UTAH GEOLOGICAL AND MINERALOGICAL SURVEY

QUARTERLY REVIEW

Vol. 1, No. 13

Geologic Investigation in the State of Utah

August, 1967

It Could Happen . . . Again!

EDITOR'S NOTE — The Utah Geological Survey is actively engaged in making the public aware of the role geology plays in their total environment, particularly if it poses a hazard.

by BRUCE N. KALISER*

On May 24, 1967, a damaging rock slide occurred about 25 miles southeast of Salt Lake City, and it could happen again! This particular slide was in Park City.

A 7,000-volt power line and a telephone service line were downed by the slide, and a mine assay office and a garage containing a car were damaged.

The real danger, however, was in the damming of narrow Empire Canyon, and its stream, which was already in flood stage. Fortunately, the tream skirted the toe of the slide, which extended across the canyon bottom. (See picture on page 3)

*Engineering geologist, UGMS.

Inspection of the crown and flanks of the slide has revealed cracks back of the scarp face, indicative of further possible sliding, though on a smaller scale. A tilt block perched on the main scarp face is also rotating forward, contributing debris to the main mass below. Repair of the utility lines was hampered by those still hazardous conditions.

Apparently, snow melting contributed enough water, especially along road switchbacks, to aggravate the weak bedrock condition. Gouge zones, clay seams and deterioration of the local rock by faulting have further weakened the bedrock. Added to this, the steepness of the canyon walls provides adequate factors for making a geologic hazard.

Landslides, including rock slides, are only one of the geologic hazards

that may be expected to exert an ever greater influence on population centers. As people move into less populated and consequently more picturesque areas, the detrimental effects of a geologic disaster may be grossly magnified.

Such could be the case if a landslide were to dam a canyon; only to burst violently through, sweeping the canyon clean downstream. The loss directly attributable to the slide may be negligible when compared to the destruction of a settlement in the lower reaches of the canyon.

As the Salt Lake community continues to expand along the Wasatch front, many people will desire summer homes in the canyons, too. It is well to bear in mind that earth and rock underfoot is not indicative of a geologically sound site.





Jack Shroder, professor of geomorphology, left, checks crack in potential slide area in Park City. Aerial view (right) shows snow-covered road switchbacks sliced by the massive rock slide.

Shake 'Em Up Country

135 Quakes Jar Utah in 6 Months

Since early in 1967, the Department of Geophysics, University of Utah, has issued a news release each month listing the earthquakes that have occurred in the state of Utah during the preceding month.

The following list, as reported by J. Larry Wilson, technician-analyst for the department, gives the number of Utah earthquakes recorded during the 6-month period January 1 - June 30, 1967.

Area
Salt Lake City (one felt in Salt Lake City)
Logan
Price (includes 34 probable rockbursts in mines)
Nephi
Vernal
Enterprise
Promontory Point
Promontory Mountains
Ogden (one felt in Huntsville)
Huntsville (felt in Huntsville)
Castle Gate
Soldiers Summit
Milford
Castle Rock
Sunnyside (probable rockbursts)
Fillmore
Moab
Lehi
Richfield
Cedar City
Henry Mountains
Sevier Lake region
Provo
Lakeside
Orange Cliffs
Central Utah
S. Central Utah
Southwest Utah
N. Central Utah
Southern Utah
Northern Utah
Glen Canyon
Utah-Wyoming border east of Logan

All of these earthquakes were less than Richter magnitude 4.0 and most were less than magnitude 3.5. Two earthquakes were felt in Huntsville, and one was felt in Salt Lake City.

The earthquakes were recorded at the Uintah Basin Observatory, Vernal, Utah, a U. S. Government installation; the University of Utah network of seismograph stations at Dugway, Salt Lake City, and Price (College of Eastern Utah); and at the Utah State University seismograph station.

Thirty-four rockbursts were recorded at the Price station.

Twenty-three earthquakes were recorded in the Salt Lake City area; one of these, on March 19, 1967, was felt. Twenty-three quakes were also recorded in the Logan area. The latter are believed to be long-term aftershocks of the large (Richter magnitude 5.7) earthquake there on August 30, 1962.

