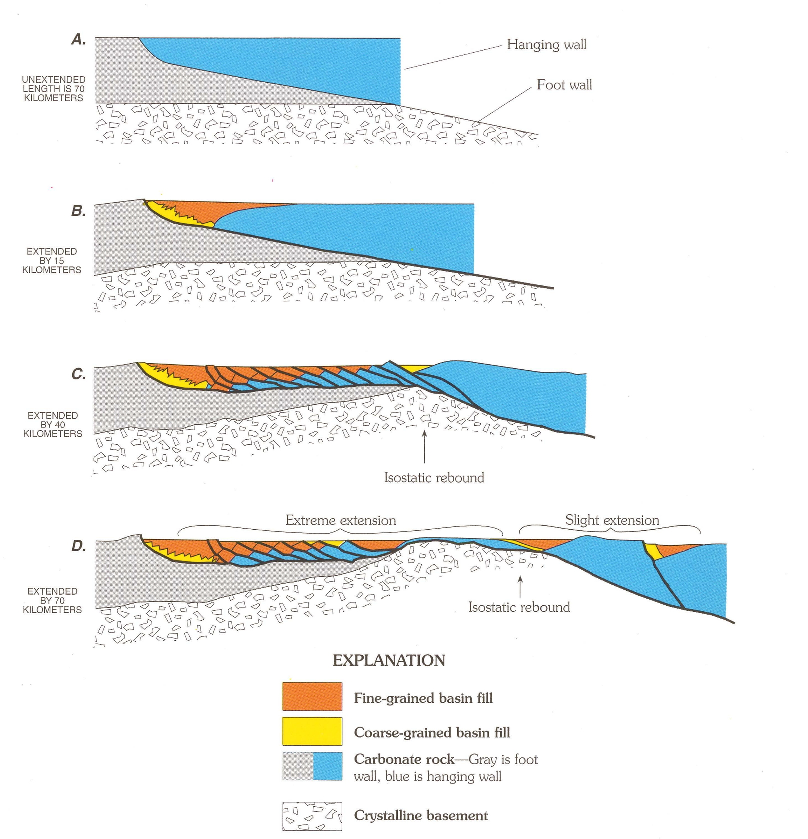


Figure 2. Diagrammatic geologic sections showing hypothetical progressive extension of a crustal block. Modified from Wernicke (1985) and Hamilton (1988).

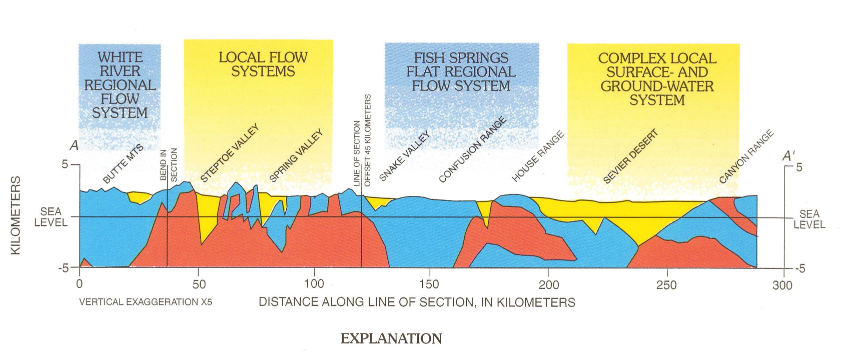


Figure 3. Generalized hydrogeologic section A–A′. Modified from Gans and Miller (1983) and Allmendinger and others (1987). Line of section is shown in figure 5. Bends in line of section east of offset (fig. 5) are too numerous to show above.

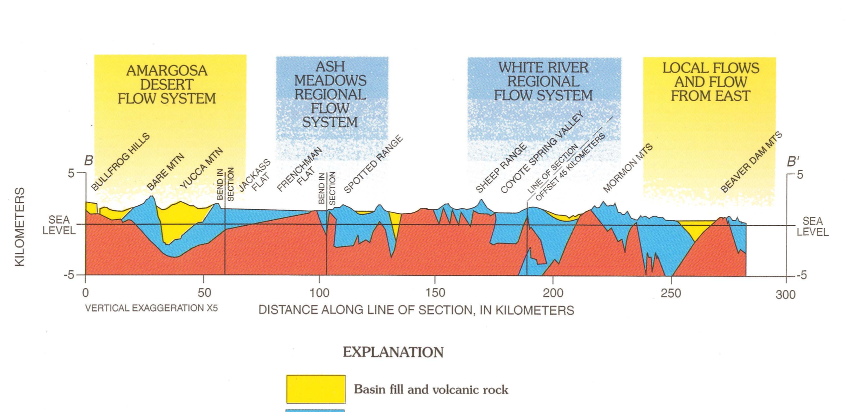


Figure 4. Generalized hydrogeologic section B–B′. Modified from Scott and Whitney (1987), Axen and others (1988), and Peter Guth (U.S. Naval Academy, written commun., 1988). Line of section is shown in figure 5.

HYDROGEOLOGIC FEATURES

Rock Types and Aquifer Characteristics

Several rock types in the eastern Great Basin are potential aquifers (Winograd and Thordarson, 1975, p. C10). Basin-fill deposits, volcanic rocks, and carbonate rocks all can be aquifers, but none of these rock types is everywhere an aquifer. Each contains poorly permeable zones that can be confining layers or barriers to ground-water flow, depending on their present structural orientation.

Basin-fill deposits commonly contain aquifers of sand and gravel hundreds to thousands of meters thick in structural basins underlain and separated by other rock types. The deposits are mostly unconsolidated to semiconsolidated, alluvial and lacustrine sediments that partly fill the basins. The oldest deposits may be partly or entirely consolidated and are slightly permeable. Sediments deposited under lacustrine, playa, or marshy conditions are much less permeable than coarse-grained alluvial deposits of some alluvial fans and stream flood plains.

