UTAH GEOLOGICAL & MINERAL SURVEY

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SILVER CREEK JUNCTION

Excavation Yields Vertebrate Fossil Assemblage

Several years ago, in an effort to drain an area at Silver Creek Junction, Summit County, Utah, for subdivision, a land developer unearthed a vertebrate fossil assemblage the same age as the classic Rancho La Brea deposit in Los Angeles, California.

Jeff Lewis, working out of Arizona, notified the University of Utah of his find, and generously cooperated with scientific personnel once they arrived.

Under the Salvage Act, which provides funds for scientific excavation and removal when a road runs through a paleontological site, James H. Madsen, Jr., Assistant Research Professor and Curator, Department of Geological and Geophysical Sciences, University of Utah, collected the specimens: thousands of teeth and bones from skeletons of extinct and extant animals.

The abandoned water hole, however, did not yield any complete skeletons.

The specimens were placed on loan in 1972 to Wade Miller, Professor of Zoology, Brigham Young University, in a cooperative study between the University of Utah and Brigham Young University, to identify the fossils to the species level and to study them in terms of prevailing climatic conditions.

Dr. Miller recently released the following preliminary faunal list. More than 40,000 years are represented by the specimens.

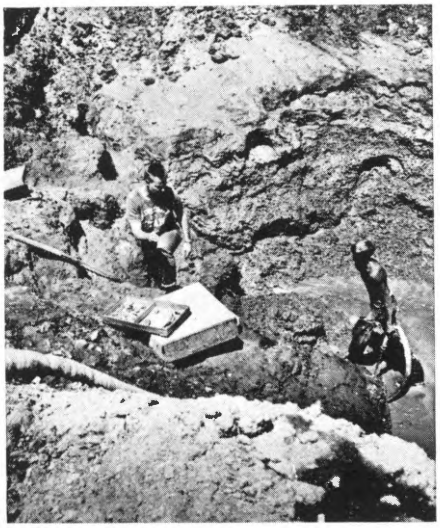
Amphibians
- *Rana* sp. (frog)

Birds
- *Anas* cf. *centrocercus* (sage hen)

Mammals
- *Sorex* cf. *palustris* (shrew)
- *Paramylodon* cf. *harlani* (ground sloth)*
- *Sylvilagus* sp. (cottontail)
- *Lepus* sp. (jackrabbit)
- *Citellus* sp. (ground squirrel)
- *Eutamias* (chipmonk)
- *Thomomys* sp. (pocket gopher)
- *Peromyscus* sp. (white-footed mouse)
- *Ondatra* cf. *o. zibethicus* (muskrat)
- *Phenacomys* sp. (vole)
- *Microtus* sp. (vole)
- *Erithizon* cf. *E. dorsatum* (porcupine)
- *Mustela* sp. (weasel)
- *Taxidea taxus* (badger)
- *Lynx* sp. (bobcat)
- *Smilodon* sp. (saber-tooth cat)*
- *Mammuthus* sp. (mammoth)*
- *Equus* sp. (horse)
- *Camelops* cf. *hesternus* (camel)*
- *Bison ? latifrous* (giant bison)*

* Extinct.

Below: Workers remove bones from excavation. *Top right:* James Madsen examines washed specimens. *Bottom right:* Natural water at diggings is re-circulated to unearth specimens.



The project, besides the obvious scientific advances, demonstrates cooperation between the community and the university, and the successful application of salvage monies.

UGMS TRANSFERS

Governor Appoints Survey Board

The recent transfer of Utah Geological and Mineral Survey to the Department of Natural Resources involved a reorganization of the Survey's advisory board.

Seven members of the new board were appointed by the governor, with the advice and consent of the senate: one is knowledgeable in the field of geology as applied to the practice of civil engineering; four represent various segments of the mineral industry (such as hydrocarbons, solid fuels, metals, and industrial minerals), one reflects the economic or scientific interests of the mineral industry in the state, and one is from the public at large.

