UTAH GEOLOGICAL AND MINERALOGICAL SURVEY

QUARTERLY REVIEW

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"GEOLOGY AND RESOURCES OF SOUTH CENTRAL UTAH—

Resources for Power" is the title of the Utah Geological Society Guidebook to the Geology of Utah, Number 19, 1965. It will contain four papers dealing with stratigraphy, one paper on the tectonic history, and six papers of economic interest as follows:

"Tectonic history of south-central Utah," by W. L. Stokes and E. B. Heylmun.

"Pre-Pennsylvanian stratigraphy of the Kaiparowits region, south-central Utah and north-central Arizona," by R. D. Munger, John Greene, F. S. Peace, and J. A. Liming.

"Triassic and Jurassic strata of southwestern Utah," by R. G. Wilson.

"Jurassic and Cretaceous stratigraphy of south-central Kaiparowits Plateau, Utah," by Fred Peterson and H. A. Waldrop.

"Stratigraphy of the Dakota and Tropic Formations of Cretaceous age in southern Utah," by J. C. Lawrence.

"History of exploration for oil and natural gas in the Kaiparowits region, Utah," by R. P. Kunkel.

(Continued on Page 8, column 3)

QUARTERLY REVIEW

State of Utah.....*Calvin L. Rampton Governor*

University of Utah....*James C. Fletcher President*

College of Mines & Mineral Industries.....*George R. Hill Acting Dean*

Utah Geological & Mineralogical Survey .....*William P. Hewitt Director*

UTAH GEOLOGICAL AND MINERALOGICAL SURVEY
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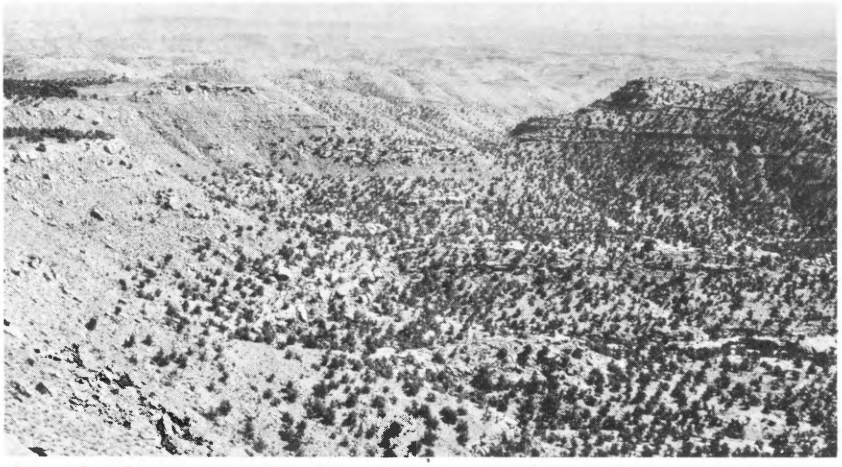
FIELD CONFERENCE EMPHASIZES ENERGY POTENTIAL

The Utah Geological Society and the Intermountain Association of Petroleum Geologists are jointly sponsoring a field conference September 17-18 in the high plateaus on the western margin of the Colorado Plateau. The Cockscomb, Hell's Backbone, the White, Pink and Vermillion Cliffs, Kolob Terrace, Kaiparowits Plateau and other spectacular geologic features will be seen on the two-day trip (see map next page). Cedar Breaks National Monument lies just north of the route, and Bryce Canyon National Park will be visited on the second day.

Some of the stops of economic interest will be a coal mine in the Culver zone (Cretaceous) and a power plant near Cedar City; a coal mine in the Dakota Formation near Alton; an abandoned coal mine in the Straight Cliffs Formation (Upper Cretaceous); the Glen Canyon Dam; and the Upper Valley Oil Field near Escalante. This is the only major producing field in south central Utah, and produces from the Kaibab Formation (Permian). There will also be several stops to collect fossils.