Volcanic-rock deposits are hundreds to thousands of meters thick and contain highly permeable zones that can be aquifers. The permeability of these rocks strongly depends on joints and rock textures that developed as the rocks cooled after deposition (Winograd, 1971, p. 996). Volcanic-rock aquifers composed of tuffs and lavas are widespread around Tertiary calderas in central Nevada, near the Nevada Test Site, and in southwestern Utah.

Marine carbonate rocks, mainly dolomite and limestone, underlie much of the eastern Great Basin and once covered the entire region in layers as much as 10,000 m thick. These carbonate rocks were deposited on the continental shelf of North America during the Paleozoic era, and are permeable where fractured or partly dissolved. Impermeable clastic rocks in layers centimeters to hundreds of meters thick are interbedded with the carbonate rocks (Plume, 1996). The most hydrologically important clastic unit is a middle Paleozoic shale that is several thousand meters thick in central and south-central Nevada (Stewart, 1980, p. 28; Winograd and Thordarson, 1975, p. C11). This unit commonly acts as a barrier to regional ground-water flow. The carbonate rocks form important aquifers that integrate ground-water flow in regional multibasin systems for 400 km because they are thick, extensive, and permeable.

The Paleozoic rocks are underlain by Precambrian rocks that are generally impermeable to ground-water flow. The Precambrian rocks (often referred to as the hydrogeologic basement) consist of thick layers of quartzite and shale that overlie the older basement complex of Precambrian igneous and metamorphic rocks. The Precambrian rocks are intruded locally by younger plutonic rocks.

STRUCTURAL EXTENSION

The crust of the Earth beneath the northern Great Basin Province has been greatly stretched or extended during the past 35 million years (Allmendinger and others, 1987, p. 311). Holocene basin-and-range structures and remnants of middle Tertiary extension (described below) are results of that stretching and form the structured framework for aquifer distribution, especially in the carbonate-rock province of the eastern Great Basin. However, these structures were not considered in evaluations of the regional hydrology in that area because the structures were not well understood and are complex. Although no single interpretation of extensional structures is accepted universally, the following observations now are generally accepted:

(1) Traditional horst-and-graben structural models of the Basin and Range Province are applicable only locally and, on the basis of deep seismic-reflection data, "can be largely ruled out" as a regional model (Allmendinger and others, 1987, p. 316). The basins and ranges are remnants of extensional processes that operated at scales much larger than individual horst-and-graben structures.

(2) Much of the extreme extension is related to low-angle normal faults and associated high-angle faults during the middle Tertiary period (about 35 to 10 million years ago). Certain low-angle faults formed detachment surfaces that separated the extended and transported hanging-wall rocks from footwall rocks. Extension above detachments structurally thinned the sedimentary rocks that are important aquifers today.

(3) The eastern Great Basin can be subdivided into (a) broad areas of extreme extension where many effects of extreme structural thinning of the sedimentary rock section are evident, and (b) areas of slight extension, where the sedimentary-rock section is only slightly to moderately thinned (Wernicke and others, 1984, p. 473; Gans, 1987, p. 2).

The progressive extension of a theoretical crustal block, with most extension along a single detachment surface, is shown in figure 2. Geologic settings corresponding to each extension profile are found in the present Great Basin. Structural remnants of each stage of extension affect ground-water flow in aquifers in the eastern Great Basin.

Basins formed by extension include large, deep basins (left of center, fig. 2*B*); small, shallow, complexly deformed basins (center, figs. 2*C* and 2*D*); and moderately thick and simple basins on thick parts of the hanging wall (right of center, fig. 2*D*). Thus, the extent and thickness of basin-fill deposits are a direct consequence of extensional processes. Distribution of fine- and coarse-grained sediments in the fill also is dependent on the presence of high-relief mountain ranges in the extending hanging wall.

Volcanic rocks were extruded before, during, and after middle Tertiary extension. As a result, volcanic rocks commonly are interlayered with basin fill, and are tilted by extension. Flat-lying volcanic-rock aquifers are present throughout the region (Stewart, 1980, p. 92), but faulted, tilted sections of volcanic rock are common in areas of extreme extension.

The presence of extensive carbonate-rock aquifers in the eastern Great Basin depends on variations in extensional thinning. For example, the thick section of footwall and hanging-wall rocks probably is part of the original carbonate-rock section. In figures 2*C* and 2*D*, the thick section of carbonate rocks in the footwall is progressively separated from the thick part of the hanging wall by the isostatically rebounding footwall (Wernicke and Axen, 1988). Basement rocks commonly comprise much of the rebounding section and can impede ground-water flow from one thick section of carbonate rocks to another (left to right in fig. 2). Generally, the thick sections are beneath areas of slight extension and the numerous, tilted fault blocks and nearby exposures of the basement are beneath areas of extreme extension.

Faults are more abundant than shown in block diagrams (fig. 2) and the slightly extended areas contain many faults and fractures that provide paths for ground-water flow.

DESCRIPTION OF HYDROGEOLOGIC SECTIONS

Generalized hydrogeologic sections oriented across extensional structures in eastern Great Basin near latitudes 37° and 39° N. are shown in figures 3 and 4 (lines of section are shown in fig. 5). These sections show the general distribution of aquifers and large-scale effects of extensional thinning on the carbonate-rock aquifers. Before extension, carbonate rocks beneath both sections were at least several kilometers thick, and as much as 10 km thick.

Basin-fill deposits are generalized in these diagrams, but some deep basins are shown (for example, the Sevier Desert basin in fig. 3). The deepest sediments in these basins are commonly semi-consolidated and fine-grained, and probably restrict regional ground-water flow.