	Location* Magnitude*
April 1	South-central Utah
April 3	Near Castlegate. Utah
	(near Price) 2.8
April 4	Near Salt Lake, Utah <2.0
April 4	Southwest Utah
April 5	South of SLC,
1	approx. 40 miles < 3.0
April 5	Probable rockburst,
	near Price, Utah <2.0
April 6	""""""" <2.0
April 6	""""""" <2.0
April 6	North of SLC,
	approx. 30 miles<3.0
April 6	Southwest Wyoming
	approx. 3.0
April 7	Near Soldier Summit <3.0
April 8	Probable rockburst,
	near Price, Utah 2.9
April 9	Southwest Wyoming 4.4
April 11	Promontory Mountains
A	approx. 3.0
April 11	North central Utah < 3.0
April 11	Probable neckburgt
April 11	near Price Litah -20
April 19	
April 12	
April 14	"""""" ~ ~ ~ ~ ~ 5
April 16	"""""" <30
April 16	"""""" <2.0
April 18	""""""
April 18	""""""
April 18	
April 19	Promontory Mtn's < 3.0
April 19	Near Milford, Utah <3.0
April 20	Near SLC approx. 1.0
April 21	Probable rockburst,
	near Price, Utah <2.0
April 21	"""""""" <2.0
April 21	······ ·······························
	approx. 3.0

*These are general locations and magnitudes. Final determination of both epicenters and magnitudes will be made at a later date.

Events represent the major activity in the state, not the total number of occurrences. Many smaller events are not listed.

The frequency of occurrences for April did decrease as compared to the previous months. Frequency of rockburst occurrences in April, however, was not different than the

previous month, but they were larger on an average. Smaller rockbursts were not analyzed.

April	22	,,	,,	,,	,,	**		2.5
April	24	,,	"	**	••	,,		2.6
April	24	Near	r SI	C				<20
April	24	Roc	khu	rst .	ne	ar		14.0
p		Pr	ice	IIt:	ah	**		<28
April	24	Roc	khu:	rst	ne	ar		14.0
- pin	41	Pr	ice	TIt.	ah			<20
April	25	Near	r So	Idie	rS		nit	12.0
April	26	Roci	khu	ret	no	unn vr	mit	14.0
npin	40	D	ico	TIt.	h	11		9.0
Amil	96	1 1 ,,	ice,		,,	,,		2.9
April	20	,,	,,	••	,,	,,		2.4
April	20	,,	,,	,,	••	,,		< 3.0
April	20	NT	~	.1.	n	1		< 3.0
May	1	Near	Cas	tie .	KO	СК,		0.4
3.0	0	Uta	h					2.5
May	3	Rock	burs	st-Si	ınn	ysic	le,	
		Uta	h					2.2
May	3	Rock	burs	st-Sı	ınn	ysic	le,	
		Uta	h					2.4
May	3	Near	Log	gan,	Ut	ah .		<2.0
May	4	North	ieas	t of	Fil	lmo	ore,	
		Uta	h					<2.0
May	8	Near	Mo	ab,	Ut	ah .		<2.0
May	9	Near	Log	an.	Ut	ah .		<2.0
May 1	1	Rock	burs	it —	Ne	ar		
		Pric	e. I	Ital	h			15
May 1	9	South	wes	t M	voi	nin	o	<9
May 1	5	Near	Pric		Ita	h	5	91
Mayl	7	South	ern	III	ah			-20
May 9	2	Near	Loc	ran	TI	tah		20
May 2	1	Noar	Log	san,	TI	ah	••••••	2.0
May 2	.T	Noan	Drie	all,	Ito	a11 . h		12.0
May 2	.5	Near	T	.e, 1	TI+	11	******	< 3.0
May 2	5	Near	Log	an,		an.	•••••	<2.0
May 2	0	Near	Lei	11,	Uta	m.		<2.5
June	4	Near	LO	gan	, 0	tan		<2.0
June	3	Proba	able	ro	CKD	urst		<0 F
	0	nea	ar F	rice	e, l	Jtar	1	<2.5
June	3	Near	Pri	ce,	Uta	ah.		< 2.0
June	6	Near	Pri	ce,	Uta	ah.	2.	5 - 3.0
June	6	Near	Su	nny	side	e, L	Jtah	<2.0
June	9	Near	Ric	hfi	eld,	Ut	ah	<3.0
June	12	Near	Cec	lar	Cit	v. U	Itah	<3.5
June 1	17	Henr	v M	ou	ntai	ns.		
5		Ut	ah					< 3.5
June 1	18	Near	Sal	t La	ake	Cit	v.	
J		Ut	ah				,,	<2.0
Iune I	9	North	iern	IJ	tah			<30
June	9	Sevier	r La	ke	Re	orion	1	10.0
June		IIt	ah	inc		5.01	1,	<30
June 9	21	Utah.	Ari	z h	ord	ler .		10.0
June 2		Cl	on (avn	D	emi	212	185
Iuno 9	99	Noor	Sol	L YII	. N	Cit	JII	0.0
June 2	-4	TIL	Sal	Li	аке	u	·y,	190
Tura	29	Draw	ан. ТТ	tal		rico		2.0
June 2	10	FIOVO	, U	lan	reg	sion	· ···· '	\$4.0
June 2	4	Laste		Vev:	aua	nd.		19 "
T	77	nea	ar U	tan	00	rde	· '	< D.
June 2	1	Near	Log	gan,	0	tan	····· '	<2.
June	21	Proba	able	roc	KD1	urst,	•	-0 ×
		nea	ar P	rice	e, L	tah	· '	<3.5
June 2	27	Utah	-Wy	o . b	orc	ler -	-	