The road log will note exits to dry holes throughout the area, and will discuss the stratigraphic and structural relationships. Rocks ranging in age from Permian to Recent will be pointed out along the route.

Registration is set for the evening of September 16 in Cedar City. The two-day trip, September 17-18 will be completely catered by Hatch, of Delta, Utah. The trip will terminate at Cedar City on September 18. It is not known at the time of this writing whether or not busses will be used. Road logs, accommodations, and other details of arrangement are the responsibility of the Intermountain Association of Petroleum Geologists. For further information regarding the field conference contact the field-trip chairman, Mr. Parker Chipman, Marathon Oil Company, Box 268, Salt Lake City, Utah.



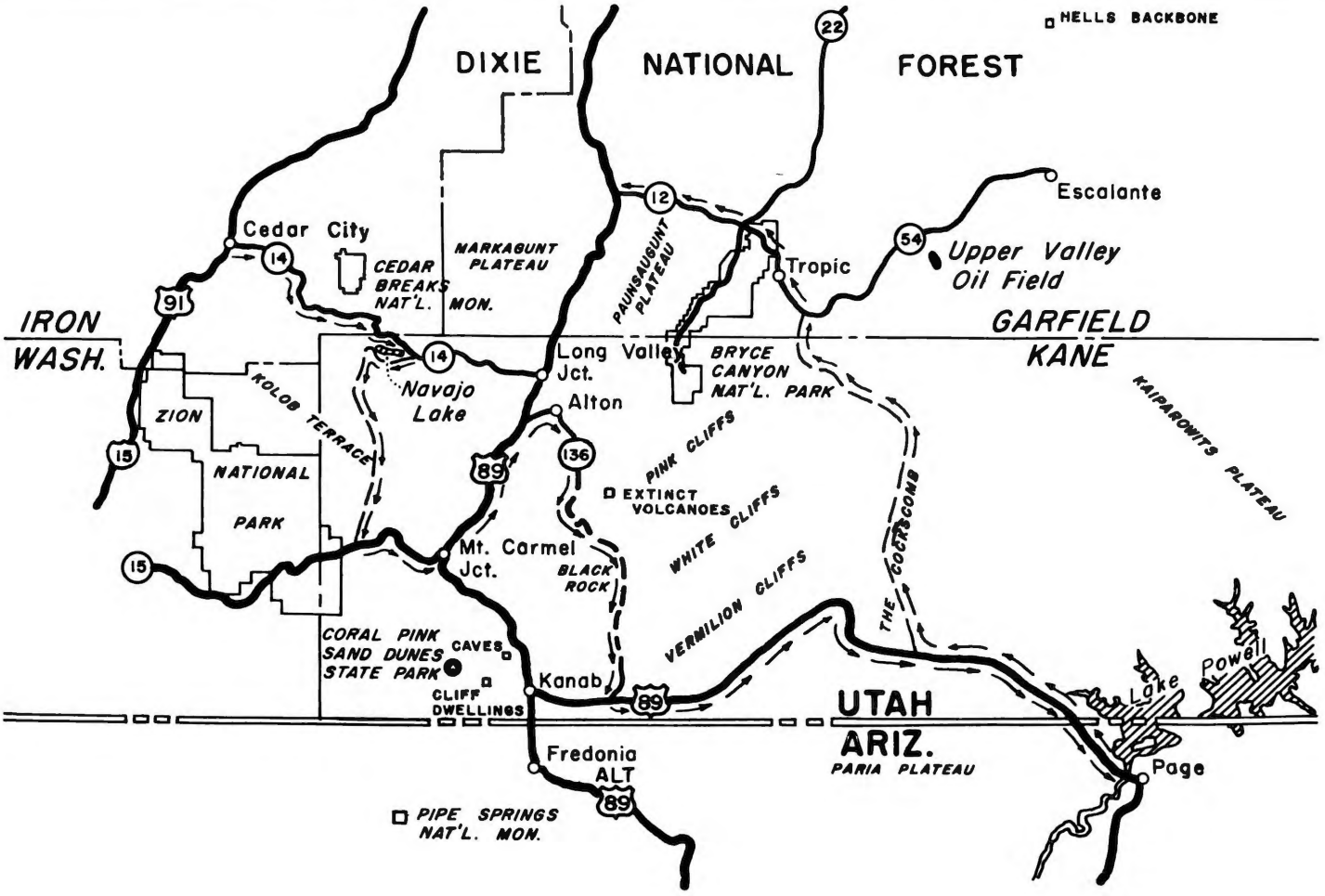
View Southwest across Southern Kaiparowits Plateau, Kane County, Utah. The Straight Cliffs Sandstone is exposed in the foreground.