They are: Robert W. Bernick, Vice President–Marketing, Walker Bank and Trust Co. (economic interests); Benton Boyd, Vice President and General Manager of Western Operations, U. V. Industries (solid fuels); Mrs. Philip A. Mallinckrodt (public at large); Paul M. Dougan, Secretary, Equity Oil Company (hydrocarbons); Dean D. Kerr, Manager of Process Control Improvement, Utah Copper Division, Kennecott Copper Corporation (metals); Ned F. Parson, Jack P. Parson Construction Co. (industrial minerals); and William E. Mead, Consulting Partner, Dames and Moore (geology as applied to civil engineering).

Gordon Harmston, Executive Director, Department of Natural Resources, and Charles Hansen, Director, Division of State Lands, will serve as *ex officio* members.

In their first meeting held July 16, Dean D. Kerr was elected chairman and Paul M. Dougan, vice chairman, of the Board.

Mineral Demand Outstrips Development

by Carlton Stowe
UGMS Information Specialist

The energy crisis is no surprise. Authorities have forewarned consumers, legislators, and newsmen for 20 years; only now everyone senses the immediacy of the crisis and everyone is concerned.

A tremendous outgrowth of experts, specialists and instant scientists has evolved; Congress reacts by passing a national energy research and development policy, and national development and environmental protection acts.

Yet a crisis in mineral development looms as great, if not greater, than the crunch now affecting the energy needs of the U. S.

In the first annual report under the Mining and Minerals Policy Act of 1970, the Secretary of the Interior states:

U. S. demand has outstripped development of domestic resources;

Imports to make up the differences are growing and affect the nation's economy and balance of payments as well as our incentive to encourage our domestic mineral industries;

The atmosphere to develop our own potential resources is lacking, and

Environmental improvement programs are not yet in balance with our technology and supply needs (italics added).

Increased consumption of all minerals, with corresponding increases in imports and metal prices, is currently being met by only slight production increases.

A study of U. S. Bureau of Mines data for the first part of 1973 underlies the problem:[1]

Copper consumption recorded a 4 percent increase in March over February, with 221,700 tons used in this country, the largest monthly quantity since World War II. Most of the increase took place at the brass mills. The 151,500 tons of production at the mines is the highest recorded since May 1970, indicating the increase the refineries and smelters see is necessary to meet demand. Producer stocks of refined copper, however, were drawn down in March to the lowest level since the 1971 copper strike. Net imports increased from 18,500 to 21,500 tons while exports decreased from 15,600 to 12,300 tons. The price of copper increased 4 cents to 60-60¼ cents a pound.

A drop of 10,400 tons in metal imports in March led to a 7 percent decrease in the new supply of lead. Smelter and refinery metal production was virtually unchanged compared with output in February. Reported consumption of lead increased 10,400 tons to 128,500 tons, a new monthly record. In the first quarter of this year, the new supply of lead increased about 6 percent, whereas metal consumption was up about 8 percent over the corresponding period in 1972. Mine production of lead dropped 9 percent in March to 44,800 tons, the smallest monthly output since February 1971. Lead prices advanced from 15 to just slightly over 16 cents per pound.

Zinc consumption statistics show a 9 percent increase for March over February to a total of 131,090 tons. The increase in usage was in zinc-base alloys for galvanizing, brass and bronze, and rolled zinc and zinc oxides. Mine production of 39,120 tons was an increase over February, but actual stocks held by producers decreased 3 percent to 30,398 tons. In April, stocks were further reduced to 28,071 tons. Producer price for zinc now stands at 20.5 cents per pound.

. . . In the platinum group metals, production dropped 43 percent in the first quarter of 1973. During the same period, imports rose 76 percent, while exports dropped 33 percent. Industrial consumption rose 14 percent, and stocks were down 7 percent. In gold, where the U. S. Government still clings to an official price of $42 an ounce compared to around $115 on the world market, domestic production was 2 percent lower than in February. Imports were down 33 percent from those in February, with exports up.