west of Logan, Utah <3.0

Page 2

August, 1967

QUARTERLY REVIEW

Page	3
	-

June 28	Near Richfield, Utah <3.0
June 28	Near Logan, Utah <2.0
Rock	burst total, June 1-30, 1967: 13
(only larger ones included)
July 1	east of Provo, Utah <2.0
July 6	near Filmore, Utah <2.5
July 11	near Salt Lake City,
	Utah
July 14	east of Provo, Utah <2.0
July 14	Rangely, Colorado $\overline{<}2.5$
July 14	30 miles northwest of
	Vernal, Utah,
	3 small shocks all <1.5
July 14	Near Utah/Wyoming
	border, north of
	Uinta Mountains <2.5

July 15	30 miles northwest of Vernal, Utah
July 17	near Salt Lake City, Utah<2.0
July 19	near Mount Pleasant, Utah<2.5
July 19	near Delta, Utah <2.5
July 20	near Mount Pleasant Utah<2.5
July 21	Terrace Mountains, northwest of Lakeside, Utah
July 22	east of Filmore, Utah 3.0
July 22	east of Filmore, Utah <3.0

July 22	Utah/Wyoming border, approx, 70 miles
	northwest of Vernal,
	Utah
July 26	southwest Wyoming,
	approx. 60 miles
	west of Logan,
	Utah
July 26	Utah/Wyoming border
5 ,	northwest of
	Vernal, Utah
July 27	Rangely, Colorado,
	5 quakes all <3.5
July 29	Parowan, Utah
July 31	near Salt Lake City,
	Utah



View of last May's Park City slide, looking east to the east side of Empire Canyon. Slide moved from upper left to lower right, exposing main scarp, wiping out road switchbacks and destroying power lines. Note power poles left of Center.

Utah's uranium activity reached a low point in the fall of 1966. Claims lapsed and mining virtually ceased. In late 1966 there was a rebirth of claim staking in southeastern Utah.

Increasingly exponentially, it is now reflected in increased exploration efforts, principally in the Moab-Monticello area.

It is reported that east of the Mi Vida-North Alice trend, over 70 holes have been drilled to depths of 2,600-2,750 feet to intersect basal Chinle "sands" on the downthrown side of the Big Indian fault, and that several of the major uranium producers are now engaged in exploration efforts in that area.

Likewise, drilling activity is reported from the Seven Mile, Yellow Cat, and Sage Plain areas. Much of the latter is aimed at Morrison mineralization but some drilling reportedly is penetrating the basal Chinle horizons at depths of 1,500-2,000 feet.

Utah's oil production has been holding steady at about 66,500 barrels daily during the first six months of 1967. June's total of 2,000,693 barrels averaged 66,700 barrels daily.

U. S. oil needs and overseas demand during the Middle East crisis were met largely out of storage and by turning on the petroleum faucet in major producing states - mainly Texas and Louisiana. As Middle East oil bans ended - officially and otherwise - U. S. production tapered off and crude oil again moved into coastal storage facilities. Increased production proved to be no problem, but moving the surge of oil by pipeline, disposing of larger quantities of salt water and handling greater volumes of associated gas without waste was troublesome in many instances.

Utah oil production is expected to climb slowly in the months ahead as the results of (1) rising demand within and outside of the State and (2) increased production capacity of several new areas, among them Bridger Lake in Summit County.



Phillips Petroleum in mid-August was preparing to rig up at its No. 6 Fork-A, SWNW 23-3N-14E, Summit County, Utah. This is the sixth well in the new deep Bridger Lake oil field where flowing oil production has been developed from an average depth of 15,550 feet from Dakota sand.

The first three wells in the field are completed and flowing. No. 4 Fork-A is drilling below 13,400 in a sidetracked hole to bypass a "fish" (stuck drill pipe) in the original hole which could not be retrieved.

Phillips is running production casing at No. 5 Fork-A to total depth 15,867 feet and will begin production tests.

To the end of June, 1967, Bridger Lake field had produced 553,282 barrels of oil from two wells. June production totalled 54,990 barrels, averaging 1,833 barrels per day.

"... No matter how much our instruments and techniques improve, the search for new sources of metals will never be completed, at least in the foreseeable future. Nor will any sortie into the field be final, for always there will be tomorrow when we can look deeper and can see better.