SUMMER ACTIVITIES IN UTAH

This listing is a continuation of the list previously published in the May, 1965 *Quarterly Review.* Summer projects of the Utah Geological Survey are indicated by an asterisk (*).

Investigator	*School-Agency*	*Purpose*	*Subject*
Baars, D. L.	U. of Colo.	Ph. D.	Subsurface stratigraphy in southeastern part of Utah.
*Baetcke, V.	U. G. M. S.	Mineral Resources	Star Mineral District, Star Range, Beaver County.
Condie, K. C.	U. of Calif. San Diego	Ph. D.	Petrology and Geochemistry, Late Precambrian Rocks, Northeastern Great Basin.
El-Shatoury, H.	U. of Utah	Thesis	Mineralization of the Gold Hill District, Tooele County.
Erikson, M. P.	U. of Utah	Mineral Resources	Milford Project: Magnetometer survey of several areas to the west and south of Milford which have been geologically mapped.
*Kolvaard, R.	U. G. M. S.	Mineral Resources	Star Mineral District, Star Range, Beaver County.
Maberry, J. O.	Colo. S. M.	Thesis	Stratigraphy of Price River Formation, Sunnyside District.
Stringham, B.	U. of Utah	Mineral Resources	Geology and Mineral resources of Star and Beaver Lake mining districts, Beaver County.

ROUTE OF JOINT I.A.P.G. AND U.G.S. FIELD TRIP



Dr. Eardley "Retires," Dr. Hill New Acting Dean

Dr. Eardley

Dr. Armand J. Eardley, Professor and former Dean of the College of Mines and Mineral Industries, has distinguished himself in the professional field of Geology and is widely known for his academic contributions to the field.

Dr. Eardley attended Stanford University (for one year), then transferred to the University of Utah and graduated in 1927. He received his Ph. D. degree at Princeton University in 1930, and rose to full professor at the University of Michigan. Dr. Eardley came to the University of Utah in 1949, and has been Dean of the College of Mines and Mineral Industries for the last 11 years.

During this time the Utah Geological and Mineralogical Survey and eight departments including ceramic engineering, fuels engineering, geology, geophysics, metalurgy, meteorology, mineralogy, and mining and geological engineering have been under his supervision. The departments influence the State's economy through research and instruction.

Dr. Eardley is the author of three books as well as many shorter papers. In 1961 he received the James E. Talmage Scientific Achievement Award from Brigham Young University.

He has been president of the Rocky Mountain Section of the American Association of Petroleum Geologists, the Geological Society of Utah, and the National Association of Geology teachers, and was distinguished lecturer of the A.A.P.G. and Sigma Xi. He is now president of the American Geological Institute.

At a meeting of the Utah Geological and Mineralogical Survey Advisory Board, Mr. John Ehrhorn, Chairman, wished Dr. Eardley the best of luck and praised him for his efforts in the establishment of the Survey Advisory Board. Mr. Ehrhorn said, "In the 1961 legislature, there was an attempt to eliminate funds for the Geological Survey." He added that through Dr. Eardley's efforts to focus the attention of the Board on mineral industries, the legislature both in 1963 and 1965 has recognized some real benefits to be derived from the Survey.

Dr. Armand J. Eardley

Dr. George R. Hill

Dr. Hill

Dr. George R. Hill, Professor and former Head of the Department of Fuels Engineering, College of Mines and Mineral Industries has national professional stature in the fields of fuel technology and energy resources.