Section *A–A′* (fig. 3) shows thick, continuous masses of carbonate rock beneath the Butte Mountains, the Confusion Range, and the Canyon Range (which marks the eastern edge of the Great Basin Province). The first two of these thick sections contain the major regional ground-water flow systems in the eastern Great Basin at this latitude:

(1) The **White River system of eastern Nevada** (Eakin, 1966; Welch and Thomas, 1984; Kirk, 1987), in which southward flow totals 120 hm^3/yr, and

(2) The **Fish Springs Flat system of western Utah** (Gates and Kruer, 1981, p. 31; Carlton, 1985), in which northward flow totals about 103 hm^3/yr.

These ground-water systems include flow in basin-fill and carbonate-rock aquifers (and possibly in volcanic-rock aquifers) over large distances and through many topographic basins.

The zone between these two regional ground-water flow systems contains thin, discontinuous blocks of carbonate rock and poorly permeable quartzites, shales, and underlying crystalline basement. This area contains two closed-basin flow systems (Steptoe and Spring Valleys) and one system (Snake Valley) that discharges by local evapotranspiration from the basin floor and leakage into the Fish Springs Flat system. Farther east, thick basin fill in the Sevier Desert may impede east–west flow in the carbonate rocks and is the location of complex surface- and ground-water interactions around Sevier River and Lake.

Section *B–B′* (fig. 4) shows thick carbonate-rock masses beneath the Spotted Range and Coyote Spring Valley of southern Nevada. Farther north (about latitude 38° N), the thick sections of carbonate rocks beneath Coyote Spring Valley contain the **White River ground-water flow system**. Water flows south through the thick carbonate rocks at Coyote Spring Valley toward the terminal discharge area for the flow system, at Muddy River Springs (44 hm^3/yr). The thick carbonate rocks beneath the Spotted Range may transmit flow (9 hm^3/yr) that enters the **Ash Meadows flow system** from the White River ground-water flow system near Pahranagat Valley (Winograd and Thordarson, 1975, p. C110).

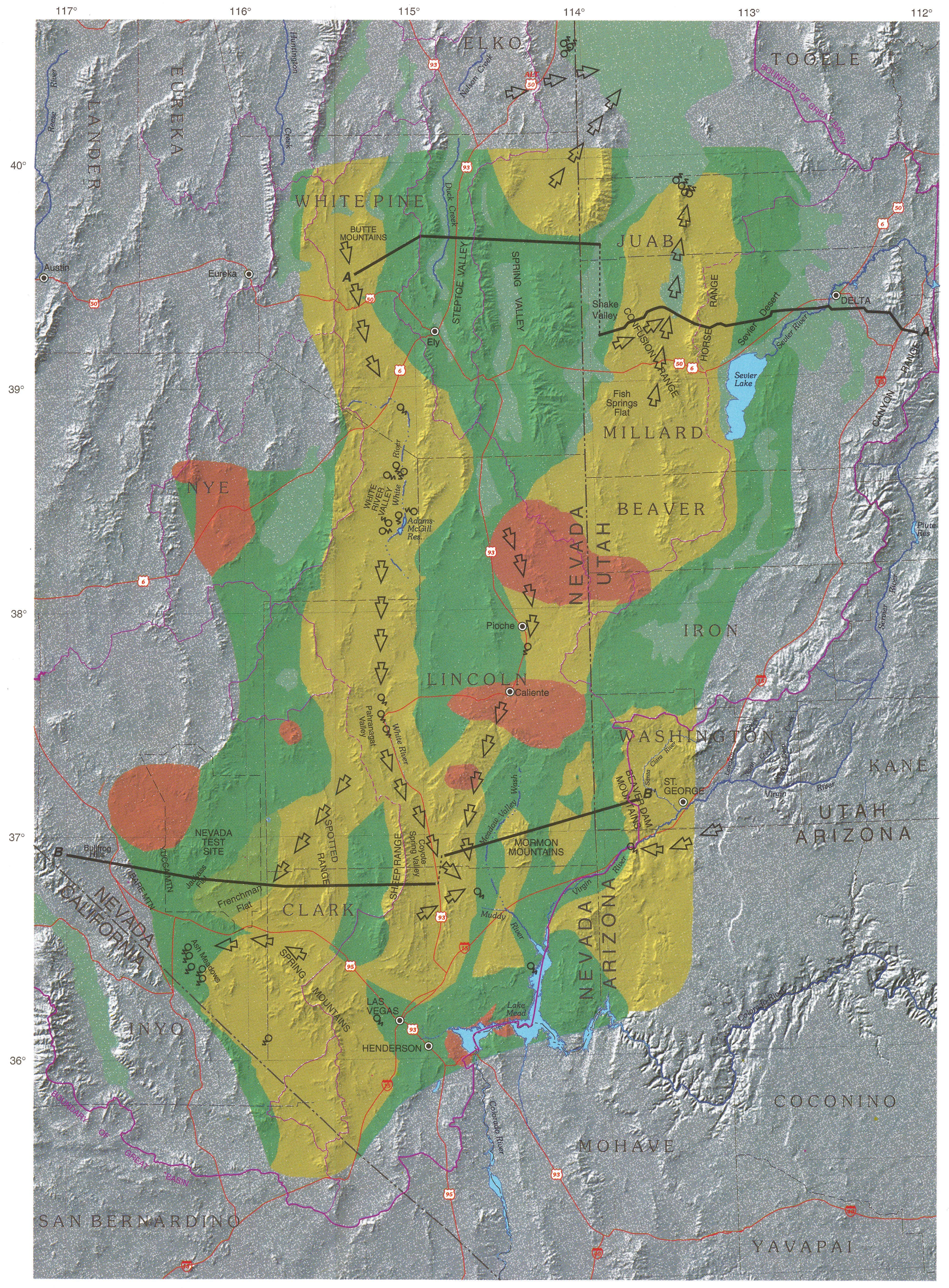
Other thick carbonate-rock sections at this latitude (at Bare Mountain, possibly Frenchman Flat, and Mormon Mountains) seem to be isolated from nearby regional aquifers by shallow buried and exposed Precambrian basement and Tertiary calderas surrounding them on all sides but especially to the north and south. Areas underlain by these isolated blocks, and the intervening areas of thin (or no) carbonate rocks, contain little or only local ground-water flow (Dettinger, 1989, p. 13).