I would like to speak both as a geophysical scientist and as an American who feels deeply about this country and our obligation to make any sacrifice necessary to safeguard it. The United States cannot survive unless it has assured adequate supplies of the metals that are essential to the maintenance of the industrial complex from which both our prosperity and our military might accrue.

To block or bar the search for these metals anywhere they might reasonably be expected to be found, in the light of emerging knowledge, would be the first step toward national suicide. Barring entry on lands where those metals are known to exist

ENERGY SOURCES IN THE UNITED STATES*

	Quadrillion BTU			Per	cent of t	otal
	1945	1955	1965	1945	1955	1965
Crude oil	9.6	16.3	21.6	30.5	40.8	39.6
Gas liquids	0.5	1.2	1.9	1.5	3.0	3.4
Natural gas	4.0	9.2	16.5	12.6	23.1	30.3
Coal	16.0	11.7	12.4	50.7	29.3	22.8
Others	1.5	1.5	2.1	4.7	3.8	3.9

*From statistics of National Petroleum Council in Oil and Gas Journal, vol. 65, no. 6, February 6, 1967.

would be the final blow."*

Tenneco Oil Company No. 1 Clear Creek Unit, proposed to test Mississippian formations at 16,800 feet, was abandoned at 15,703 in late July.

At scheduled total depth, this well would have set a new drilling record for Utah - a mark held by Pan American No. 1 Pace-State drilled to 16,237 in Grand County in 1964.

The Tenneco deep test in the Clear Creek gas field was plugged after much mechanical difficulty and unsuccessful attempts to recover drill pipe.

San Juan's Boundary Butte – one of Utah's oldest commercial fields – is suddenly news.

A year ago, Sinclair Oil and Gas began drilling to the shallow Coconino Sandstone.*

By the end of the year, a string of successful completions had produced 49,273 barrels -95 percent of the year's total of 52,257.

Production rose in January, 1967, to 19,977 barrels from wells, averaging 644 barrels daily.

The following month, the company took 28,223 barrels from 12 wells a daily average of 1,008 barrels for the field.

By March, the nine-month total of new Coconino oil exceeded Boundary Butte's entire yield since its discovery in 1948. (It produced a disappointing total of 109,551 barrels from 1949 through 1965.)

Significantly, the field appears capable of steady commercial production for years to come.

Early Coconino (Shinarump) wells in the field were open hole and were troubled with water invasion.

Sinclair's new wells have been completed through selective perforations in casing and have had minimal water problems. Water produced with the oil is cycled back into the reservoir to assist further production.

Coupled with spectacular new development of prolific Pennsylvanian production in Arizona's Dineh-bi-Keyah field about 35 miles southeast, exploration for Pennsylvanian and Permian oil is expected to show a marked increase in the Four Corners area during 1967 and 1968.

^{*}Taken from a paper presented by W. E. Heinrichs, Jr., President, Heinrichs Geoexploration Company, Tucson, Arizona, be fore the Public Land Law Review Commission and printed in Pay Dirt, #339, June 23, 1967.

^{*}The Permian Coconino, formerly correlated as Shinarump, has a depth of only 1,300 to 1,500 feet.

August, 1967

QUARTERLY REVIEW

Page 5

Kenneth Cook Elected To Society Post

Dr. Kenneth L. Cook, professor and chairman of the Geophysics Department, University of Utah, has been elected vice-president of the Society of Exploration Geophysicists.

The SEG is an international organization comprised of 6,000 geophysicists who explore for oil and gas structures, ore deposits and, more recently, the geophysics of outer space.

Causeway's Effect on Lake Studied

In 1957, a quarry run, permeable, rock-fill causeway to permit passage of water through two culverts was constructed across Great Salt Lake. One-third of the Lake lies north of the causeway, two-thirds to the south of it.

Nearly all inflow now originates south of the causeway, brine has become more highly concentrated to the north, and a salt crust several feet thick has been deposited in the north arm.

