

OIL & GAS CONSERVATION COMMISSION  
Meeting: September 19, 1975  
Mr. John Bannister, Exec. Sec.

32x41



OFFICE OF  
**Oil and Gas Conservation Commission**  
STATE OF ARIZONA

PHOENIX, ARIZONA 850  
PHONE: (602) 271-5161

A G E N D A

Meeting  
September 19, 1975  
8686 North Central Avenue, Suite 106

10:00 a.m. Hearing, Case No. 50

Immediately following Hearing Call to order

1. Approval of minutes of meeting of June 20, 1975
2. Report of Executive Secretary
3. Report of Enforcement Section
4. Report of Geology Section
5. Old Business
6. New Business
7. Adjourn

*Kansas City  
Oct 16 1975  
WASH*

*John A. [unclear]*

*SO LINDA HEARING - FLAGG*

*NEXT Meeting  
Nov. 21*

IF YOU ARE UNABLE TO ATTEND THIS MEETING, PLEASE INFORM THIS OFFICE AS SOON AS POSSIBLE.



OFFICE OF

**Oil and Gas Conservation Commission**

STATE OF ARIZONA  
8686 N. Central, Suite 106  
PHOENIX, ARIZONA 85020  
PHONE: (602) 271-5161

September 10, 1975

Memo: Commissioners  
From: John Bannister

As you have been advised, the Hearing requested by Kerr-McGee Corporation to consider implementation of secondary recovery plans in the Dineh-Bi-Keyah area has been set for 10:00 a.m. on September 19th and will be immediately followed by the regular Commission meeting.

The most important item to come before the Commission meeting will be consideration of the Commission budget request for the 1976-77 year. All indications at this time are that Governor Castro intends to tightly control budget requests for this period, perhaps as stringent as the 1975-76 budget.

The staff has received several requests to make speeches on energy related topics and these are being complied with as rapidly as possible.

The Auditor General has revised his auditing times for the Commission and has decided upon an 18-month rather than a 24-month audit, consequently the auditors are again in our office but should be through with this portion of the work by September 19th. It will be some time after that before we receive the report, however indications are that the affairs of the Commission are in excellent shape.

The Governor has formed an Interagency Energy Planning Committee, which may become quite active. Dr. Brent Brown of the Office of Economic Planning and Development has been named Chairman and Dr. Robert Handy has been named Vice Chairman. In addition to the Oil and Gas Commission, Arizona Power Authority, Arizona Resources Information System, Water Commission, Atomic Energy Commission, Corporation Commission, Division of Administrative Services, Department of Transportation, State Land Department, Mineral Resources, Department of Administration and the Bureau of Mines are represented on this Committee.

Memo: Commission  
September 10, 1975  
Page 2

From an informal discussion with Andrew Bettwy and A. K. Doss, indications are that the State Land Commission stand on the leasing of known geothermal resources in Arizona is still firm.

The Interstate Oil Compact Commission has called a meeting of the Executive Committee in Washington, D.C. on October 2nd. As a member of the Executive Committee and as representative of the Governor, I request permission to attend. The IOCC feels that the Fall Executive Committee meeting should be held in Washington each year and the Congressional representatives of the various states be invited to attend this session. It is felt that direct and informal contact can be made in this manner, with perhaps favorable results. The first of these meetings was held last year and a representative of Congressman Sam Steiger's office attended. As usual, I will issue invitations to our Congressional representatives in the near future. It should be noted that this is one of the five out-of-state meetings for which we requested funding and which funding was granted.

Mrs. Saralee Lorenzo has been granted leave without pay due to a forthcoming operation. This is in accordance with the rules of the Personnel Commission. Mrs. Lorenzo, who works with Bill Allen, will be absent approximately six weeks. Upon returning, she will continue her probationary employment period, as if there had been no interruption in service. The duties assigned to Mrs. Lorenzo will be accomplished by Mrs. vonBlume and Mrs. Stacey in the interim. While this will mean some disruption in service, it is nothing that we cannot cope with.



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PHOENIX, ARIZONA 85020

A C T I V I T Y   R E P O R T

September 10, 1975

Memo from W. E. Allen, Director  
Enforcement Section

The Federal Power Commission has completed a comprehensive study of anticipated gas curtailments for the coming winter season and predicts a 41 per cent increase over last year's cutbacks... provided that the winter is no more severe than the last one.

Curtailments amounting to 466 billion cu. ft. of gas are indicated by the FPC's Bureau of Natural Gas in a preliminary report on its summary of past and projected reductions in available gas for the nation's domestic markets.

Rocky Mountain states are expected to fare better than some parts of the country, according to the FPC study...but Colorado could be hit by a 34 billion cu. ft. curtailment for the winter period, more than any other Rocky Mountain state for which figures are shown in the study.

Arizona, with a 27 billion cu. ft. curtailment last winter, all in the firm category, is to have an added 6 billion curtailment in 1975-76 for a total reduction of 33 billion cu. ft., and again no interruptible supplies are cited.

You are aware, of course, of the hearing requested by Kerr McGee to start a pilot water flood in the Dineh Bi Keyah field. This flood would, if proved successful, in my opinion create the necessity of drilling several more wells, both producing wells and for injection purposes. This is going to be an interesting project. To my knowledge, it will be a first for attempting a water flood in this type of producing formation.

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Clinton Oil Company has completed it's #0-3 in the SW/SW/4, Sec. 23, T41N,R30E, Apache County. (This is the well Clinton requested an unorthodox location for). The well tested 122 BO and 208 MCF in 24 hours. GOR was 1705-1.

Clinton has also put their #2 well on the pump. This well was drilled in 1972 and temporarily abandoned because of excessive water production. The well is located at NW/SE/4, Sec. 23, T41N, R30E. During the month of July, the well produced 997 BO, 8861 BW and 4110 MCF gas.

Williams Energy has completed the drilling of 2 additional storage wells in the Adamana area and they have one permit outstanding.

Apparently, both Duval and St. Joe have concluded their stratigraphic testing programs for potash in the Navajo Springs area. From my conversations with representatives of these two companies, I have been left with the opinion that an increase in the price of potash could lead to the development of mines in the area.