Thus, regional ground-water flow systems at these latitudes are contained mostly in areas where carbonate rocks are thick, continuous layers. These layers form extensive and regionally integrated aquifers, and are remnants of areas of slight extension. Areas of extreme extension separate the thick carbonate-rock aquifers and regional flow systems, and contain flow systems in basin-fill aquifers, in individual basins, or in local aquifers confined to individual mountain blocks.

STRUCTURALLY EXTENDED TERRAINS AND GROUND-WATER FLOW SYSTEMS

The relation between patterns of regional flow and patterns of extension in the eastern Great Basin is shown in figure 5. The extended terrains are complex and heterogeneous geologic settings, each with unique local and regional characteristics. However, although many properties of the different areas probably influence flow, the broadest and simplest hydrogeologic influences of these areas may be the variations in thickness and continuity of the carbonate-rock aquifers associated with the terrains. Regionally, in areas of extreme extension, carbonate rocks that elsewhere serve to connect and integrate flow in basin-fill and volcanic-rock aquifers have been themselves extended and removed. In areas of slight extension, carbonate rocks are thick, continuous aquifers that allow for broadly integrated flow. The bounds of these terrains commonly mark divides between deep regional and shallow local ground-water flow. For example, large regional springs discharge from lower ends (as opposed to middle sections) of several of the regional flow systems near (at the scale considered here) the boundaries between areas of slight extension and areas of extreme extension. Water discharging from these springs derives from recharge areas connected to them by tens to hundreds of kilometers of thick carbonate-rock aquifers. Regional springs that discharge from the middle areas of the regional flow systems tend to be aligned near recent active faults in the carbonate-rock aquifers within the areas of slight extension. Within the areas of extreme extension, ground-water discharge is typically from mountain-front springs and from broad areas of evapotranspiration on basin floors.

Thus, current geologic concepts and models of extension and extensional remnants in the eastern Great Basin appear to provide a simple, broad-scale, hydrogeologic framework for understanding and evaluating regional ground-water flow.



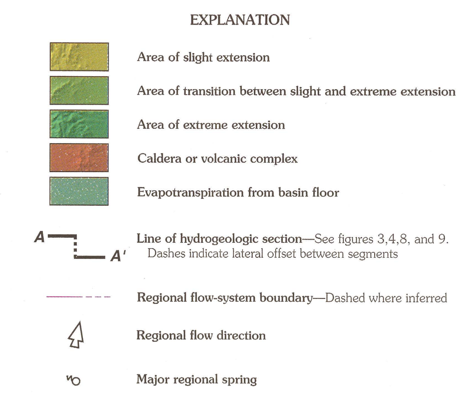


Figure 5. Location of extended terrain and ground-water flow systems.

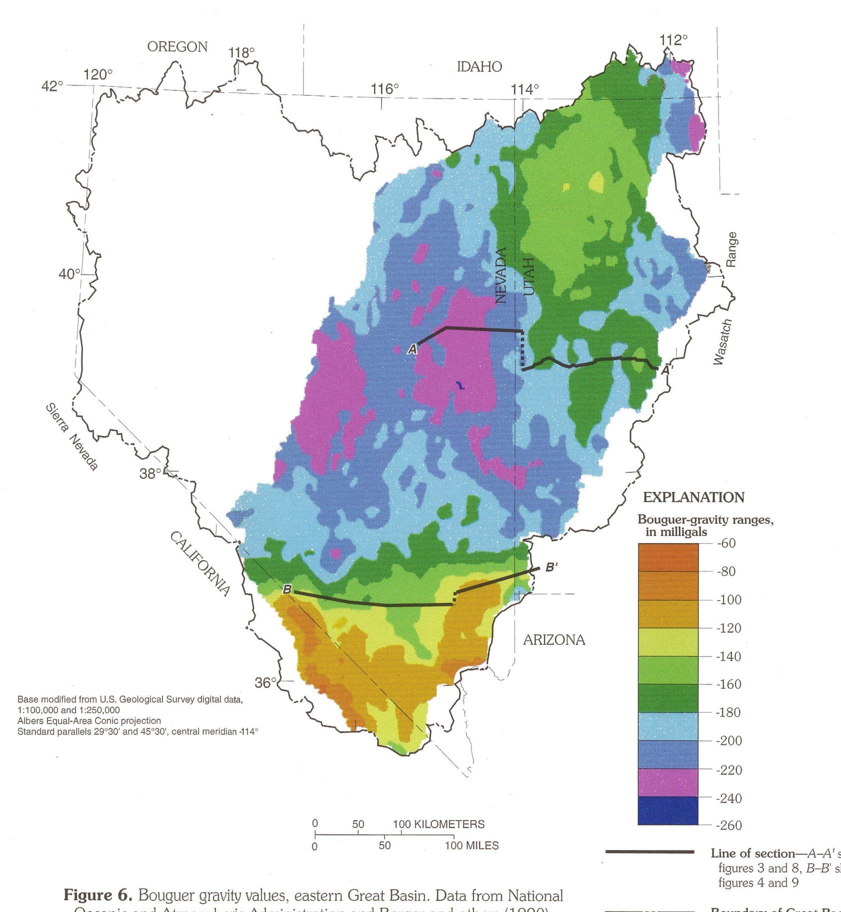


Figure 6. Bouguer gravity values, eastern Great Basin. Data from National Oceanic and Atmospheric Administration and Berger and others (1990).