A native of Utah, Dr. Hill attended Brigham Young University, where he majored in chemistry and graduated with high honors in 1942.

At Cornell University, where he received his Ph. D. degree in 1946, Dr. Hill majored in inorganic and physical chemistry and minored in plant physiology. He was a part-time Instructor while a student, and acting Assistant Professor during the summer of 1946.

From 1946, when Dr. Hill came to the University of Utah, he has gradually risen from Instructor of Chemistry to Head of the Department of Fuels Engineering, a position he now leaves to become Acting Dean of the College of Mines and Mineral Industries.

Dr. Hill has served as Supervisor or Director on numerous projects for the Air Force, Atomic Energy Commission, and Office of Naval Research.

During the summer of 1956, Dr. Hill attended the International School of Nuclear Science and Engineering, Argonne National Laboratory.

Articles and Reports on various research projects have appeared in the Journal of the American Chemical Society, the Academy of Sciences Forum, the Journal of the Electro-Chemical Society, and the Journal of the Physical Chemistry Society. Newsweek Magazine carried news of his work.

Dr. Hill is a member of Sigma Xi, Phi Kappa Phi, and has held national office in the American Chemical Society and the National Association of Corrosion Engineering. He was a National Science Foundation visiting lecturer from 1961-64.

PROGRESS OF 1964-1965 FIELD INVESTIGATIONS

Great Salt Lake Desert

Penetration problems along with extreme heat and unusually wet spring weather hampered this operation, yet 85 sites were hand-drilled to an average depth of 7 feet. Drilling sites, all north of Highway 40, and in large measure south of Silver Island, extend for some 36 miles east of Wendover. Initially spaced at 1-mile intervals, spacing was increased toward the end of the summer to 3 miles or more.

From these sites, 85 core samples and 87 brine samples were collected. All brines have been assayed for Ca, Mg, Na, K, Li, Cl, and SO_4. The core samples are being studied as a thesis problem by Mr. George Lindenberg, party chief during the summer of 1964.

The investigation was augmented by a series of Shelby tube samples of sediments. Of these, 154 were collected by the Highway Department from 33 sites along Highway 40 and at proposed interchanges for Interstate Highway 80, and 33 were collected at 20-foot intervals from a hole drilled for the Survey by the Highway Department in March, 1964. This 805-foot hole was drilled in Sec. 19, T. 1 S., R. 15 W., about 23 miles east of Wendover just north of Highway 40, at the site of the booster station Barro-K of the A.T.&T. Company. These Shelby tube samples have been leached of their soluble salt and the resulting liquors have been assayed for Ca, Mg, Na, K, Cl, and SO_4.

Results have been open-filed and are available for inspection at the offices of the Utah Geological Survey.

As a continuation of the 1964 program, the core samples that were collected by Survey personnel are now being leached of their soluble salts, and a few brine samples collected by the Highway Department will be assayed, as will a few samples of brines and sediments that were collected during the Winter of 1964-65 from points south of the Highway. From experience gained, it has been decided to discontinue the hand-drilling phase of the program, and a truck-mounted auger has been ordered. Delivery is expected by mid-summer 1965, at which time the program will be reactivated.

Asphalt Ridge

An area of approximately 20 square miles (12½ miles long by 1½ to 2 miles wide) which extends from Sec. 24, T. 4S., R. 21 E., southeasterly to Sec. 4, T. 6 S., R. 22 E., has been mapped on the scale of one inch equals 400 feet. Field notes have been compiled and final drafting is now in progress. Two crude petroleum analyses from the U.S. Bureau of Mines' Petroleum Research Center at Laramie, Wyoming, have been received for samples of saturated sandstone collected from two localities at depths of about 2 feet beneath the surface. Additional samples from these same sites have been analyzed at the University of Utah for Ultimate and Proximate analyses. Ten samples of saturated sandstone have been analyzed for their porosity, permiability, and percentage saturation of both bitumen and water. Six thin section descriptions have been recorded of type sediments. A dry hole listing has been compiled, together with information concerning tops of horizons and availability of logs. A structural contour map and stratigraphic cross-sections have been drawn. The above data have been open-filed and are available for inspection at the offices of the Utah Geological Survey pending completion of a written report.