My June report mentioned the possibility of reclaiming methane gas from sanitary landfills. NRG-Nu Fuel Company has a plant in operation at the Palo Verdes landfill near Los Angeles. This operation will originally process enough gas to supply 3500 homes. The operation will be enlarged in the near future. NRG-Nu Fuels are planning operations in two landfills in the Phoenix area.

The June report also mentioned that the Attorney General had been asked to determine if this Commission would be involved in the recovery project. We have not received the Attorney General's formal opinion, however, the attorney that was assigned to this request has orally told me that operations of this kind would be outside our realm of interest.

*realm*

*who*



OFFICE OF

**Oil and Gas Conservation Commission**

STATE OF ARIZONA  
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ACTIVITY REPORT

September 10, 1975

J. N. Conley  
Director, Geology Section

PUBLICATIONS

Sales for the past month totaled \$107.50. Purchasers were:

Mapco Diversified, Denver  
Fluor Gas & Oil Corp., Denver  
Cyprus Georesearch Co., Los Angeles  
Trans Ocean Oil, Inc., Houston  
Mobil Research & Development Corp. Library, Dallas  
Phillips Petroleum, Denver  
Phillips Petroleum, Odessa  
Patrick Petroleum Corp., Jackson, Mich.  
Gulf Research & Development Co., Pittsburgh  
Marathon Oil Co., Casper  
Dean Smith, Scottsdale  
C. W. Morton, Los Angeles  
James D. Sell, Tucson  
Ben W. Sturges, Phoenix  
Ed Nicksic, Phoenix

INVESTIGATIVE PROJECTS

"Macrofold" Map. Relating to this project is a quotation from the August 1975 issue of the University of Arizona Remote Sensing Newsletter:

"Oil and Gas Conservation Commission

"George Davis (Geology, University of Arizona), in a recently completed study, interpreted LANDSAT imagery to identify structural features in north-eastern Arizona to determine a structural framework for oil and gas deposits.

"Because his work was so successful, the Oil and Gas Conservation Commission has decided to continue the investigation in order to identify candidate areas for oil and gas deposits."

The final editing of Davis' manuscript by this office was completed today. A color proof of the map will be printed this week. Barring further unforeseen delays, the map (Structure Map of Folds in Phanerozoic Rocks, Colorado Plateau Tectonic Province of Arizona) and the report (Tectonic Analysis of Folds in the Colorado

Activity Report  
September 10, 1975  
Page 2

Plateau of Arizona) will be printed within the next few weeks. This investigative project was proposed by this Commission. It was funded jointly by National Aeronautics and Space Administration (NASA) grant NGL 03-002-313; this Commission; and the Department of Geosciences and Office of Arid Lands Studies (OALS), University of Arizona. The satellite-image base was provided by courtesy of the Arizona Resources Information System.

As to the second paragraph of the Newsletter quotation, the map and the report will be very useful to this Commission and the oil industry in semi-isolating areas of interest warranting additional exploration. In our initial proposal for this project, however, we stated that the macrofold study represented only the first phase of an overall remote sensing program involving a detailed photogeologic/geomorphic study of areas of interest defined or semi-defined by the LANDSAT (ERTS)-1 imagery study, follow-up geophysical studies, and integration of the results of these studies with the known surface and subsurface geology.

When it appeared that the first phase of the overall project was going to be very useful, we requested the Office of Arid Lands Studies to consider undertaking the second phase, a detailed geologic/geomorphic study of aircraft photography. The following quotation from the previously mentioned Newsletter indicates that this portion of the project has been approved by OALS and NASA:

"U-2 Coverage of Northern Arizona

"A NASA high altitude flight of northern Arizona is being planned for late September of this year. The proposed flight will be high resolution color infrared and matching natural color at a scale of 1:120,000 with limited coverage at 1:30,000.

All potential users are urged to write a formal letter to the Applied Remote Sensing Program expressing needs and intended use for such coverage."

The cost of this U-2 photo coverage to be furnished by NASA will be approximately \$50,000. This Commission's participation will be limited to furnishing our expertise in the integration of the results of both investigations with the available geological and geophysical information, and the publication of maps and reports in FY1976-77. A modest budget request for funds to prepare and print the maps and report was submitted to Mr. Bannister this past month.

Holbrook Area. It currently appears that Webb Resources has not funded its proposed 7-well exploratory program in the gross Holbrook area. Our Holbrook G-7 Coconino Structure Map, which has been shelved pending completion of the program, will be resumed soon. The other structural studies mentioned in the July Activity Report are underway.

Subsurface Temperature Map of Arizona. This map, published in October 1972, needs to be updated and reprinted, as the bottom-hole temperatures recorded in several deep holes since then are appreciably higher than any shown in the original map. We have assembled the new data. Later this calendar year we plan to prepare an in-house reproducible of the map. We will not have funds to publish the map but it will be available as an open-file item. Persons, academic institutions, and

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Page 3

governmental agencies desiring blue-line prints from the reproducible can get them at private expense.

Paleozoic "Folio." Within a few weeks the first phase of this project, consisting of a detailed study of logs, well records, and a research of literature in north-eastern Arizona, will be completed. The investigation involved such items as:

- 1) Stratigraphic and geographic occurrence and thickness of igneous sills
- 2) Net thickness of Paleozoic sediments
- 3) Net thickness of each of the geologic systems present
- 4) Sea level datum of the top and bottom of each of the systems
- 5) Predominant lithology of each system
- 6) Lithology of basement rock
- 7) Notation of significant shows of hydrocarbon data
- 8) Recognition and notation of abnormal stratigraphic or structural relationships

Upon completion of a review of all the data, we will commence the preparation of the first two planned maps, which will be a thickness map of the Paleozoic sediments and a map showing the topography of the underlying basement rocks.

#### GEOHERMAL

In the July 1975 Activity Report I reported an investigation of the potentialities of a hot-dry-rock method of utilizing geothermal heat being conducted near Los Alamos, New Mexico. To date the results have been encouraging. If continued investigations establish the feasibility of such a method to generate electricity, one of the next problems to be solved would be where to search for hot dry rocks.

Although almost three million holes have been drilled in North America in search of hydrocarbons and minerals, they have been drilled mostly in sedimentary rock in oil-producing areas. Very few have been drilled in igneous or metamorphic rock and many areas of possible geothermal interest have not been drilled at all.