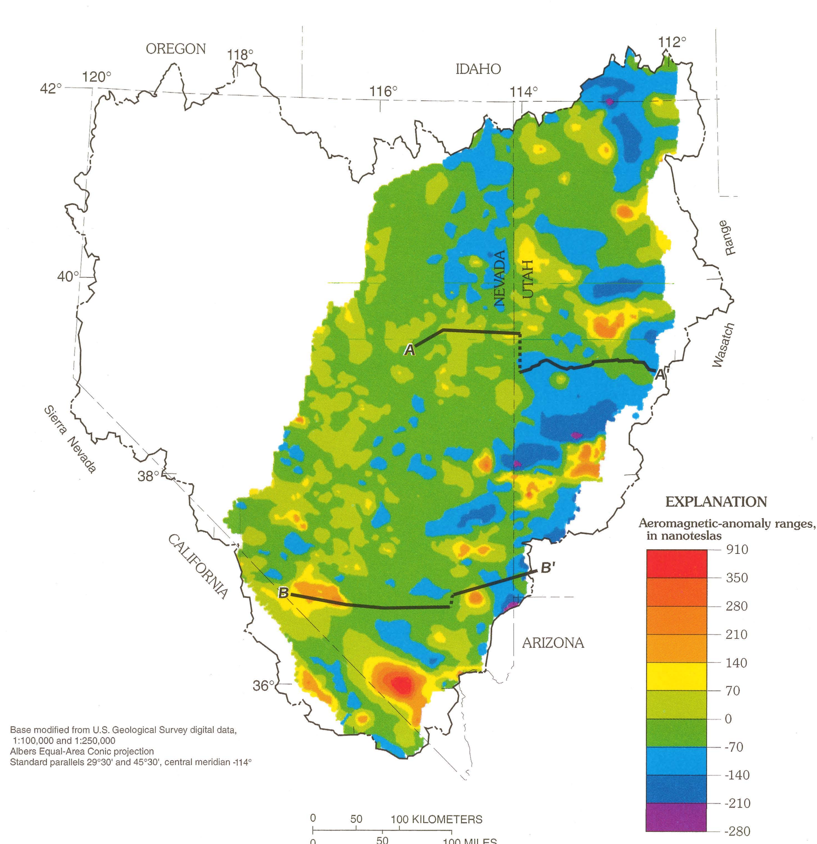


Figure 7. Aeromagnetic anomaly values, eastern Great Basin. Data from Hildenbrand and others (1983).

TESTING THE INFERRED DISTRIBUTION OF CARBONATE-ROCK AQUIFERS

The geologic sections and maps of structurally extended terrain (figs. 3–5) are generalizations of detailed geologic sections developed by Gans and Miller (1983, fig. 7 and fig. 21), Allmendinger and others (1987, fig. 8), Scott and Whitney (1987), and Axen and others (1988) on the basis of field mapping and geophysical measurements of the structural remnants of extensional tectonics. For this report, gravity and aeromagnetic profiles have been constructed to test the conceptual model of geology and hydrology.

Gravity modeling methods can be used to determine thicknesses of geologic units of differing densities. The modeling process usually involves constructing a profile of measured gravity values across the area of interest. A coincident generalized geologic section consisting of rock types and thicknesses is similarly constructed. Initial estimates of density and thickness for the various geologic units are entered in a mathematical model that calculates the resulting gravity field. This calculated gravity profile is compared with the measured gravity profile and an iterative process of adjusting rock densities and thicknesses is done by the model until a reasonable fit is achieved. The degree of reasonableness of the fit is subjective and usually is based on the needs of the modeling project.

Aeromagnetic modeling is a similar process, but aeromagnetic data respond to magnetic susceptibility of the rocks. Magnetic susceptibility is the degree to which a material can be magnetized. Volcanic and crystalline basement rocks have a high susceptibility, whereas basin-fill deposits, carbonate rocks, and most clastic rocks have a low susceptibility.

The iterative modeling process for aeromagnetic data is similar to the one used for gravity data. Because the gravity modeling is useful for determining basin-fill thickness (if the basin is underlain by denser rock) and the aeromagnetic modeling is useful in determining carbonate-rock thickness (if the carbonates are underlain by more magnetic rock), the two processes can be combined to give an indication of stratigraphic thicknesses.

Analysis of Geophysical Data

Geophysical data were analyzed and geophysical profiles constructed for comparison to the conceptual model of ground-water flow. The gravity profiles provide an indication of basin-fill thickness and bedrock topography. The aeromagnetic profiles provide an indication of carbonate-rock thickness and of the extent of igneous rocks.

Gravity Data

Gravity data used for this study were obtained from several sources. Most of the data were from the National Oceanic and Atmospheric Administration (NOAA) National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo. The data set was compiled from approximately 1,869,000 gravity measurements made throughout North America (NOAA, written commun., 1989). In addition to those data, approximately 200 gravity measurements were made in southern Nevada as part of this study (Berger and others, 1990).

Terrain corrections of the NOAA data set were made by computer and manually. Terrain corrections of the other data were made ually. Correction of the NOAA data set is described by O'Hara and Lyons (1985). Reductions of data collected for this study include manual terrain corrections from the gravity station radially outward to a distance of 2.25 km. Terrain corrections of data from 2.25 outward to 167 km were done by computer (Plouff, 1977) using digitized topographic maps. The procedure is described by Berger and others (1990, p. 2).