UGMS FINANCIAL STATEMENT

(July 1, 1966 – June 30, 1967)

SOURCE OF FUNDS:		
Appropriations & Allotments:		
Mineral Leasing Fund: Fiscal Income Mineral Leasing Fund: From Retained	\$102,708.10	
ReserveF4_6	48,073.00	
Land Grant Maintenance Fund	50,000.00	
General Fund	67,000.00	
		\$267,781.10
Other:		
State Reimbursements: Bonneville Salt Flats		
Investigations	\$ 1,302.59	
Publication Sales (Restricted)	16,731.21	
Services Rendered (Restricted)	877.40	
Cooperative Projects (Restricted)		
Carry-Over:		
Operating Funds	30,905.36	
Publication Receipts	13,837.57	
		\$ 63,654.13
TOTAL FUNDS AVAILABLE	\$331,435.23	\$331,435.23
APPLICATION OR DISPOSITION OF FUNDS Employment Costs:	:	
Staff	\$ 77,408.75	
Summer Assistance	31,435.86	
Time Card Wages	47,672.42	
Employee Benefits	10,502.59	
		\$167,019.62
Cooperative Costs:		
U. S. Geological Survey	\$ 37,500.00	
U. S. Bureau of Mines	1,500.00	
		\$ 39,000.00
Contract Service (none)		
Examination Costs and Travel	\$ 18,456.01	18,456.01
Equipment, Supplies & Maintenance	45,534.97	45,534.97
Printing Costs, Consignment, Taxes, Etc.	20,557.28	20,557.28
Unexpended – Returned to General Fund	2.07	2.07
TOTAL FUNDS USED	\$290,569.95	\$290,569.95
BALANCE CARRIED FORWARD	\$ 40,865.28	\$ 40,865.28
TOTAL SUMMARY	.\$331,435.23	\$331,435.23
		. ,

The UGMS, the Morton Salt Company (a division of Morton International Incorporated), and the USGS have entered into a cooperative study of the brine's chemical changes occurring as a result of causeway construction.

The cost for the first year's effort (July 1, through June 30, 1968), \$25,000, will be borne as follows:

Morton	Salt	Compa	ny\$	5,000
UGMS	******	*	\$	7,500
			\$	12,500
Matchee	ł by	USGS	\$	12,500
Tot	al			25,000

Samples for chemical analysis are to be collected quarterly at 25 sites distributed along five lines extending perpendicularly to the causeway. On each line there will be two sites north of the causeway and three south.

To measure salt crust level, three or four fathometer lines will be run north of the causeway and two "salt gauges" will be installed. Planned by the UGMS and USGS, the program is to continue for a three-year period and will be executed under the direction of Ted Arnow of the USGS.

As explained by Frank Colladay, Morton Salt Company's Saltair manager: "The yearly salt harvest depends on the brine concentration. The more dilute the brine the greater the area required for evaporating ponds. To protect its Great Salt Lake investment, and to anticipate the acreages that will be needed in pond surfaces, the Morton Salt Company must understand the changes that appear to be taking place in the brine."

Various proposals have been made by State agencies and private groups to divert the fresh water inflow to the Lake, even to dike portions of the Lake to create a fresh-water reservoir. Both industrial and recreational use is made of the brine and a knowledge of the long-term effects of dikes on the regimen of the Lake is needed.

In addition to this cooperative investigation pertaining to chemical changes in the vicinity of the causeway, the UGMS is carrying on a monthly monitoring program of the entire Lake, and has planned an experimental drilling and coring program that will probe the depth of salt precipitated since 1957.

7 Geologic Kaiparowits Maps Show Coal-Bearing Zones

Publication of seven geologic maps illustrating coal-bearing horizons in Kane County's Kaiparowits Plateau is announced by the UGMS at the University of Utah.

The maps, which cover a 414square mile area, were published as $7\frac{1}{2}$ -minute quadrangles at a scale 1 inch equals $\frac{1}{2}$ mile. They show topographic contours in subdued background with the coal horizon in green overlay. Accompanying each is a description of the formations. Measured stratigraphic sections on the back of each map illustrate the thickness of coal beds.

Published maps include:

- –24-A Nipple Butte quadrangle, Northwest quarter
- -24-B Nipple Butte quadrangle, Northeast quarter
- -24-C Nipple Butte quadrangle, Southeast quarter
- -24-D Nipple Butte quadrangle, Southwest quarter
- -24-E Gunsight Butte quad-
- rangle, Northwest quarter -24-F Gunsight Butte quad-
- rangle, Northeast quarter -24-G Gunsight Butte quad-

rangle, Southeast quarter Prepared by the USGS and modified and printed by the UGMS, the maps are available from the Utah Geological and Mineralogical Survey Office, 103 Utah Geological Survey Building, University of Utah, Salt Lake City, Utah. They are priced at \$5.50 a set, over-the-counter, or \$6.00 a set by mail. Individual maps may be purchased at \$1.00 a sheet with postal charge of 25¢ up to and including three sheets by mail. A geological highway map of the Southern Rocky Mountain region (Utah-Colorado-Arizona-New Mexico) has been published by the American Association of Petroleum Geologists.

To help the travelers correlate geology and scenery, the principal map (approximately 2 feet by 2 feet) depicts general outcrop geology of the four states. The Interstate Highway network and other main highways are superimposed.