County Studies

Sevier County: A field reconnaissance was completed on approximately 90% of the County's State lands. A report is in preparation on the coal resources of the County. Compilation of data pertaining to additional resources, bentonite and silica among them, has been delayed because of personnel requirements. Final completion of this portion of the study has been postponed.

Sanpete County: A field reconnaissance of 72 of the County's 85 State sections was completed. A report on the mineral resources of Sanpete County's State lands is being prepared.

Garfield County: A field reconnaissance of 287 of some 362 State sections was completed. Field work is in progress.

Wayne County: A reconnaissance of 212 of the County's 255 school sections has been completed. Field work is in progress.

Piute County: This program became disorganized and although 88 of the County's 102 State sections were visited, reports have not been submitted.

Deep Creek Mountains

Field work on this two-year thesis project, about 33 percent completed, was confined during the 1964 field season to the west side of the range. Field investigations continue.

Star Mining District

Field work on this area immediately west of Milford was actively advanced during 1964 and is still in progress.

New Publications

The following publications have been printed since May and are available from the Utah Geological Survey, 103 Civil Engineering Building, University of Utah, Salt Lake City, Utah.

Special Studies 10, Foundation Characteristics of Sediments, Salt Lake Metropolitan Area, by Richard A. Bauman, 40 pages, 6 illustrations, $2.00.

Special Studies 12, Hydrothermal Alteration and Mineralization in the Staats Mine and Blawn Mountain Areas, Central Wah Wah Range, Beaver County, Utah, by James A. Whelan, 32 pages, 12 illustrations, $1.50.

Publications, Utah Geological Survey, 1965. A new feature of the list of Publications is a complete subject listing. Guidebooks of the I.A.P.G. and the Utah Geological Society are also listed and available at the Survey office. 46 pages, FREE.

Summary of Cooperative Projects from July 1, 1964 - June 30, 1965

Investigations under cooperative agreement between the U.S. Geological Survey and the Utah Geological and Mineralogical Survey:

In 1965, a total of $33,743 (of which $16,580 was contributed by the Utah Geological Survey) was available to conduct the following investigations:

Chemical characteristics of the water resources of western Utah—

This investigation of the water resources of the western part of the State began in July, 1963, with cooperative funds from the State Engineer's office. In July, 1964, its scope was expanded and trace element analyses, that might be significant in mineral exploration, were increased.

Field work during the last fiscal year was completed for Rush, Dugway, and Government Wash Valleys. In addition there was a limited amount of followup field work in Skull Valley and, in conjunction with the ground-water reconnaissance program in cooperation with the Utah State Engineer, data were obtained in Snake Valley.

Laboratory analyses for major dissolved constituents were completed for all samples, and spectrographic analyses of selective samples were made. Special determinations of iodide, bromide, phosphate, lead, zinc, copper, strontium, and lithium were completed for samples from Skull Valley and springs in southern Utah, and were started for samples from Dugway, Government Wash, and Rush Valleys. Results of analysis of special samples from 42 wells and springs in Beaver, Iron, and Millard Counties were compiled for release to the Utah Geological and Mineralogical Survey.

The investigation continues.

Chemical hydrology of Great Salt Lake—

During 1965 fiscal year this investigation consisted of two related studies (1) dissolved-mineral inflow to Great Salt Lake during 1964 water year, and (2) reconnaissance of mineral transport in Great Salt Lake and of areal and depth variations in the chemistry of the brine.

Collection of data for the mineral-inflow study was completed September 30, 1964, and these have been open-filed pending publication.