The corrected data set was edited to include only the eastern Great Basin and was reformatted to a 4-km grid spacing. The gravity values were plotted. A color map of the values is shown in figure 6. The gravity values in this data set range from about -260 to about -60 mGal. This figure shows the complexity of the gravitational pattern of the eastern Great Basin. Gravity lows (large negative values) are shown in cool colors (blues and greens). Gravity highs (small negative values) are shown in warm colors (reds and yellows).

Gravity data along cross sections *A–A′* and *B–B′* were extracted from the regional data set shown in figure 6. Measured gravity profiles in figures 8 and 9 are based on data at 2-km intervals along the profile and are residual-gravity values (regional gravity effects removed). Where the lines of profile are offset, data were compiled in separate steps to make one continuous profile. The offset in the section causes some error in values at the ends of the profile. These effects were manually corrected and smoothed.

Aeromagnetic Data

The aeromagnetic data were from the USGS Branch of Regional Geophysics, Denver, Colo. Aeromagnetic data are synthesized on a 2-km grid from available data in the Great Basin (Hildenbrand and others, 1983, p. 1). The data were reduced to a common flight altitude (3,810 m above sea level) and the International Geomagnetic Reference Field (IGRF) was removed. Additional information on the procedures for reduction of aeromagnetic data is described by Hildenbrand and others (1983, p. 1).

The 2-km grid was reduced to a 4-km grid to correspond with the gravity data. The map of aeromagnetic anomaly values is figure 7. Magnetic values in the entire data set range from about -660 to about 1,225 nanoteslas. The map of aeromagnetic anomaly values for the eastern Great Basin is more complex than the gravity map. The two maps have almost no similarities. One contrast is the large variation of the magnetic field in comparison to the relatively smooth transitions of the gravity field.

Profiles were extracted from the aeromagnetic data in a manner similar to that used for extraction of the gravity profiles. The resultant aeromagnetic profiles are shown in figures 8 and 9.

Hydrogeologic Sections and Geophysical Modeling

In figures 8 and 9, residual-gravity profiles indicate moderate to deep alluvial valleys by large negative (downward) spikes. Gravity profiles are most useful for determining the thickness of basin fill and for defining bedrock topography. Magnetic profiles indicate local igneous features by large positive (upward) spikes. Aeromagnetic profiles are useful primarily for determining the thickness of the relatively nonmagnetic carbonate rock where it overlies more magnetic, areally extensive, crystalline basement, and for identifying the subsurface extent of granitic intrusive rock.

The strong effects of bedrock topography on the respective potential fields severely limit any direct correlations between the extensional-terrain map (fig. 5) and the geophysical maps (figs. 6 and 7). That is, the potential fields must strongly relate to geologic characteristics that are not unique to one geologic (extended) terrain or another. Thus, at a regional scale, the geophysical fields shown do not uniquely relate regional hydrogeologic conditions to extensional remnants. However, a corridor of green (moderate) susceptibilities extends beneath the White River Valley and Ash Meadows systems (and corresponding areas of slight extension) from section *A–A′* to section *B–B′* in figure 7. The northern half of the Fish Springs Flat fault system (and its corresponding area of slight extension) is underlain also by a corridor of apparently thick nonvolcanic and nonplutonic rocks. At the scale of figure 6, by contrast, gravity anomalies are more dominated by regional contrasts in bedrock topography and overall crustal thickness than by local structures (Hildebrand and others, 1983, pl. 1).

A more detailed interpretation of the geophysical fields is necessary to interpret the hydrogeologic conditions related to extensional remnants. The hydrogeologic sections in figures 3 and 4 were further generalized for comparison with corresponding geophysical profiles and are shown in figures 8 and 9. Only basin-fill deposits, volcanic rocks, carbonate and clastic rocks, and crystalline basement were represented in the geophysical models. These units are depicted as individual bodies on the model cross sections. Each body has a unique geometry and set of physical properties. The model for section *A–A′* consists of 18 separate bodies, and is complex. The model for section *B–B′* has nine bodies and is simpler.

The two geophysical models were analyzed using a computer program called SAKI (Webring, 1985). The program is a gravity and magnetic inversion program that synthesizes a structural cross section as a series of two-dimensional prisms. An inversion model takes a gravity or magnetic profile and develops a series of bodies within which the calculated gravity and magnetic fields closely resemble the measured field profiles. How closely the measured and calculated fields must match before iterations cease is decided by the user on the basis of geologic knowledge of the area.

The major assumption of the modeling process is that the actual physical system can be described adequately by the model. Generally, the assumption is valid, especially in a regional setting such as the eastern Great Basin, where only broad-scale features are of interest.

Input to the two inversion models consisted of the geophysical models, including density and magnetic contrasts among bodies, and the measured magnetic and gravity values. Physical properties for the bodies of the two sections are listed in tables 1 and 2. The tables list the output values for bodies of the two cross sections, which did not differ significantly from the initial estimates.

SAKI computes magnetic and gravity fields resulting from the bodies in the sections. These computed fields allow comparison between the measured and calculated geophysical profiles. The user can adjust the geometry or change the physical properties of the model during the modeling process. Changes in the physical properties can be specified by the user, or the program can be set to automatically change some or all of the properties by matching measured and calculated geophysical profiles as closely as possible to observed profiles.

The geometry of the model was not changed during the modeling of the two cross sections. The program, however, was set to adjust the physical properties of the bodies, usually a few bodies at a time. During the modeling, the physical properties were constrained within acceptable values for the hypothesized rock types of the bodies.