After a year's study, a group of earth scientists have proposed a 10-year program to drill a series of holes ranging in depth from 1000 to 9000 feet at scattered sites in six western states to learn more about the basement in areas where there has been no drilling into the basement. From the geothermal standpoint, such holes could increase knowledge about hydrothermal systems and active magma chambers and heat flow and thermal structure of the crust. One of the proposed sites would be in Coconino County, north of Flagstaff.

At least three deep holes in Arizona drilled into volcanic or basement rocks have recorded hotter than normal temperatures. Two of these holes were drilled by Geothermal Kinetics Systems near Higley in Maricopa County. The recorded temperature of one of these holes at a depth of 9125 feet in volcanic rock was 205°F; a computed temperature, allowing for cooling effect of the water in the hole, of 365° was reported by the operator. Humble's hole a few miles south of Tucson recorded a temperature of 296°F at a depth of 12,571 feet in basement rock; no adjusted temperature was reported.

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#### EXPLORATION

To my knowledge there are no geophysical exploratory programs being made in Arizona at this time. Keplinger & Associates, for the account of Wichita Industries, completed a reconnaissance type of seismograph survey along the crestal portion of the Morman Lake anticline near Flagstaff this past month.

Southern Union Gas Co., Dallas, Texas, is continuing some geologic subsurface studies in the northeastern portion of Apache County.

Leasing procedures, a 16 2/3 percent royalty, and "red-tape" requirements have severely hampered or discouraged exploration for hydrocarbons on the Navajo Indian Reservation. One of the Tribe's geologists informed me two years ago that the Tribal Council was seriously considering ways of getting some exploration whereby the Tribe could end up with a working interest in any oil fields discovered.

The Blackfeet Tribe in Montana has recently made an agreement with an oil company under which the company expects to spend about \$2 million for oil and gas exploration of tribal lands not now leased. The company can select acreage to be explored and the Blackfeet will approve or disapprove. If production is found under the agreement the normal 16 2/3 percent royalty will be paid until the company recovers its investment, after which production will be shared 50-50. Lands selected by the company for exploration will not come under the normal leasing procedures for Indian lands (prescribed by the Bureau of Indian Affairs) but under the separate exploration agreement.

Perhaps the Navajo Tribe may eventually adopt a similar plan.

#### GENERAL

Field Trip. This past month I made a trip to the Strip Country (Mohave County north of the Colorado River) with A. K. Doss and Frank Kellogg, Minerals Division, Arizona State Land Department. My purpose was threefold:

- 1) Get a better feel of the geology and geography of this frontier area
- 2) Check on the ground some of the localities in which oil-impregnated rocks have been reported in the literature
- 3) Visit the Virgin oil field a few miles north of the Arizona-Utah boundary

On my return trip to Phoenix I spent one day in Flagstaff to attend a geological symposium sponsored by the Museum of Northern Arizona.

Two of the oil-impregnated rock localities (1 and 4, as shown on Figure 4, Well Location Map Nine, Arizona Oil and Gas Conservation Commission, 1975) were visited. We were unable to verify the reported presence of any asphalt in the upper Permian Kaibab Limestone in Black Rock Canyon, Locality 1. The Woods Ranch Member of the Permian Toroweap Formation does contain a petroliferous dolomite in Hack Canyon, Locality 4).

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The closest oil production to the Strip Country is the Virgin field, T. 41 S., R. 12 W., Washington County, Utah. This field was discovered in 1907. It has produced more than 200,000 barrels of oil. The producing sandstone reservoirs are in the Triassic Moenkopi Formation at depths ranging from 500 to 1200 feet (considerable topographic relief in field area). Pumping gauges range from one to 40 barrels of oil per day. As a result of the current \$10.00 per barrel price for new oil, several wells in this old field have been drilled recently.

Oil Potential, Triassic and Upper Paleozoic Rock. Most oil exploratory efforts in past years in northern Arizona and southern Utah has been in search of structurally controlled traps in lower Paleozoic rocks. However, most of the oil fields discovered to date are primarily stratigraphic type traps. Most of the pools in the Greater Aneth field area in southeastern Utah, for example, produce from carbonate (limestone or dolomite) reefs. This area has already produced more than 259,554,000 barrels of oil. The two fields producing from the Triassic Moenkopi Formation, Virgin and Grassy Trail Creek, are stratigraphic traps with favorable structural conditions.

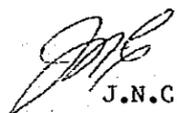
Future exploration in northern Arizona should be directed toward both structural and stratigraphic traps in Triassic and upper and lower Paleozoic rocks. Numerous oil shows in Permian (upper Paleozoic) rocks have been noted in the few wells drilled in the Strip Country and a few very minor oil shows have been noted in wells on the east flank of the Black Mesa basin in Apache County.

Unfortunately, most of the sedimentation of the Triassic and Paleozoic in northern Arizona and southern Utah is poorly understood. Most of the studies in the literature were done years ago, long before the sedimentary processes active in modern environments had been studied. Current and recently completed studies by the Utah Geological and Mineralogical Survey, the United States Geological Survey, and the Geology Department of Northern Arizona University are of the type that will be very useful in semi-isolating areas favorable for exploration for both stratigraphic and structural traps.

#### VISITORS

Visitors to the office this past month have been interested in potash information.

JNC:os

  
J.N.C.

**MONTHLY FINANCIAL REPORT**

RECEIPTS MONTH OF <i>Aug 1975</i>	CLASSIFICATION	APPROPRIATED RECEIPTS	UNAPPROPRIATED RECEIPTS	TOTAL ALL RECEIPTS YEAR TO DATE
<i>25 00</i>	1 Permits to Drill		<i>25 00</i>	<i>25 00</i>
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<i>25 00</i>	TOTAL CURRENT MONTH RECEIPTS		<i>25 00</i>	XXXXXXXX
XXXXXXXX	TRANSFERS IN			
XXXXXXXX	BALANCES BROUGHT FORWARD		<i>50 00</i>	XXXXXXXX
<i>25 00</i>	TOTALS - MONTH AND YEAR TO DATE		<i>75 00</i>	<i>75 00</i>