Data concerning item 2 (above) were collected in the vicinity of the Southern Pacific fill in July 1964 to determine differences in the chemical characteristics of the brine in the northern arm as compared to the southern arm. Several simple gauges were installed in the salt crust west of Rozel Point to obtain preliminary data on salt deposition and resolution in the northern arm. Two sets of samples of salt crust were analyzed for major mineral constituents.

Later, during December, 1964, and January, 1965, samples of brine were obtained from about 15 sites in the lake utilizing a boat and a helicopter. Spectrographic analyses for 17 minor elements were made on 8 of the 41 samples obtained at these sites; determinations of major dissolved constituents were made on all samples.

During July and October, 1965, and July, 1966, it is planned to collect data that will be representative of the annual high and annual low stages of the lake. Sampling will be conducted from approximately 25 sites.

Springs of Utah—

An investigation of the water, mineral, and thermal characteristics and potential of the major springs of Utah began in 1965 fiscal year. During this first year the major effort was an assembly of average data from both published and unpublished sources. In addition a minimum amount of field work was coordinated with "the chemical characteristics of water-resources of western Utah" program. Samples from about 60 springs were analyzed for major chemical constituents and spectrographic analyses were made for 17 minor elements from springs in Tooele County. Field work is continuing. Report preparation will be deferred until 1968 and 1969 fiscal year when it is planned to prepare two major reports: Major Thermo Springs of Utah, and Springs of Utah.

Reconnaissance of the quality of surface water in the Sevier Lake Basin—

This study is mainly a cooperative program between the Utah State Engineer and the U.S.G.S., but the Utah Geological and Mineralogical Survey also supported the study. Other agencies, among them the Utah State Department of Public Health, the Water Commissioner for the Sevier River, and the Soil Conservation Service and the Forest Service of the Department of Agriculture contributed personnel for the collection of field data and part of the laboratory work.

During March-September, 1964, four sets of data were obtained at about 60 sites on streams in the basin. Information, including chemical, biochemical, bacteriologic, radiological, trace-element, and suspended-sediment analyses will be released to the open-file in August 1965. An interpretive report will be prepared in 1966 fiscal year.

U.S. Bureau of Mines analysis of oil field brines:

With the cooperation of personnel from Utah's Oil and Gas Commission brine samples have been collected from the following oil fields: Wonsits, Upper Valley, Ashley Valley, Red Wash, Walker Hollow, Duchesne, Virgin, Lisbon (3 samples), Long Canyon, Salt Wash, and Rozel. Analyses have not yet been received.

FINANCIAL STATEMENT

The Utah Geological Survey receives its financing from three separate funds: first there is a special line-item appropriation from the University of Utah budget; second, it receives a percentage of the Uniform School moneys that are derived from mineral leases, rental and royalties in the Federal domain; third, the receipts from sales of publications and maps are deposited in a special publication account known as the Survey Fund. In addition, it has received grants from the University of Utah. The following, a consolidated statement of all funds, shows income and expenditures for the fiscal year that commenced July 1, 1964, and ended June 30, 1965.