In figures 8 and 9, the measured and calculated magnetic and gravity fields do not match perfectly, especially where the models are complex or plutonic-metamorphic processes are superimposed on the fields. However, the curves do match over broad areas, indicating that the models are similar for broad features. To reproduce the broad zone of low aeromagnetic susceptibility in the middle of section *B–B′*, a broad zone of thick nonvolcanic rocks was assumed for the profile segment between 100 and 200 km (fig. 9). This zone may include thick sections of carbonate rock, or Precambrian and lower Cambrian clastic rocks, or most likely both. Alternatively, this broad low may be a dipolar reflection of the enormous high beneath the southern Spring Mountains, and thus may not be related to the local rock types. If so, SAKI cannot be expected to reproduce it. The goal herein was not to obtain a perfect match, but rather to test the similarities of the geologic sections in figure 3 and figure 4. The major problem with geophysical models is that solutions are not unique. Many combinations of body geometries and physical properties yield similar calculated gravity and magnetic fields, but only one combination correctly describes the geologic setting. Geophysical modeling, therefore, must be used where the particular geologic models are constrained by current geophysical data. Additional information, such as that obtained by drilling deep test holes, can be used to constrain the model further, and ultimately to produce unique solutions.

CONCLUSIONS

Regional ground-water movement in the eastern Great Basin is dominated by flow through thick Paleozoic carbonate-rock aquifers. The distribution of these rocks and aquifers is largely a result of late Cenozoic structural extension and consequent thinning of sedimentary-rock sections in parts of the region.

Geologic descriptions of extensional remnants in the eastern Great Basin show numerous geographic parallels between structurally extended terrain and regional ground-water flow systems. In particular, some large areas of slight extension underlie major ground-water flow systems and may connect the upgradient, recharge-rich parts of these systems with their distal, discharge areas. Other areas of slight extension are not connected to recharge areas and contain only minor or local ground-water flow systems. Areas of extreme extension generally underlie single-basin flow systems that discharge from broad areas of basin fill. Conceptual models of extensional features provide simple hypotheses for explaining the connections between regional-flow patterns and structurally extended terrains.

Analysis of gravity and aeromagnetic profiles indicates a general correlation between large-scale extensional features and the regional ground-water flow system. The geologic framework described in this atlas, therefore, can be used in evaluation of ground-water resources in the eastern Great Basin. Although the structural framework of aquifers in the Great Basin is complex, this atlas shows that remnants of structural extension are particularly important in determining ground-water flow conditions.

These conceptual geologic models are supported by geophysical modeling to reproduce measured gravity and magnetic fields. Calculated gravity and aeromagnetic profiles along two geologic sections match the observed profiles adequately, and the agreement could be improved by minor adjustments of the body dimensions and properties.

Patterns of extension in the eastern Great Basin can no longer be regarded as unknown or random; they are mappable and, to some extent, identifiable at many scales. Understanding patterns and processes of extension is necessary for adequate understanding of water resources in all aquifers in the region because of their effect on regional hydrology.

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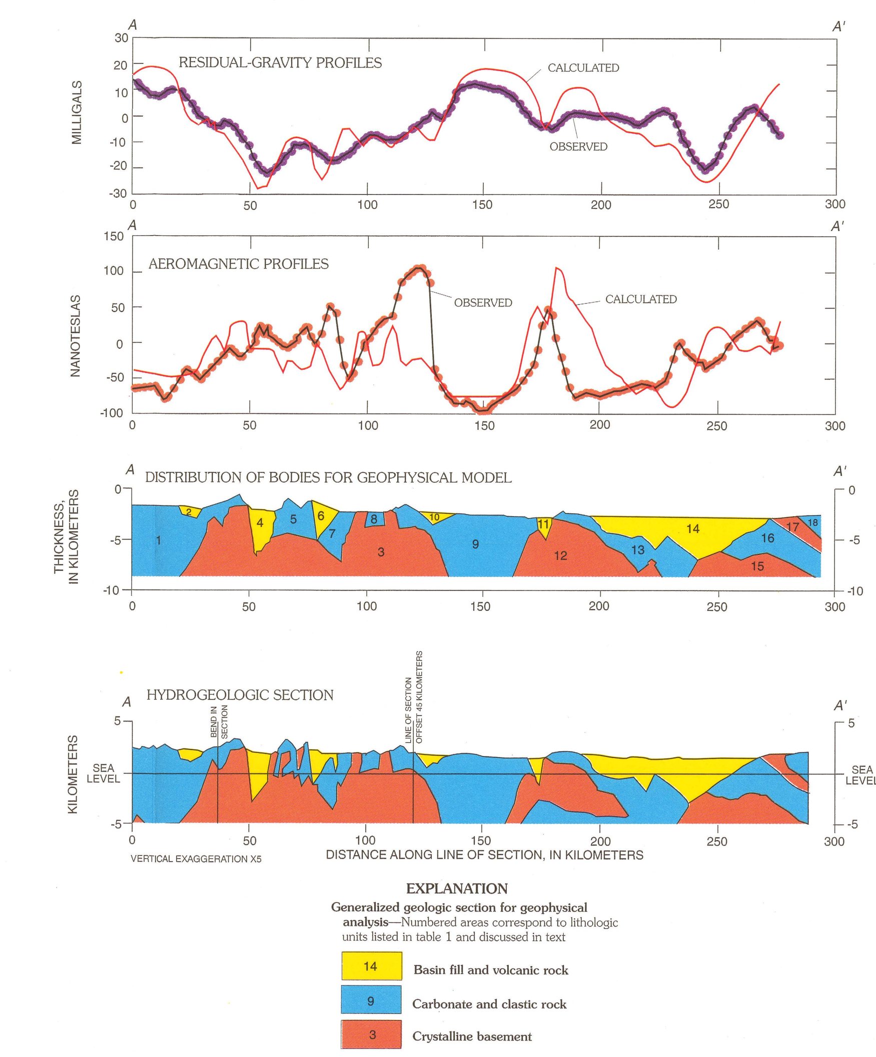

Figure 8. Geologic and hydrogeologic profiles along line of section *A–A′*.