CLAIMS PAID MONTH OF <i>Aug 1975</i>	FUND TITLES	TOTAL AMOUNT AVAILABLE YEAR TO DATE	CLAIMS PAID YEAR TO DATE	OUTSTANDING ENCUMBRANCES	UNENCUMBERED BALANCE
<i>9,064 46</i>	1 Personal Services	<i>28,370 00</i>	<i>15,409 62</i>		<i>12,960 38</i>
<i>1,279 78</i>	2 Emp. Related Exp.	<i>3,990 00</i>	<i>2,145 13</i>		<i>1,844 87</i>
<i>1,765 14</i>	3 Other Operating Exp.	<i>20,845 54</i>	<i>5,577 64</i>	<i>14,798 92</i>	<i>468 98</i>
<i>168 75</i>	4 Prof. & Outside Serv	<i>750 00</i>	<i>168 75</i>		<i>581 25</i>
<i>529 61</i>	5 Travel - State	<i>1,925 00</i>	<i>529 61</i>	<i>257 70</i>	<i>1,137 69</i>
	6 Travel - Out of St.	<i>2,200 00</i>			<i>2,200 00</i>
<i>31 76</i>	7 Cap. Outlay - Equip.	<i>400 00</i>	<i>370 91</i>		<i>29 09</i>
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<i>12,839 50</i>	TOTALS	<i>58,480 54</i>	<i>24,201 66</i>	<i>15,056 62</i>	<i>19,222 26</i>

AGENCY Oil & Gas Conservation Comm.

DIVISION \_\_\_\_\_

IDENTIFICATION CODE NO. \_\_\_\_\_

1	2	3	4
CLAIMS PAID YEAR TO DATE	OBJECT CODE NO.	DISTRIBUTION OF EXPENDITURES CLASSIFICATION	CLAIMS PAID MONTH OF Aug 1975
	7111	1 Per Diem: Commission Members	1
15,409.62	7112	2 Salaries: Employees	2 9,064.46
		3	3
	7151	4 Industrial Insurance	4
	7152	5 Unemployment Insurance	5
901.48	7153	6 F.I.C.A.	6 530.28
1,078.65	7155	7 Retirement	7 634.50
165.00	7156	8 Health Insurance	8 115.00
	7159	9 Personnel Comm.	9
		10	10
	7215	11 Professional Services: Engineer	11
168.75	7219	12 Professional Services: Other	12 168.75
		13	13
240.00	7221	14 Travel-State: Mileage	14 240.00
139.00	7222	15 Subsistence	15 139.00
	7223	16 Public Transportation	16
337.31	7224	17 Vehicle Expense	17 337.31
90	7225	18 Reg. Fees; Parking; etc.	18 90
		19	19
	7232	20 Travel-Out of State: Subsistence	20
	7233	21 Public Transportation	21
	7234	22 Airport Parking	22
	7235	23 Reg. Fees; Telephone; etc.	23
		24	24
4,826.64	7251	25 Occupancy: Office Rent	25 1,603.83
	7261	26 Warehouse Rent	26
	7263	27 Maintenance & Repairs	27
170.00	7272	28 Mtn. & Repairs: Furniture & Equipment	28 90.00
	7280	29 Office Supplies	29
	7280.1	30 Orthophoto Quads.	30
	7300	31 Field Supplies: Film; Am.Strat; P.I.; etc.	31
	7331	32 Printing: Reports; Large Maps; etc.	32
	7332	33 Legal Advertisement	33
	7333	34 Court Reporter	34
331.00	7334	35 Postage	35 66.26
	7335	36 Telephone	36
	7337	37 Drayage; Express; etc.	37
	7339	38 Rental, Misc.	38
	7360	39 Dues & Subscriptions	39
		40	40
370.91	7431	41 Capital Outlay: Office Equip.	41 31.76
	7434	42 Spec. Equip. (Geol.)	42
	7436	43 Automobile	43
		44	44
250.00	7913	45 Revolving Fund	45
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		54	54
		55	55
24,201.66		TOTAL	12,839.50

OFFICE

DO NOT WRITE BELOW THIS LINE

FIELD

Copy to  
COMMISSIONERS

Newsweek, June 23, 1975

By Milton Friedman



## Subsidizing OPEC Oil

In a recent column (NEWSWEEK, May 12), I argued that decontrolling the price of "old" oil (mostly that part of the oil from domestic wells which is less than 1972 output) would lower, not raise, the price of oil products to final consumers because it would give domestic producers an incentive to produce more oil and therefore would increase the total amount of oil available. The higher price to producers of "old" oil would, I argued, not raise the price to consumers but simply end the present bonanza to refiners and other intermediaries from being able to buy "old" oil cheaply.

### MEA CULPA

A former student of mine, Michael Canes, now an economist with the American Petroleum Institute, has informed me that my analysis was incomplete and my final conclusion wrong. My mistake was in not realizing how perverse and irrational are the Federal Energy Administration's regulations for allocating the benefits of being able to buy "old" oil at the controlled price. These regulations in effect tax domestic producers of "old" oil and subsidize consumption of both "new" oil and imported oil.

President Ford has now imposed a tariff of \$2 a barrel on imported oil. At the same time, the FEA, an agency responsible to the President, is giving what amounts to a subsidy of roughly \$3 a barrel to imported oil. Was there ever a clearer case of the right hand not knowing what the left is doing? I know that the FEA is not in fact being run by secret agents of the Shah and sheiks. No need, when unwitting volunteers are so cooperative.

This absurd procedure means that, while decontrolling "old" oil would indeed increase domestic production, it would reduce imports even more by ending the current subsidy to imported oil. The final result would be a smaller total amount of oil and a higher product price.

I oppose subsidizing oil consumption. But surely, if a subsidy is to be given, it should be given to domestic oil production only, not to the producers in the OPEC cartel that we are exerting every device of diplomacy to break. Still higher tariffs could have that effect—but what a confused and confusing way to achieve it.

This incredible result has occurred because the FEA has yielded to the pressure for statistical "equity" to oil

refiners and marketers. A ceiling price of \$5.25 for "old" oil, when the market price is more than twice that amount for "new" and imported oil, would favor those refiners who happen to have access to more than the average percentage of "old" oil. To avoid this outcome, the FEA distributes to all refiners (and marketers of imported refined products) "entitlements" to "old" oil proportional to the total number of barrels of oil that they use. Currently, "old" oil accounts for about 40 percent of total oil consumption. Hence, for every 100 barrels of oil that a refiner uses he receives entitlements to buy 40 barrels at the controlled price of \$5.25, which he may exercise himself or sell to another refiner. A refiner whose own production of "old" oil is more than 40 percent of his total usage must buy entitlements to use his own oil from less-well-endowed refiners!