Time and rock unit charts are included. Tectonic and physiographic maps, structural cross sections and maps illustrating geologic history appear on the reverse side. All are generalized. The entire presentation is in fine graphic detail and brilliant contrasting color.

This map, number 2 of a projected nationwide series, is a must for the geologist touring unfamiliar territory, for the discerning vacationer or the knowledge-seeking rockhound. It should provide fascinating reading and study for armchair travelers as well.

Sponsors of the map include oil companies and several educational institutions and foundations. Listed among sources of information are the UGMS and the Utah Geological Society and Intermountain Association of Geologists. Individuals acknowledged include A. J. Eardley and W. L. Stokes, Geology Department, and W. P. Hewitt and H. H. Doelling, UGMS, at the University of Utah.

The map sells for \$1.00 folded and and \$1.25 rolled from A.A.P.G., Box 979, Tulsa, Oklahoma 74101.

Survey Offers Catalog of Samples

Circular 50, "Catalog: Library of Samples for Geologic Research, 1951-66," has been issued and is available from the Survey's offices at \$1.00 per copy.

The catalog lists samples, cores and electric and other mechanical logs for 3,408 wells, core holes and other drill holes filed in the sample library through December 31, 1966.

The University computer facilities were used to organize the 320 page volume.

Most samples, cores and logs are of oil and gas wells, but some are derived from water wells and mining and construction drill holes. The circular includes 2,045 Utah wells, comprising 5,759,800 feet of samples and 279,209 feet of core.

Well totals of other states are: Arizona, 76; Colorado, 819; Idaho, 6; Nevada, 28; New Mexico, 201; Wyoming, 231; Montana and Nebraska are one sample each.

The catalog was compiled by Wm. D. Byrd, curator of the sample library, Robert Kayser and R. Chris Fox. Computer programmer was Roy Willie.

Staffer Assigned To Canal Study

Bruce N. Kaliser, engineering geologist, UGMS, was granted a six-month leave of absence to accept an assignment with the Atlantic-Pacific Interoceanic Canal Study Commission.

Mr. Kaliser left July 10 for Balboa Heights in the Canal Zone.

At present, the commission is engaged in making preliminary exploration studies to determine a location for a long-planned sea level canal that will replace the now-antiquated Panama Canal.

Mr. Kaliser, whose studies will be oriented toward nuclear excavation techniques, will be occupied with surface and subsurface geologic work in the brush of Colombia, Panama, or both. The work will take him into some of the world's least explored areas. Stratigraphic work is just beginning on the Isthmus, and geologists have encountered unusually complex structural relations in certain areas of the route.

As a member of the UGMS staff, Mr. Kaliser has conducted studies of brine distribution at the Wendover Salt Flats, the foundation characteristics of Salt Lake City's reservoir sites (particularly, the Victory Road reservoir), and areas of potential geologic hazard.

For two years prior to joining the UGMS, Mr. Kaliser served as city geologist in Bethlehem, Pa. As an advisor to Bethlehem's Engineering and Water Bureaus, he supervised foundation investigation, location of water transmission lines, watershed development and location and inspection of water wells.

Mr. Kaliser was graduated with honors from the University of Reading, Eng. Upon receiving his B. Sc. degree in 1963, he was awarded a teaching assistantship at Lehigh University in Bethlehem, and completed one year of graduate training

DEFENSE RESTS

The mining industry often feels it is a target of those bent on turning the United States into one vast wilderness area.

At a recent meeting of the American Institute of Mining Engineering in Los Angeles, Calif., it was pointed out that "if all mine scars in the United States were brought together, they would cover only 2.6 percent of the area set aside for wilderness."

6 Counties Ready Development Meet

A Community Development Conference, sponsored by six county commissions, will be held at Snow College in Ephraim, Nov. 16.

Purpose of the meeting is to point up resource potentials within reach of the participating counties – Juab, Sanpete, Millard, Sevier, Piute and Wayne.

Speakers, representing the University of Utah, Utah State University and the State's tourist industry, will discuss past, present, and future development in agriculture, tourism, industry and business.

A similar conference involving five counties – Beaver, Iron, Kane, Washington, and Garfield – was conducted by the Bureau of Community Development in Cedar City last February.

SHELL TO DRILL 4 MILES NORTH OF PROPOSED WILDERNESS AREA

Shell Oil Co. has announced it will drill a deep test 3½ miles southwest of Bridger Lake Oil Field, Summit County.

The test site, at an elevation close to 10,000 feet in heavily forested country, is 4 miles north of the proposed High Uintas Wilderness Area and 1 mile south (mountainward) of the concealed trace of the North Flank Fault.

Rocks at the surface are Quaternary glacial deposits, which probably rest on steep-dipping Paleozoic formations of the Uinta overthrust sheet.