Table 1. Physical properties of bodies for geophysical model of section *A–A′*, eastern Great Basin

Body No.	Lithologic unit	Density (grams per cubic centimeter)	Magnetic susceptibility (centimeter-gram-second units)
1	Carbonate rocks	2.72	$1.0x10^{-6}$
2	Basin fill	2.27	$1.0x10^{-6}$
3	Crystalline basement	2.57	$7.6x10^{-4}$
4	Basin fill	2.42	$6.7x10^{-4}$
5	Carbonate rocks	2.67	$1.7x10^{-4}$
6	Basin fill	2.38	$4.4x10^{-4}$
7	Carbonate rocks	2.62	$1.0x10^{-6}$
8	Carbonate rocks	2.62	$1.0x10^{-6}$
9	Carbonate rocks	2.62	$1.0x10^{-6}$
10	Basin fill	2.27	$1.0x10^{-6}$
11	Basin fill	2.27	$1.0x10^{-6}$
12	Crystalline basement	2.67	$2.0x10^{-3}$
13	Carbonate rocks	2.77	$1.0x10^{-6}$
14	Basin fill	2.37	$1.0x10^{-6}$
15	Crystalline basement	2.67	$3.0x10^{-3}$
16	Carbonate rocks	2.72	$1.0x10^{-6}$
17	Crystalline basement	2.67	$3.0x10^{-3}$
18	Carbonate rocks	2.72	$1.0x10^{-6}$

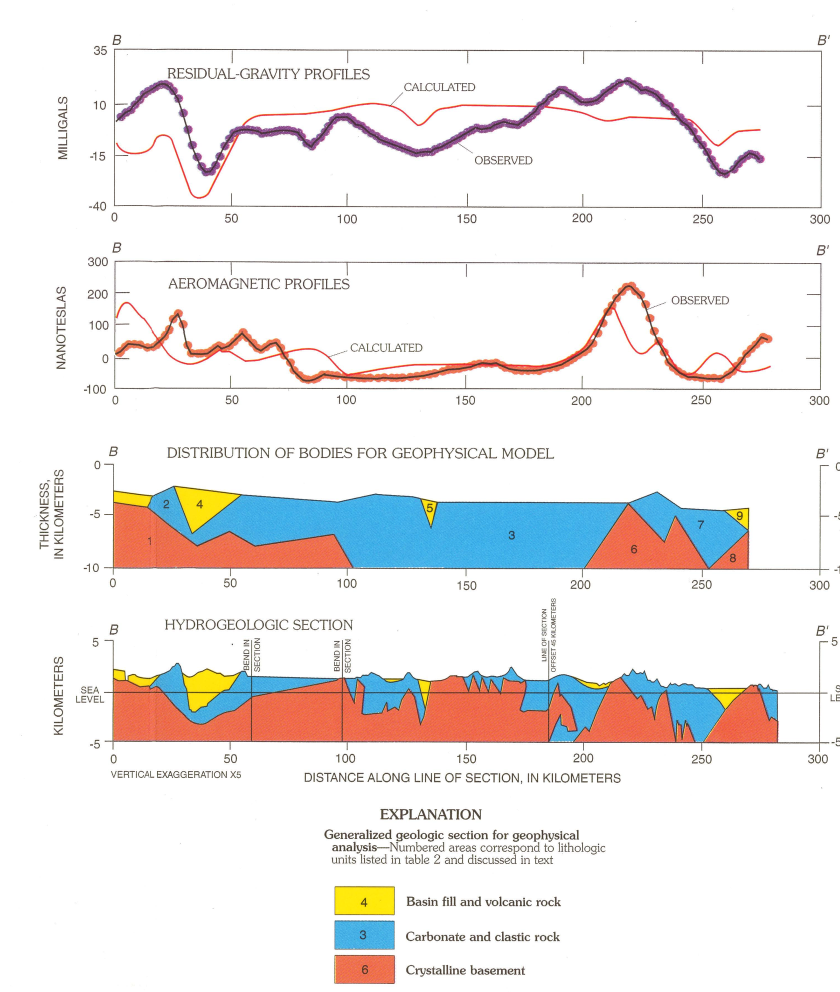

Figure 9. Geologic and hydrogeologic profiles along line of section *B–B′*.

Table 2. Physical properties of bodies for geophysical model of section *B–B′*, eastern Great Basin

Body no.	Lithologic unit	Density (grams per cubic centimeter)	Magnetic susceptibility (centimeter-gram-second units)
1	Crystalline basement	2.67	$3.0x10^{-3}$
2	Basin fill	2.27	$1.0x10^{-6}$
3	Interbedded carbonate and clastic rock	2.72	$1.0x10^{-6}$
4	Basin fill	2.27	$1.0x10^{-4}$
5	Basin fill	2.27	$1.0x10^{-4}$
6	Crystalline basement	2.67	$3.0x10^{-3}$
7	Carbonate rocks	2.72	$1.0x10^{-6}$
8	Crystalline basement	2.67	$3.0x10^{-3}$
9	Basin fill	2.17	$1.0x10^{-5}$

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To Obtain
meters (m)	3.281	foot
kilometers (km)	0.6124	mile
cubic hectometer per year (hm^3/yr)	810.7	acre-foot per year

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929) — a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

HYDROGEOLOGY OF STRUCTURALLY EXTENDED TERRAIN IN THE EASTERN GREAT BASIN OF NEVADA, UTAH, AND ADJACENT STATES, FROM GEOLOGIC AND GEOPHYSICAL MODELS

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