The entitlements are valuable. At a market price of crude oil of, say, \$12.75 per barrel (including the tariff), an entitlement to buy one barrel of "old" oil is worth \$7.50 (\$12.75-\$5.25). A refiner who imports one barrel at \$12.75 gets an entitlement for .4 of a barrel worth \$3 (.4x\$7.50). In consequence, his net cost is \$9.75. The result is the same as if control of the price of "old" oil were replaced by a tax on "old" oil of \$7.50 a barrel and the proceeds used to give a subsidy of \$3 to each barrel of oil produced in the U.S. or imported from abroad. The total sums involved are staggering: roughly \$16 billion a year of taxes imposed by administrative edict on domestic producers of oil and redistributed to refiners and importers.

### ABOLISH FEA

It is inconceivable that the President would recommend or that the Congress would enact such a tax-subsidy arrangement. Yet it now exists! Over a year ago, during the chaos that followed the oil embargo, I wrote in this space: "The way to end long lines at gas stations is to abolish FEO [now FEA] and end all controls on the prices and allocation of petroleum products." That is also currently the way to strike a major blow at the oil cartel and to take the power to tax and to spend away from appointed administrators and return it to elected representatives of the people.

RECEIVED

JUL 9 1975

O & G CONS. COMM.



OFFICE OF

**Oil and Gas Conservation Commission**

STATE OF ARIZONA  
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~~XXXXXXXXXX~~  
PHOENIX, ARIZONA ~~85009~~X 85020  
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PLEASE NOTE: THE NEXT COMMISSION MEETING WILL BE AT  
10:00 A.M. ON FRIDAY, SEPTEMBER 19,  
1975.



OFFICE OF  
**Oil and Gas Conservation Commission**  
STATE OF ARIZONA  
4515 NORTH 7TH AVE.  
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PHONE: (602) 271-5161

August 18, 1975

Memo: Commissioners  
From: John Bannister

Re: 1976-77 Budget

Attached is the suggested Commission budget for the 1976-77 fiscal year. Basically, the Commission is seeking to regain the ground lost during the 1975-76 fiscal year, i.e., restoration of lost services. I believe this is about as much as we can anticipate receiving.

However, during our Commission meeting in September, which will be following the Kerr-McGee hearing, Mr. Conley and I would like to present several proposed geological projects. These proposed projects, if accepted and approved by the Commission, would call for some revision within the budget as presented.

Should you have any questions or suggestions prior to our September meeting, please advise.

In accordance with instructions from the Budget Office, the attached is being submitted as of September 1, with the explanation that this will not be an approved request until you Commissioners have reviewed it on September 19th.



OFFICE OF

**Oil and Gas Conservation Commission**

STATE OF ARIZONA  
8686 N. Central Ave., Ste. 106  
~~XXXXXXXXXXXX~~  
PHOENIX, ARIZONA 85013  
PHONE: (602) 271-5161

August 7, 1975

Memo: Commissioners  
From: John Bannister

The office has been comparatively quiet since our report to you in July. Personally, I have completed the trip to Pennsylvania (at IOCC expense) as part of the team to analyze Pennsylvania's regulatory efforts. In the near future I will submit my personal recommendations to the IOCC. In frequent meetings the team members arrived at general conclusions. These will be compiled by Mr. Dowd of the IOCC and personal observations based upon our individual efforts while in Pennsylvania will be submitted next week. A compilation of these will be made and Mr. Dowd will then circulate what will eventually be total recommendations for committee approval.

Kerr-McGee Corporation has made application to the Commission for an order to permit injection of salt water into the Dineh-Bi-Keyah area. I have advised Kerr-McGee that this matter will be heard by the Commission on September 19th at 10:00 a.m. This is our regular Commission meeting date and will entail no additional time on the part of the Commissioners. With my next report I will submit a copy of Kerr-McGee's application for you to review prior to the Commission hearing. The application is relatively straightforward and anticipates a pilot project in the Dineh-Bi-Keyah area to eventually lead to secondary recovery, i.e., water flooding of the area.

I would remind you that the statutes currently call for Kerr-McGee to bear the cost of publication and the cost of the court reporter in this hearing and Kerr-McGee's application fee of \$50 has been received. This will be credited back to Kerr-McGee when the total cost of the hearing has been determined.

The staff vacations are proceeding at a normal rate. By the time of the September meeting it is anticipated that vacations will have been taken by all except John Bannister, Jack Conley and Ann vonBlume.

Memo: Commission  
August 7, 1975  
Page Two

Since our last report, the State Motor Pool Department has somewhat changed regulations on automobiles. As previously advised, we have surrendered two of our vehicles and it looks like in the near future a third vehicle, currently assigned to John Bannister, will be surrendered also. This will, in effect, leave the Commission with one assigned vehicle, which will be operated by Bill Allen. As needed, vehicles can be withdrawn from the Motor Pool and be returned upon completion of the individual mission. Mileage accumulated by personal cars for such things as trips to the Capitol, in-state, etc., will, as usual, be reimbursed at 15¢ per mile. Our forthcoming budget request will reflect this change.

It is anticipated at this time that our initial budget recommendation for the year 1976-77 will be completed and forwarded to you around the week of August 18th. Essentially, I am seeking to recommend the Commission do no more than regain the ground lost last year. As you are aware, the money allocated for the Commissioners' time was reduced this year and we have been advised it may be necessary to do this again next year in order to maintain reclassifications of employees. However, I have advised Jack Brenner of the Budget Division of the Finance Department that I feel the Commission was not dealt with fairly during this current year and that I will recommend this situation be corrected in the upcoming new budget. I have, of course, pointed out that my recommendations will not become official until such time as the Commissioners have acted upon it.

You may have noticed in the newspapers recently that the Arizona Corporation Commission is seeking to establish its own Energy Advisory Committee. Governor Castro's office has indicated that it will discuss establishment of an Inter-Agency Energy Planning Office with the purpose of coordinating the energy efforts of the various State agencies. A meeting has been called on August 13th in the Governor's office at 9 a.m. and I have been advised to be present at this meeting. I have no indication at this time of what the thinking of the Governor or his staff is concerning the so-called Inter-Agency Office, and I will keep you advised of developments in this area.