Drilling should penetrate the south-dipping, overthrust North Flank Fault and enter Tertiary or Upper Cretaceous formations of the Green River Basin beneath the thrust sheet. Target oil sands in the Dakota Formation are expected around 15,-800 feet.

Designated Shell 21X-9 Unit, NENW Sec. 9, T-2-N, R-14-E, the well is the first on the Dahlgreen Creek Unit, which covers over 30,000 acres south of the North Flank Fault.

Shell's work should prove the angle at which the North Flank Fault dips south toward the proposed Wilderness and hopefully that at this location petroleum occurs in the thick sedimentary formations beneath the thrust sheet.

At press time, Shell Oil Co. was building roads and preparing the location for a spud date set for Nov. 15. The company expects to drill throughout the winter months.

Samples and Cores Recently Added to Sample Library

Wm. L. Farrelly LOGS 1 sample ARIZONA NEW MEXICO Amerada 1 sample Aztec Colorado Basin Petroleum 1 log El Paso Natural Gas 1 sample Gulf-British American 2 logs E. R. Campbell 1 sample 1 log Gulf Oil COLORADO 2 samples Anderson-Prichard International Oil 1 log 1 log California Company Johnson and Shear $1 \log$ 2 logs **Caulkins** Oil Kingwood Oil 1 log 1 log **Continental Oil** Monsanto Chemical 2 logs C. Wentworth Drilling 2 samples l log El Paso Natural Gas Pan American Petroleum 1 sample Standard of Texas 2 logs 1 log Gulf Oil Sunray Mid-Continent 2 logs 1 log J. L. Cramer 2 logs **NEVADA** Marathon Oil California Company 2 samples 1 log McDaniel Drilling Davis Oil 2 logs 3 logs Petroleum Inc. Shell 2 logs 1 log Pure **Oil** Texaco 2 samples 1 log Union of Cal. UTAH 2 samples United Oil and Gas Amax Pctroleum 6 logs Arbuckle-Mclish-Luff l log Vaughey and Vaughey l sample Wadkins Prod. 3 logs Belco Petroleum l sample 6 logs British American Oil Wasatch Refining 2 logs 2 logs

California Oil 1 log, 2 samples Carter Oil 2 logs Chevron Oil 1 log, 1 sample **Continental Oil** 2 logs Delhi-Taylor 3 logs E. B. LaRue l log Equity Oil l log Federal Oil 1 log Gulf Oil 30 logs, 8 samples Helbing-Podechan 2 logs Humble Oil 2 logs Husky Oil 2 logs Kerr-McGee 1 log Marathon Oil 2 samples Moncrief-Chaplin 2 samples Monsanto Chemical 8 logs National Park Service 1 sample **Odessa** Natural Gas 1 log Oil Sic. and Gas Corporatio 1 log Pan American Petroleum 5 logs **Phillips Petroleum** 2 logs, 1 sample Pumpelly-Stava 3 logs

Pure Oil 4 logs Roy Pledger l log Richfield $1 \log$ Sabine Exploration Compai 3 logs Shamrock Oil and Gas 3 logs, 1 sample Sinclair 16 logs Skelly **Öil** 3 logs Superior Oil 6 logs **Tennessee** Oil 6 logs Texaco 8 logs Three States Natural Gas l log Travis Oil 1 sample Union Oil 7 logs USSR&M 1 sample Walton and Kearns 2 logs W. Pease Drilling l log Zoller and Danneburg 4 logs WYOMING British American Oil 2 logs **Caulkins** Oil 1 log

C. Griffith Enterprise

2 logs

Davis Oil

7 logs

El Paso Natural Gas 2 logs Empire State Oil 2 logs Farmers Union l log Forest Oil – U.P.R.R. 1 log Frontier Refining 4 logs Gulf Öil 2 logs J. G. Dyer 2 logs Louis G. Coffey 2 logs Marathon Oil 1 sample Murphy Oil 19 logs Panhandle Oil 1 sample Petroleum Inc. 3 logs Samuel Gary 5 logs Shell 3 logs Summit Oil Corp. 2 logs Sun Oil 4 logs Tenneco 4 logs Texaco Natural Petroleu 6 logs Trigood Oil 8 logs True Oil 9 logs Vaughn Petroleum 1 log Wind River Drilling 3 logs

Illinois Coals Produce Cokes

by Bernice Y. Smith*

The last 20 years have seen a tremendous surge in the use of Illinois coal for coke, and faster growth is looked for in the next decade.

Illinois coals have been tested by the Illinois State Geological Survey for use in metallurgical coke since 1943. Prior to that time, the coals had been considered too high in moisture, sulfur and ash content to produce metallurgical coke.