Silver production was up slightly at the end of March and the beginning of April compared to January and February 1973. However, production is 14 percent less than in March 1972. Molybdenum production declined over 1 percent compared to the same period of 1972. Exports nearly tripled, and internal consumption rose substantially due to increased use in steel products.

Among the precious metals, silver poses the biggest problem as far as the metal crisis is concerned. Gold is making the headlines, but its use is still primarily as money with very little industrial use. Silver, while used as money, is more than that. It is a valuable, indispensable and irreplaceable metal used in products which have become necessities in our everyday lives.

[1] Mineral industry surveys, U. S. Bureau of Mines, May 1973.

Survey Releases Latest Studies

The Utah Geological and Mineral Survey has released the following publications for sale (available at UGMS' Publications Office, 103 Utah Geological and Mineral Survey Bldg., University of Utah, Salt Lake City, Utah, by mail or over-the-counter; add 10 percent for handling if ordering by mail).

Special Studies 44, "Lead and Zinc Resources in Utah," by Allan H. James ($3.00). The study, funded jointly by the Four Corners Regional Commission and UGMS, projects potential lead-zinc production in Utah and focuses on occurrence, costs and prices of reserves. It is organized around the collection, analysis and evaluation of past production and potential resources of lead and zinc ores in Utah.

Bulletin 99, "Mineral Deposits of the Deep Creek Mountains, Tooele and Juab Counties, Utah," by K. C. Thomson ($4.50). The Deep Creek Range is a potential producer of gold, silver, lead, copper, tungsten, beryllium and mercury. The study divides the range into three mining areas, exclusive of Gold Hill, and maps and assay data are given. Geochemical and magnetic surveys were conducted over the southern Clifton area. Nonmetallic mineral deposits and water resources throughout the range were investigated.

Bulletin 100, "Petrology, Geochemistry and Stratigraphy of Black Shale Facies of Green River Formation (Eocene), Uinta Basin, Utah," by M. D. Picard, W. D. Thompson and C. R. Williamson ($2.50). The black shale facies of the Green River Formation is the most productive rock unit along the Bluebell-Altamont-Cedar Rim trend, which eventually might produce a billion barrels of oil. The principal aims of the study are: to reconstruct the environments of deposition; to contribute to source bed studies; to deduce the geologic history of Lake Uinta during deposition of the black shale facies, and to increase understanding of this important productive interval in northeast Utah.

Bulletin 102, "Mineral Resource Potential of Piute County, Utah and Adjoining Area," by Eugene Callaghan ($6.00). The study, financed jointly by the Four Corners Regional Commission and UGMS, focuses on the geologic characteristics and production history and evaluates the production potential of the lead-zinc-silver, gold, uranium, manganese and iron, alunite and industrial mineral deposits of the region. It provides a basis for making decisions concerning economic development, industrial expansion and land use in the area.

Map 34, "Geologic map of the Marysvale region, Piute County and parts of adjoining counties, Utah," by Eugene Callaghan ($2.00). A single muticolored sheet shows the geology of the Marysvale region.

Career of Service

LIBRARIAN RETIRES FROM U OF U

Edith Rich, Associate Professor of Library Science and Librarian of Physical Sciences and Engineering, University of Utah, retired last month. Her lifetime dedication to upgrade library services and to increase library collections, however, will continue in volunteer supervisory work for the Social Services Division of the LDS Church, and in organizing a library for a testing laboratory.

Miss Rich began her career in 1936 at Ricks College, Rexburg, Idaho; she came to the University of Utah in January 1947 from Utah State University, for a total of 35 years in library work.

The map collection she began in the early 1950's, the first in the Intermountain area to have a separate catalog, now contains more than 67,000 maps.