The Auditor General has been reviewing the affairs of this Commission. Two auditors were present for approximately ten working days. They had under consideration the fiscal year 1974-75. Consequently, they audited this Commission's records through June, 1975 and some time in February or March of 1976 they will complete the remaining half of the

Memo: Commission  
August 7, 1975  
Page Three

1975 calendar year and at that time make their complete report as to the affairs of the Commission. They have, however, advised me that the affairs of this Commission are well in order.



OFFICE OF

## Oil and Gas Conservation Commission

STATE OF ARIZONA

4515 NORTH 7TH AVE.  
PHOENIX, ARIZONA 85013

OFFICE CENTRAL, SUITE 106  
PHOENIX, ARIZONA 85020

PHONE: (602) 271-5161

### ACTIVITY REPORT

August 6, 1975

J. N. Conley  
Director, Geology Section

#### PUBLICATIONS

Sales for the past month totaled \$91.25. Purchasers were:

Southern Union Gas Co., Dallas  
Arizona Refining Co., Phoenix  
Trio Petro Inc., Denver  
Harry E. Nelson, Las Vegas  
Cypress Georesearch Co., Denver  
Ashland Exploration Co., Denver  
Earl Huggins, Sedona  
Petroleum Investment Co., Salt Lake City  
W. R. Grace Co., Dallas  
Phillips Petroleum, Bartlesville  
James K. Munn, Denver  
D. W. Hurd, Winnipeg  
John Corollo Engineers, Phoenix

An announcement of the availability of our Well Location Map 9 and a revised edition of our Holbrook A-1 map appeared in the July 24, 1975, issue of PETROLEUM INFORMATION.

#### INVESTIGATIVE AND MISCELLANEOUS PROJECTS

"Macrofold" Map. We completed editing Dr. George H. Davis' manuscript and map earlier this month. He expects to make the necessary corrections for final copy-ready material prior to September.

Subsurface Temperature Map. Most of the data for an updating of this map, published in 1972, have been assembled.

Index of Samples. This catalog was published in June, 1971. An "update insertion" was prepared in February, 1973. An insertion listing the drill-bit samples of wells added to our library since then has been compiled.

Other Projects. Very little progress was made this past month on our investigative projects because of vacations.

Activity Report  
August 6, 1975  
Page 2

#### LEASING ACTIVITY

Most of the State of Arizona leases acquired since the first of this year are in the Strip Country (area in Mohave County west and north of the Colorado River). The three principal leasees have been:

James Pickett (local lease broker)  
Home Oil Company, Houston  
Grynberg-Kenter, Denver

There have been some scattered lease acquisitions by individuals and small oil companies in Cochise County.

#### GEOPHYSICAL EXPLORATION

A contract seismograph crew is operating on roads on the Norman Lake anticline southeast of Flagstaff. The program is under the supervision of Keplinger & Associates, an oil and gas property management firm, probably for Wichita Industries or a subsidiary of this company.

#### VISITORS

We had only four visitors this past month. They were a graduate student from Northern Arizona University (interested in getting logs and well data for a master's thesis on the facies of the Pennsylvanian rocks of northern Arizona); D. L. Nelson, Arizona Refining Co.; D. W. Hurd, Winnipeg, Canada; and John Corollo, an engineer.

JNC:os

  
J.N.C.

**MONTHLY FINANCIAL REPORT**

RECEIPTS MONTH OF <i>July 1975</i>	CLASSIFICATION	APPROPRIATED RECEIPTS	UNAPPROPRIATED RECEIPTS	TOTAL ALL RECEIPTS YEAR TO DATE
<i>50 00</i>	1 Permits to Drill		<i>50 00</i>	<i>50 00</i>
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
<i>50 00</i>	TOTAL CURRENT MONTH RECEIPTS		<i>50 00</i>	XXXXXXXX
XXXXXXXX	TRANSFERS IN			
	BALANCES BROUGHT FORWARD		<i>3,926 83</i>	XXXXXXXX
<i>50 00</i>	TOTALS - MONTH AND YEAR TO DATE		<i>3,976 83</i>	

CLAIMS PAID MONTH OF <i>July 1975</i>	FUND TITLES	TOTAL AMOUNT AVAILABLE YEAR TO DATE	CLAIMS PAID YEAR TO DATE	OUTSTANDING ENCUMBRANCES	UNENCUMBERED BALANCE
<i>6,345 16</i>	1 Personal Services	<i>28,370 00</i>	<i>6,345 16</i>		<i>22,024 84</i>
<i>963 83</i>	2 Emp. Related Exp.	<i>3,990 00</i>	<i>963 83</i>		<i>3,026 17</i>
<i>3,812 50</i>	3 Other Operating Exp.	<i>20,773 15</i>	<i>3,812 50</i>	<i>16,474 06</i>	<i>486 59</i>
	4 Prof. & Outside Serv.	<i>750 00</i>			<i>750 00</i>
	5 Travel - State	<i>1,925 00</i>		<i>1,100 00</i>	<i>825 00</i>
	6 Travel - Out of St.	<i>2,200 00</i>			<i>2,200 00</i>
<i>339 15</i>	7 Cap. Outlay - Equip.	<i>400 00</i>	<i>339 15</i>		<i>60 85</i>
	8				
	9				
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	29				
	30				
<i>11,460 64</i>	TOTALS	<i>58,408 15</i>	<i>11,460 64</i>	<i>17,574 06</i>	<i>29,373 45</i>

AGENCY Oil & Gas Conservation Comm.