	1964-65	Total
INCOME:		
Balance Carried Forward:		
Survey Fund (Utah Code 53-36-2-7) (123-401010)	$ 7,787.11	
University of Utah Research Fund Grant for Oil Well Sample Library	62.00	
Accounts Collectible (Unpaid Invoices)	1,211.44	
Mineral Leasing Fund (122-401011) Carry Over	25,819.53	
Fiscal Year Appropriation (121-401012) Carry Over	179.74	
		$ 35,059.82
Appropriations:		
Mineral Leasing Fund (122-401011) Allotted	$132,050.77	
Fiscal Year Appropriations (121-401012)	27,500.00	
		$159,550.77
Receipts:		
Sale of Maps & Bulletins — Gross Receipts (Utah Code 53-36-2-7) (123-401010)	$ 18,614.19	
College of Mines & Mineral Industries (Earth Science Project Fund-Publ. of SS 12 & salaries)	1,518.00	
		$ 20,132.19
TOTAL INCOME	$214,742.78	$214,742.78
EXPENSES:		
Operations:		
Salaries		
Administrative	$ 16,299.84	
Research	5,625.00	
Office	11,205.46	
Part-time Field Parties		
Asphalt Ridge (Uintah County)	2,251.14	
Deep Creek (Tooele County)	1,720.16	
Garfield County	2,695.00	
Wayne County	1,050.00	
Piute County	1,895.28	
Sevier County	2,403.64	
Sanpete County	2,637.50	
Research	498.00	
Star Mining District	2,681.20	
Great Salt Lake	162.50	
PR Springs	475.00	
Great Salt Lake Desert	2,225.25	
Gold Hill	300.00	
Time Cards		
Sample Library & Engineering Office	12,528.49	
Manuscript Preparation	3,939.12	
Analyst	5,022.22	
Research	1,331.64	
Field Parties	242.00	
Manuscript Compilation	2,732.60	
Office	3,819.19	
Social Security	2,666.09	
State Retirement	445.29	
T.I.A.A.	822.52	
Blue Cross - Blue Shield	205.81	
Workmen's Compensation	56.55	
Group Life Insurance	27.28	
		$ 87,963.77
Supplies:		
Office	$ 3,188.20	
Sample Library	803.53	
Drafting Office	2,764.66	

	1964-65	Total
Laboratory	231.21	
Field Parties	1,871.34	
Shale Oil Investigation	141.80	
		$ 9,000.74
Publication Expenses:		
Water Resources No. 3, Part 2	$ 340.90	
Bulletin 69	2,004.50	
Quarterly Review No. 1	203.00	
Quarterly Review No. 2	196.00	
Quarterly Review No. 3	200.00	
Quarterly Review No. 4	331.00	
Special Studies No. 9	260.58	
Water Resources No. 7	810.60	
Advertising Brochure	220.00	
Special Studies No. 11	412.75	
Bulletin 74	2,157.00	
Map No. 19 - compilation and publication	1,217.20	
Special Studies No. 10	570.40	
List of Publications	358.00	
Mailing Dowels	112.70	
Water Resources No. 3, Part 1 (Reprint)	296.00	
Special Studies No. 12	363.00	
Special Studies No. 13	446.00	
Misc. (Vouchers & overpaid orders)	8,168.45	
Dinosaur National Monument	172.05	
Misc. Publication Expenses	814.67	
		$ 19,654.80
United States Geological Survey Coop:		
Dissolved Mineral Inflow	$ 3,000.00	
Chemical Characteristics	7,500.00	
Springs of Utah	2,500.00	
Sevier Lake Basin	500.00	
Chemistry of Great Salt Lake	3,000.00	
Salt Input of Great Salt Lake & Trace Element Prospecting — Basin & Range	2,875.00	
		$ 19,375.00
United States Bureau of Mines Coop:	$ 3,000.00	3,000.00
Fencing and Warehousing:	590.76	590.76
Travel Expenses:		
Staff Travel	1,215.10	
Field Parties	10,303.87	
Rental on vehicles - summer 1964	614.16	
Rental on vehicles - summer 1965	410.00	
		$ 12,543.13
Sales Tax:	$ 122.89	122.89
Assaying:	1,573.04	1,573.04
Postage:	774.50	774.50
Aerial Photographs:	1,173.22	1,173.22
Freight:	2,525.55	2,525.55
Petroleum Information Cards:	90.00	90.00
Telephone and Telegraph:	132.02	132.02
Misc. Disbursements:	96.71	96.71
Maintenance - Parts and Repairs:	72.67	72.67
Equipment:		
IBM Selectric Typewriter	$ 450.50	
IBM Executive Typewriter	525.40	
Nucleometer	100.00	
Magnetometer	2,425.00	
Coleman Analyzer-Shale Oil Investigation	2,000.00	
Travel Graph	169.00	
Hanging Compass	94.59	
Pilot Plant (Dismantling charges, Los Angeles)	635.00	
Fans	199.99	
		$ 6,599.48
CARRIED FORWARD:		
Mineral Leasing Fund (122-401011)	$ 39,543.81	
Survey Fund (123-401010)	9,778.33	
Research Grant for Oil Well Sample Library	132.36	
		$ 49,454.50
TOTAL SUMMARY	$214,742.78	$214,742.78