She assisted in the compilation of the bibliography of Utah compiled by Walter Buss in 1951 and in the edition updated by Sylvia Goeltz to 1970 (presently in press; both were published by UGMS), and compiled periodic lists of theses done at the University of Utah in geology and related subjects (available to 1972).

Her professional associations include Utah ALA Membership Committee Chairman, president of the Utah Library Association, and since 1963, ULA Historian.

Miss Rich's goal was to organize geologic materials in the library so that they were easily accessible. Her chief concern was to serve people so they could utilize time and resources most efficiently.

It was her practice to give every Ph. D. graduate in physical sciences and engineering a box of home-made peanut brittle. She reminisces that more probably remember her for her candy than her assistance in the capacity of librarian.

She says her "desk never was cleared off, but people were more important."

The Utah Survey staff, among all the other organizations and individuals who have utilized Edith Rich's talents and willingness to serve, recognize the contributions she has made and express their gratitude for the help she has been in the past years.

Industry and Society Develop

Progress Measured in Minerals[1]

Historians measure man's progress by his use of natural materials. The Stone Age was the time of tribal units and wood was the energy source. The Bronze Age—man still depended on wood for energy—saw the rise of feudal kingdoms. The Coal Age was the age of colonial empires.

Nonmetallic and industrial rocks and minerals show similar progress in usage.

Stones were used for cracking nuts, bones and heads; later, in the Paleolithic period, stones shaped by chipping and flaking were used for cutting wood and soft stones, or for digging. The Neolithic period about 2500 B. C. marks the beginning of shaping stones by grinding and polishing, and the introduction of pottery.

With the development of mineral resources evolved the concept that minerals were the property of the tribe and their development was for the benefit of the tribe. During the Bronze Age the deposits belonged to the king; the Iron Age Greeks held that the minerals were property of the state, although they leased the mines. The Romans, however, maintained the mineral resources were the property of the landowner, except gold, which belonged to the state. Lands taken by conquest and their mineral resources also were Rome's.

That mineral resource ownership went with land ownership spread through Roman conquest to England and thence to America. Mining, however, was considered an abuse of the earth in the Roman Empire and was not approved. But looting the produce of other lands' mines was favorably viewed.

Oriental cultures passed through the same stages as Western cultures, but later and at a slower rate, because of their culture, not aptitude—the Orientals emphasized husbandry of the land and animals.

During the Middle Ages in Europe, mines and quarries were worked sporadically on a small scale. Salt mining was the most consistent and widespread, but established communities like Cornwall and the Erzegebirge produced tin, copper, lead, zinc and silver.

In the Renaissance, the construction of roads, cities and cathedrals was renewed. Nations formed and their armies required the latest weaponry. Old mines were reopened, and the economists of the day forecast the world must soon run out of mineral resources.

The demands of society led to an age of exploration. Explorers sought first for gold, silver, gems, and other high-value commodities because transporting costs were high.

In North America, mineral development was limited to construction stone, sand and gravel, peat and other low-value products until the late 1700's. The Virginia frontiers were advanced in 1608 when bog iron was discovered in the interior. Copper was discovered in 1632, but none was worked until 1705, when the Simsbury mine in Connecticut went on stream. Lead was discovered in what is now Missouri in 1720, but not until 1792 was it mined for the local production of musket ball and shot.

In 1782, gold nuggets were found in Virginia's streams, and in 1799 a rush began to North Carolina. In 1827, a rush to Georgia began, replete with claim jumping and lynch law. In 1830, the rushers moved on to Alabama.

Wherever the miners went they opened paths for farmers, shopkeepers and lawyers. And often, as was the case in the West, when the bonanza ores were gone and the rushers moved on, the farmers and merchants stayed to found a permanent settlement. Some miners also stayed to work the more prosaic, but more plentiful base metal ores.

In 1848, two events occurred which shaped American destiny—the discovery of gold in California, and, lesser known but equally important, the successful mining of iron in the Marquette Range in Michigan.