DIVISION \_\_\_\_\_

IDENTIFICATION CODE NO. \_\_\_\_\_

1	2	3	4
CLAIMS PAID YEAR TO DATE	OBJECT CODE NO.	DISTRIBUTION OF EXPENDITURES CLASSIFICATION	CLAIMS PAID MONTH OF <i>July</i> 1975
6,345.16	7111	1 Per Diem: Commission Members	1 6,345.16
	7112	2 Salaries: Employees	2
		3	3
	7151	4 Industrial Insurance	4
	7152	5 Unemployment Insurance	5
405.79	7153	6 F.I.C.A.	6 405.79
485.54	7155	7 Retirement	7 485.54
72.50	7156	8 Health Insurance	8 72.50
	7159	9 Personnel Comm.	9
		10	10
	7215	11 Professional Services: Engineer	11
	7219	12 Professional Services: Other	12
		13	13
	7221	14 Travel-State: Mileage	14
	7222	15 Subsistence	15
	7223	16 Public Transportation	16
	7224	17 Vehicle Expense	17
	7225	18 Reg. Fees; Parking; etc.	18
		19	19
	7232	20 Travel-Out of State: Subsistence	20
	7233	21 Public Transportation	21
	7234	22 Airport Parking	22
	7235	23 Reg. Fees; Telephone; etc.	23
		24	24
3,217.76	7251	25 Occupancy: Office Rent	25 3,217.76
	7261	26 Warehouse Rent	26
	7263	27 Maintenance & Repairs	27
80.00	7272	28 Mtn. & Repairs: Furniture & Equipment	28 80.00
	7280	29 Office Supplies	29
	7280.1	30 Orthophoto Quads.	30
	7300	31 Field Supplies: Film; Am.Strat; P.I.; etc.	31
	7331	32 Printing: Reports; Large Maps; etc.	32
	7332	33 Legal Advertisement	33
	7333	34 Court Reporter	34
	7334	35 Postage	35
264.74	7335	36 Telephone	36 264.74
	7337	37 Drayage; Express; etc.	37
	7339	38 Rental, Misc.	38
	7360	39 Dues & Subscriptions	39
		40	40
339.15	7431	41 Capital Outlay: Office Equip.	41 339.15
	7434	42 Spec. Equip. (Geol.)	42
	7436	43 Automobile	43
		44	44
250.00	7913	45 Revolving Fund	45 250.00
		46	46
		47	47
		48	48
		49	49
		50	50
		51	51
		52	52
		53	53
		54	54
		55	55
11,460.64		TOTAL	11,460.64

OFFICE

DO NOT WRITE BELOW THIS LINE

FIELD

**MONTHLY FINANCIAL REPORT**

RECEIPTS MONTH OF FY 1974 - 1975	RECEIPTS CLASSIFICATION	APPROPRIATED RECEIPTS	UNAPPROPRIATED RECEIPTS	TOTAL ALL RECEIPTS YEAR TO DATE
	1 Permits to Drill			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	TOTAL CURRENT MONTH RECEIPTS			XXXXXXXX
XXXXXXXX	TRANSFERS IN			
XXXXXXXX	BALANCES BROUGHT FORWARD			XXXXXXXX
	TOTALS - MONTH AND YEAR TO DATE		3,926 83	3,926 83

CLAIMS PAID MONTH OF 13th Mo. 1975	EXPENDITURES FUND TITLES	TOTAL AMOUNT AVAILABLE YEAR TO DATE	CLAIMS PAID YEAR TO DATE	OUTSTANDING ENCUMBRANCES	UNENCUMBERED BALANCE
	1 Personal Services	116,700 00	116,128 88		571 12
194 24	2 Emp. Related Exp.	15,200 00	15,043 40		156 60
	3 Other Operating Exp.	36,038 85	31,915 13		4,123 72
365 40	4 Prof. & Outside Serv	4,535 85	4,296 84		239 01
178 24	5 Travel - State	9,900 00	8,298 89		1,601 11
139 73	6 Travel - Out of St.	3,474 75	3,494 30		19 55
	7 Cap. Outlay - Equip.	4,100 00	4,031 38		68 62
	8				
	9				
	10				
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	25				
	26				
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	28				
	29				
	30				
877 61	TOTALS	189,949 45	183,208 82		6,740 63

AGENCY Oil & Gas Conservation Comm.

DIVISION \_\_\_\_\_ IDENTIFICATION CODE NO. \_\_\_\_\_

1	2	3	4
CLAIMS PAID YEAR TO DATE FY 1974-75	OBJECT CODE NO.	DISTRIBUTION OF EXPENDITURES CLASSIFICATION	CLAIMS PAID MONTH OF 74- 13th Mo. 1975
2,460 00	7111	1 Per Diem: Commission Members	1
113,668 88	7112	2 Salaries: Employees	2
		3	3
454 29	7151	4 Industrial Insurance	4 120 18
277 41	7152	5 Unemployment Insurance	5 74 06
5,985 18	7153	6 F.I.C.A.	6
6,521 52	7155	7 Retirement	7
1,420 00	7156	8 Health Insurance	8
385 00	7159	9 Personnel Comm.	9
		10	10
	7215	11 Professional Services: Engineer	11
4,296 84	7219	12 Professional Services: Other	12 365 40
		13	13
1,548 96	7221	14 Travel-State: Mileage	14
3,310 50	7222	15 Subsistence	15
171 40	7223	16 Public Transportation	16
2,725 38	7224	17 Vehicle Expense	17 178 24
472 65	7225	18 Reg. Fees; Parking; etc.	18
		19	19
1,122 00	7232	20 Travel-Out of State: Subsistence	20
1,921 83	7233	21 Public Transportation	21
1 02	7234	22 Airport Parking	22
449 45	7235	23 Reg. Fees; Telephone; etc.	23
		24	24
19,448 67	7251	25 Occupancy: Office Rent	25
1 00	7261	26 Warehouse Rent	26
	7263	27 Maintenance & Repairs	27
659 53	7272	28 Mtn. & Repairs: Furniture & Equipment	28
3,025 11	7280	29 Office Supplies	29 90 32
1,198 50	7280.1	30 Orthophoto Quads.	30
615 04	7300	31 Field Supplies: Film; Am.Strat; P.I.; etc.	31 49 36
979 34	7331	32 Printing: Reports; Large Maps; etc.	32
524 06	7332	33 Legal Advertisement	33
104 50	7333	34 Court Reporter	34
856 47	7334	35 Postage	35
2,993 04	7335	36 Telephone	36
	7337	37 Drayage; Express; etc.	37
61 80	7339	38 Rental, Misc.	38
174 80	7360	39 Dues & Subscriptions	39
1,273 27	7390	40 Moving	40
497 87	7431	41 Capital Outlay: Office Equip.	41
	7434	42 Spec. Equip. (Geol.)	42
3,533 51	7436	43 Automobile	43
		44	44
	7913	45 Revolving Fund	45
		46	46
		47	47
		48	48
		49	49
		50	50
		51	51
		52	52
		53	53
		54	54
		55	55
183,208 82		TOTAL	877 61

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OFFICE OF

**Oil and Gas Conservation Commission**

STATE OF ARIZONA  
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July 11, 1975

Memo: Commissioners  
From: John Bannister

I attended the midyear meeting of the Interstate Oil Compact Commission in Charleston, West Virginia on June 22, 23 and 24th. I am pleased to report that the program presented by the Environmental Protection Committee, of which I am Chairman, turned out to be the most important and best attended of the committee sessions. During this meeting, Barbara Heller spoke on the public role in offshore oil. Miss Heller is from the Environmental Policy Center, a lobbying group from Washington, D.C.