INQUA 7TH CONGRESS

The International Association for Quaternary Research (INQUA) will gather for its 7th Congress at the University of Colorado in Boulder, August 29 through September 4. Technical field conferences and related symposia will be held August 14 to 29 and September 5 to 19. These conferences are once-in-a-lifetime affairs, and have received a great deal of careful planning and preparation. Work has been organized by a committee composed of a secretary general, Gerald M. Richmond, and 12 national scientific societies representing varied areas of interest. Much new unpublished work is being presented and many old problems are receiving renewed attention. Close focus is being given to "boundary problems" between areas. Discussions with foreign colleagues will open the door to new methods and ideas as well as new friendships.

Two field conferences are scheduled which include the Salt Lake City area: Field Conference E, NORTHERN AND MIDDLE ROCKY MOUNTAINS, August 13-29, which includes topics such as "Stratigraphy and geomorphology of successive deposits of pluvial Lake Bonneville and their relation to the glacial advances of the Wasatch Mountains" and Field Conference I, NORTHERN GREAT BASIN — CALIFORNIA, September 5-19, which includes the following topics in the Salt Lake City area: "Geomorphology, vegetation, and soils of the desert and Wasatch Mountains; Pleistocene Lake Bonneville beaches, stratigraphy, radiocarbon chronology, and relation to glacial geology; engineering and ground-water geology of the Salt Lake City area."

A symposium will be held at the University of Utah during Field Conference I: "Means of correlation of Quaternary successions."

UTAH SURVEY'S SUMMER ACTIVITIES

The busy summer season finds the Utah Geological Survey embarked on many projects. Some field parties got off to a roaring start whereas others trudged handsomely into ubiquitous red tape.

The Survey's field parties generally consist of an experienced graduate student and an undergraduate assistant.

Mineral appraisals of the central Utah counties are continuing: reconaissance of Sanpete and Sevier Counties is expected to be completed this season; the east half of Garfield, a much larger county will also be completed.

A four-man party headed by Dr. J. Whelan, Utah University College of Mineral Industries, is expected to complete field work in the Star Mining District near Milford in Beaver County.

Mr. Ed Heylmun, the Survey's petroleum geologist is studying the relationship between joint patterns and oil fields.

The Deep Creek-Gold Hill area finds three men afield: one party, continuing last summer's investigations of the economic geology of the Deep Creek Range will also attempt to determine whether geochemical methods might prove to be valid ore indicators in the Gold Hill District; the other party, a graduate student working on his Ph. D. thesis, is studying the alteration and mineralization of the Gold Hill region.

A three-man party, later to be augmented by a fourth, is studying the P.R. Springs asphaltic sands occurrence in the lion country at the south periphery of the Uinta Basin. Their well-marked tent can be spotted some 72 crow-fly miles south of Vernal in Uintah County.

Utah Survey geologists attempt to pull amphibious "duck" from mud 200 feet to the left of this photo. Cable will be attached to the "deadman" being buried in the hole shown.

The Great Salt Lake Project and its companion, the Great Salt Lake Desert project, have been concerned with logistics, and it is anticipated that most of July will be spent with construction and outfitting. However, the project is off to a good start and the Director is now assured that all hands are experienced at digging out mired-down vehicles along the shoreline of the lake.

Geology

(Continued from Page 1, column 1)

"History of coal production in southwestern Utah," by Paul Averitt and W. B. Cashion.

"Kolob, Kanab, and Kaiparowits coal fields in southwestern Utah," by L. T. Grose.

"New developments in the utilization of Utah coal," by G. R. Hill.

"Ground water in the Navajo Sandstone at the east entrance of Zion National Park," by J. S. Gates.

"Sources of water to supply coal-fired electric power plants in Kane County, Utah," by H. D. Goode.