In the East, the true foundation of American industrial might was being laid. In 1845, some iron had been smelted with bituminous coal from Pennsylvania, but in 1860, the Pittsburgh anthracite seams were opened, and this massive supply of coking coal shifted the U. S. steel industry westward.

The phosphate industry received its start in South Carolina in 1867, spread to Florida with the discovery of the vast field there in 1888, and began to produce from the Phosphoria Formation in Idaho in 1906.

"Colonel" Drake drilled his first well in 1859, but the petroleum industry got its real impetus in 1901, when Spindletop blew in.

Canada was undergoing similar development. There was a gold rush to Nova Scotia in 1860; asbestos was discovered in Quebec in 1878; the Rossland and Sullivan lead deposits were opened in British Columbia in the 1890's. In 1910 nickel was discovered in the Sudbury region.

(continued on page 5)

[1] Taken from an unpublished report by James R. Reeves, graduate student, Department of Geological and Geophysical Sciences, University of Utah.

(continued from page 4)

In 1905, the selective flotation process of base metal sulfides was perfected, and bulk mining methods began in the disseminated copper districts of the West.

The petroleum industry rode a boom into the Depression days, and after World War II, a second boom lasted into the late 1950's. In the 1950's a uranium rush began in the Colorado Plateaus and spread to the rest of the West.

Minerals in modern life provide construction material, energy sources, agricultural raw materials, munitions and military supplies, transportation and manufacturing equipment, ornamentation, materials for food preparation and preservation, and . . . money.

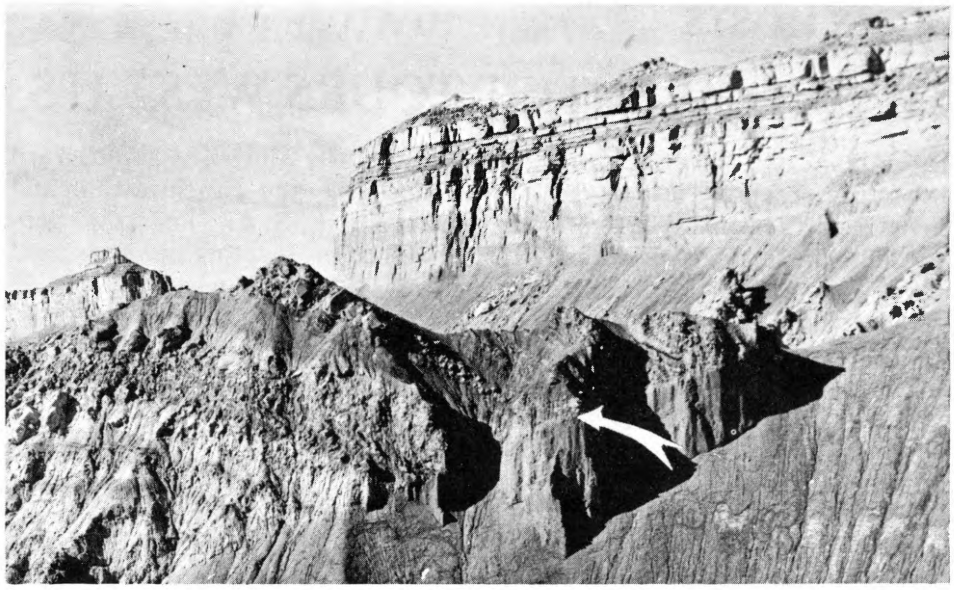
The extraction industries, including metal, nonmetal, and petroleum producers, employed 622,000 people in 1970, and the manufacturing industries that treat mineral products employed 902,000 people. The mining industry paid $5.8 billion in salaries out of a total of $541 billion for all industries. It contributed $7.5 billion to the overall national income (including premiums, etc.), or about 9 percent. The total value of mineral production in the U. S. in 1970 was $29.8 billion, including $20.2 billion in mineral fuels, $5.7 billion in metals, and $3.9 billion in nonmetals.