Original purpose of this work was to reduce transportation from eastern coal fields to the Chicago and St. Louis areas during World War II. However, since the successful completion of that project, the Survey has aimed its test at expanding the use of local coals. Two Survey coking ovens test cokes, blending local and eastern coals. Tests have also been made on blast furnace coke, foundry coke and chemical coke. Blast furnace coke about 90 percent of all coke used in the United States - is used as fuel to reduce iron ore into the metallic iron required to produce steel.

Many local steel companies have cooperated with the State Survey in developing blends of local and eastern coals suitable for their needs, with considerable – but variable – success. The high ash and sulfur content present in the Illinois coal makes it unsuitable generally for use as foundry coke. Chemical coke – used in electric furnaces for reduction of ores for conversion of limestone into calcium

*Secretary, U. of U. Department of Geology. The above item is based on: Jackman, H. W., 1966, Illinois coal in the metallurgical coke industry: Illinois Mining Institute Proceedings, p. 19-29.

QUARTERLY REVIEW

State of Utah
Governor
University of UtahJames C. Fletcher
President
College of Mines & Mineral
Industries
Utah Geological & Mineralogical
Survey William P. Hewitt
Director
UTAH GEOLOGICAL AND
MINERALOGICAL SURVEY
103 Utah Geological Survey Building
University of Utah
Salt Lake City, Utah
84112

carbide — can be made from coals from all mining areas in Illinois, by themselves and in blends.

Tests by the Illinois State Geological Survey indicate that the blending of Illinois coal with eastern coal may have many advantages.

- Illinois coals tend to produce strong cokes, and blends of eastern and Illinois coals therefore may bolster the strength of coals.
- Illinois coals may be used to reduce pressure exerted on coke oven walls by dangerously expanding coals.
- Illinois coals develop less plasticity during coking than most high-volatile eastern coking coals.

The technical work of the Illinois Survey indicates that Illinois coals can be used satisfactorily to produce most cokes. However, in many cases where local coals can be used with success, coke producers must use captive coals instead. Apparently, coals from captive mines will be replaced gradually by Illinois coal because of serious economic factors.

It may be that mining, preparation and transportation costs will be the ultimate determining considerations.

That state's coke industry exemplifies the role a state geological survey can play in expanding the use of local natural resources and developing cooperative local industry.

Kudos...

The following was written by Wayne K. Wallace, chief minerals geologist, Kern County Land Company, in a letter to Dr. Kenneth L. Cook, professor and chairman of the Geophysics Department, University of Utah.

"I wish to compliment you on your article pertaining to geophysics, which appeared in the February, 1967, *Quarterly Review*, of the Utah Geological and Mineralogical Survey.

You have presented a concise, and complete review of the various geophysical methods along with good examples of practical applications within the State of Utah...

The Utah Geological and Mineralogical Survey has performed a commendable service in presenting the *Quarterly Review* and I can assure you it is well received by the mining industry..."

Survey Releases Report On Salt Flats Study

Report of Investigation No. 35, Bonneville Salt Flats, Hydrogeological Study near Wendover, Utah, by Bruce N. Kaliser, engineering geologist for the UGMS, has been released.

This report encompasses the field work undertaken by the UGMS in an effort to evaluate the effect of brine withdrawal for potash extraction on the salt surface in the vicinity of the Bonneville race course.

The UGMS study was begun at the request of Gov. Calvin L. Rampton in the fall of 1966. Field inspection, data collection, interviews, and preparation of a salt crust (thickness contour) map and photomosaics preceded the field testing program.

Preparation for pump testing was begun on March 26, 1967, at which time the augering of 16 holes was undertaken. Four holes were pumped and twelve utilized solely for observation purposes. Twelve holes penetrated beneath the salt pan were completed by jetting to assure sensitivity.

Four horizons underlying the salt surface were tested: the salt crust itself, a gypsum horizon beneath, the top of the underlying tan and deeper into the tan clay. Permeabilities calculated for both the salt crust and clay were substantial.

It became quite apparent from the data assembled that these two aquifers exist with little connection between them. Brine withdrawal to the east, therefore, by collecting canals excavated entirely in clay is unlikely to dewater the salt crust to the west. In reaching the conclusion data was drawn from relative drawdowns, static levels and brine analyses.

MOAB-NEEDLES PAPER AVAILABLE

Regional Geophysical Investigations of the Moab-Needles area, Utah, Geological Survey Professional Paper 516-C, can be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington D. C. 20402.

This paper was prepared — partly on behalf of the U. S. Atomic Energy Commission — by H. R. Joesting, J. E. Case and Donald Plouff of the USGS, Department of the Interior.