Mineral products provide national income from taxes on personal and business income, real estate, and exports and imports. They furnish the raw materials on which other industries are based, and are prime customers for others. In 1969, mineral commodities represented 59 percent of the railway freight and 84 percent of all freight carried by commercial carriers on navigable waterways in and around the U. S.

Nations historically develop from youthful nations with rich, easily accessible natural resources and little development, to old nations, when the nation has moved past large-scale exploitation of lower grade deposits, industrialization, stable prices, taxes and tariffs, to depleted resources. Its power, influence and wealth decline. New nations—or old nations rejuvenated—shoulder it aside and become the new powers.

As Rome replaced Greece and England shouldered Spain aside, so the U. S. emerged as the world power, and so must it yield to a younger, more vigorous nation—Russia with its vast Sibera; China, recently rejuvenated by 20th century technology, or India with its recently developed iron and coal deposits and a growing steel industry—if our resource base is not expanded and continually developed.

All incoming calls to the Utah Survey offices and staff members now are processed on a key telephone system, phone number (801) 581-6831. The change was initiated as part of an overall program to cut expenditures.



'TYPICAL' ODDITY . . .

A toreva-block landslide in Kane County, Utah. A block of the Smoky Hollow Member, Straight Cliffs Formation, overrides the Tropic Shale as a single block as opposed to segregation of the mass; the failure plane contact is displayed clearly (arrow).

Bruce N. Kaliser, UGMS engineering geologist, photographed the feature while he was in southern Utah.

Geologists Rescue Milford Family

Geologists in the field occasionally step outside the "walk-map-and-sample" image to become knights errant.

Utah Survey's mineral resource geologist, Lee Perry, and his assistant, James Hindman, were en route to the Indian Peaks area, 15 miles south of U. S. Highway 21, Beaver County, Utah, on 24 June 1973, when they chanced upon Norman Thomson of Milford, Utah, and his wife and three children.

A broken axle the day before had forced the Thomson family to abandon their car in the Wah Wah Mountains; they had hiked 8 miles to the junction between Pine Valley and Pine Grove road where they spent the night in sleeping bags—without food or water.

Perry and Hindman returned them to Milford where a local jeep posse was preparing to search for them.

UGMS HOSTS

SOVIET SCIENTIST TOURS WEST U.S.

As a participant in the exchange program between the Soviet and National Academies of Sciences, S. M. Aleksandrov, Research Associate at the Institute of Geochemistry and Analytical Chemistry im. V. I. Vernadskiy, Moscow, spent the last three months in the United States.

The purpose of his visit was to study the geochemical formation characteristics and mineral composition of borostannic skarn deposits of the Northwestern and Western U. S. A., and the geochemical prospecting methods used by the U. S. Geological Survey.

As a guest of the Utah Geological and Mineral Survey from May 21 to 29, Aleksandrov toured the U. S. Bureau of Mines laboratories, Kennecott's research facilities and the ludwigite-bearing skarns at West Springs in the Beaver Lake Mountains.

A scheduled trip to Alta and Brighton's ludwigite-bearing skarns was unsuccessful because of snow cover.

Aleksandrov collected samples of rare boron minerals, some of which he gave to the Department of Geological and Geophysical Sciences, University of Utah, for analysis.

He is probably Russia's outstanding expert on ludwigite-bearing skarns and tin deposits, and has published numerous major scientific works on the geochemistry of tin and boron in skarn deposits.

His itinerary included field trips in Washington, California and Alaska, and discussions in Washington, D. C.

Third Volume Out-Coal Series Complete

UGMS released Monograph Series No. 3, "Central Utah Coal Fields: Wasatch Plateau, Book Cliffs, Sevier-Sanpete and Emery," by H. H. Doelling ($20.00), this month, completing the series of comprehensive records, maps and data on Utah coal.

This last volume, in addition to treating geographic data, geology, mines and development, land ownership and control, coal quality and reserves, includes a summary, analysis and comparison of data from all three volumes, a forecast of expected coal activity, and a new study of coal palynology.

Multicolored maps and numerous figures and tables illustrate the 600-page edition.

Monograph Series No. 1, "Southwestern Utah Coal Fields: Alton, Kaiparowits Plateau and Kolob-Harmony," is also available for $17.00; Monograph Series No. 2, "Eastern and Northern Utah Coal Fields: Vernal, Henry Mountains, La Sal-San Juan, Sego, Tabby Mountain, Goose Creek, Lost Creek, Coalville and Henrys Fork," sells for $20.00.

The set can be purchased for $50.00

Earthquakes Tamed?

Injections Release Seismic Stress

The initial phase of an experiment to control earthquakes was completed successfully at the Rangely oil field in extreme northwest Colorado.

U. S. Geological Survey scientists, in cooperation with Chevron Oil Company, have been conducting experiments since late 1970 aimed at "taming" earthquakes by deliberately pumping and withdrawing water through wells that penetrate a fault zone deep beneath the surface of the oil field.

Promising results show that numerous small tremors can be stopped by withdrawing water and, conversely, triggered by injecting water.

A rash of minor earthquakes in the Denver, Colorado, area in the mid-1960's, which were related to the pumping of liquid wastes into a deep well at the Rocky Mountain Arsenal near Denver, spurred the experiments.

At the Rangely, Colorado, site, too, a series of minor earthquakes appears related to the injection of fluid at high pressure into an area of faulted reservoir rocks. Such an injection—water flooding—is a method commonly employed to increase oil recovery.

Results of the experiment show that stresses in rocks deep in the earth (the Rangely quakes are at 6,000 feet) can be relieved artificially; seismic energy would be released in small doses, reducing the chances for the occurrence of a single major quake.

Such an undertaking, however, is many years away, and much research is yet required.

Platinum Controls Exhaust Pollution

Of the various exhaust control techniques now being studied by government and industry researchers, a platinum-based catalyst system appears to have the best features for conventional gasoline engines. The catalytic action of the platinum eliminates most of the carbon monoxide and unburned hydrocarbons in the exhaust.

If the catalytic muffler becomes the standard automobile exhaust control device, domestic demand for platinum could triple overnight.

According to U. S. Bureau of Mines Circular 8565, "Demand for Platinum to Reduce Pollution from Automobile Exhausts," by D. J. Kusler, each device would require about a tenth of an ounce of platinum. This means that in 1976, when all newly manufactured vehicles are supposed to have antipollution equipment, almost a million and a half ounces of platinum could be needed for the manufacture of catalytic mufflers.

The country normally uses about 500,000 ounces of platinum each year, three-fourths of which is recycled. For the first two years of production of exhaust control equipment, all of the platinum used would have to be new metal, with demand peaking in 1980.

After that, many of the earliest exhaust control devices would reach their 50,000-mile operational limits and could be recycled. Demand for new platinum would decline, and by 1990, salvaged emission control equipment might provide as much as three-fourths of the platinum needed for new equipment.

Even so, automobile manufacturers would continue to need large quantities of new platinum each year.

Roughly 98 percent of the world's production comes from three countries: the Republic of South Africa, USSR, and Canada. The total of imported platinum from these countries (1,789,000 ounces) would hardly fill anticipated U. S. antipollution requirements for 1976.

South Africa, however, has rich undeveloped sources of platinum and could possibly boost its production to two or three million ounces a year to meet future needs.

At Home With Geology

Water-Table Changes Critical to Homesite

by B. N. Kaliser
UGMS Engineering Geologist

Before acquiring real estate, a prospective buyer should determine the depth to the water table on the site.

The water table, the upper limit or surface of the groundwater which approximately follows the profile of the land surface, can create problems in basements, septic tanks and filter fields, and utility excavations, and may aggravate frost heave.

Knowing the depth to the water table is indispensable to those dependent on a private well for their water supply. Fluctuations of the table also are significant; rising water tables have flooded entire subdivisions and basements have been ruined by mildew. The back-up of a septic-tank system because of a rising water table is annoying and unhealthy.

Old records from wells, particularly hand-dug wells, and information from individuals who have cultivated the land, or from utility companies, may help determine future water-table fluctuations.

Changes in land use that may affect the infiltration of water from the surface should be noted. Land withdrawn from irrigation may signal a lower seasonal water table than expected; construction of an unlined pond or reservoir may indicate a higher water table in the future.

Shallow groundwater should be protected vigorously from encroachment—septic tanks, sewer lines, grease pits, sewage lagoons, and other pollution sources—especially if it is a main source of potable water. A knowledge of the earth material between the water table and a source of encroachment is requisite to evaluate the hazard (see *Quarterly Review*, November 1972, p. 2).

New Staff Member Assumes Survey Post

Utah Survey has added a new member to its staff—Lee I. Perry assumed his position as mineral resource geologist April 16.

For the last 3½ years, Perry, a 1970 graduate of Brigham Young University, was employed at Kennecott Copper's Burgin mine as a mining geologist. He initiated geological operations to find ore and to insure recovery of existing ore.

Presently he is investigating alteration in lavas and limestones of the Wah Wah Mountains and Shauntie Hills areas and will be involved in mineral inventories of Utah's mining districts.

He resides in American Fork, Utah, with his wife, Doris, and their two children.

Course Focuses on Geology and Man

Lectures and extensive field studies made up the course on environmental geology and geologic hazards in Utah, Nevada and California held by Westminster College, Salt Lake City, this summer.

B. N. Kaliser, UGMS engineering geologist, was the principal instructor.

College teachers of geology and earth science studied the relation between man and his geological habitat with emphasis on those earth processes that affect man and his works.

Activities included field trips along the Wasatch Front, tours through various mining and industrial companies in Utah, and stops en route to California to observe nuclear test sites and environmental problems associated with hydrogeology, urban geology, and solid waste disposal.

Sizable Gas Reserve Opens Near Cisco

A new area of shallow gas production, apparently with some associated oil, is developing in Grand County, Utah, six miles north and northwest of the town of Cisco.

Since the 1920's the area has achieved scattered minor oil production, and some gas discoveries which remained shut-in for lack of connection to markets. Completion of the Tejas Gas Company pipeline in the area in late 1972 spurred considerable exploration drilling and led to the present sizable new gas reserve. Higher prices for gas also stimulated exploratory activity.

Largest exploration effort to date was undertaken by Vukasovich Drilling Company, San Francisco, California, and Grand Junction, Colorado. To the end of June 1973, this operator apparently has completed seven gas wells and is testing one additional gas and another possible oil well. Two unsuccessful wells were abandoned, and eleven additional locations were staked in the series. Other operators active in the area are A. Lansdale (with Vukasovich), Ari-Mex Oil and Exploration, Adak Energy and Isabelle Thomas.

Production to date by Vukasovich appears to be from several sands identified as the Dakota, Buckhorn Conglomerate Member of the Cedar Mountain Formation, and Brushy Basin Member of the Morrison Formation. Depths range from 900 to 1,600 feet in the field so far. The producing area is located on the north flank and northwest plunge of the Cisco anticline, about midway between the Cisco townsite domal area and Cisco Dome to the northwest. Most locations are on public lands; the U. S. Geological Survey established spacing at one well per 160-acre tract.

The field probably will be called Cisco Wash for the principal drainage in the area.

QUARTERLY REVIEW
State of Utah . . . . . *Calvin L. Rampton, Governor*
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