Mr. Hubert Braunig of Gulf Oil Company, Louisiana, spoke on "'Now and Then'--Offshore Petroleum Operations", indicating the tremendous growth and efficiency of the offshore industry in all phases of environmental protection. Dr. Don Kash of the University of Oklahoma spoke on "The Appropriate Rate of OCS Development" and Dr. Lyle St. Armant had a very interesting presentation showing that oil operations in the swamp and estuarian environment of Louisiana is not exceedingly harmful to the environment, although it does cause some changes. Dr. St. Armant is Assistant Director of the Wildlife and Fisheries Commission.

Many other interesting programs were presented. The meeting, probably due to location, was one of the smallest Commission meetings in recent years, however this did give us a chance to discuss various topics with most of the speakers. All in all, I think this was a most worthwhile trip.

You will find enclosed with this report copies of several letters indicating some of the contacts I have made during our recent IPAA trip to San Francisco. These letters are merely to give some indication of what I feel is one of the more important aspects of attending some of the outstanding meetings.

Memo: Commissioners  
July 11, 1975  
Page 2

The Federal Energy Administration recently announced its intention to create storage in its leaching salt caverns for surplus crude oil. An article recently appeared concerning this in the Oil and Gas Journal and I have taken the liberty of forwarding a copy of the article to Governor Castro, pointing out to him that Arizona is an ideal location for such a project, inasmuch as we have large salt masses in ideal locations and I pointed out that storage in Arizona would be a more secure storage area than would some of the coastal areas. I have also forwarded a copy of my letter to Governor Castro to Senator Fannin.

We have been advised that the Auditor General will commence an audit of the Commission on Monday, July 14th. I anticipate a favorable report.

During the last Commission meeting, I was instructed to advise Senator Fannin that in the forthcoming geothermal lease sale announced by the Bureau of Land Management, no land in Arizona had been included. Senator Fannin responded recently and advised me he would talk to Secretary Hathaway as to why Arizona was not included therein and would advise us of the Secretary's response in the near future.

The Interagency Motor Pool for the State has been created. The four cars previously operated by the Commission have been surrendered to the motor pool. Two of the cars were assigned to Commission personnel, i.e. Bill Allen and John Bannister. Vehicles can be drawn from the motor pool, as needed for other purposes. It is anticipated that at some later date a plastic card will be issued to the Commission for the purpose of drawing vehicles out of the motor pool. The card will, in effect, be issued to personnel of the Commission authorized to request cars. When this point has been reached, I will have cards issued to myself, Bill Allen and Jack Conley. At a later date in the motor pool plan, we will be able to order such vehicles as four wheel drive, pick-ups or other specialty vehicles as we may need. Consequently, the four vehicles once operated by the Commission have been removed from our inventory. The Commission, of course, received no compensation for the surrender of these vehicles.

The State of Pennsylvania has requested the IOCC to survey its regulatory set up, such as was done for the State of Michigan. I have again been requested to serve on this review team. All expenses, of course, will be paid by the State of Pennsylvania. I have indicated that I will probably

Memo: Commissioners  
July 11, 1975  
Page 3

be able to serve and will do so unless I hear to the contrary from the Commissioners. It is my feeling that this assignment acknowledges some expertise available on this Commission and should be viewed as a compliment to us. Inasmuch as time is available for this purpose and will cause no financial hardship to the Commission, I have indicated my initial availability.



OFFICE OF  
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STATE OF ARIZONA

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July 10, 1975

Memo from W. E. Allen Director  
Enforcement Section

Just for a change, this activity report will open on an optimistic note. The first of the week, Webb Resources requested a copy of our Rules and Regulations. They said that their plans were to start drilling the Holbrook Basin during the month of August. This morning, Webb contacted this office for various forms required by this Commission and said that they plan to start operations during the week of July 13. Our information is that they still plan to drill at least 7 test wells in the Basin.

Two California operators have visited the office recently. They claim they are going to drill a test well in Sec. 33, T5N, R3W, Maricopa County. This is some 5 miles SW of Whitman. Two tests were drilled in this section sometime during the early to middle 40's by Robertson Oil Company. One of the operators mentioned above was a driller of a test drilled in 1946. He tells me that there was good oil and gas show. It is his claim that the operator drilled into water and was unable to affect a shutoff. If this man follows thru and drills a test well with his own money, it may be that he knows something.

I visited the Nix Drilling Company location recently. His rig had broken down again. The hole is just below 600' and water in the well is 119°F. The same temperature as the water from the nearby Indian Hot Springs.

Clinton Oil Company has set 5½" casing on the Navajo "O" #3 location in the SW/SW¼, Sec. 23, T41N, R30E, Apache County. Drill Stem Tests indicated several shows of oil and gas in this well.

Petroleum Energy Company has just completed a well across the line in New Mexico. Very little information is available on this well. Drill Stem Tests indicate that it could be a major discovery from the Mississippian. The well is approximately 9 miles E. of the Arizona line and about 16 miles E. of the Dineh-Bi-Beyah field.

ACTIVITY REPORT

Page 2

July 10, 1975

At a recent symposium for the Development and Utilization of Geothermal Resources held in San Francisco in May, three themes came to the foreground as the conference progressed:

Papers on the technical aspects of geothermal exploration concluded that exploratory technology needs to be refined, as the geology and hydrology of geothermal systems are extremely complex. Questions were also raised regarding the accuracy and the meaning of geothermal reservoir indicators.

A second concern voiced by some participants (in particular, Dr. John Barnea, associated with the United Nations Institute for Training and Research) was that the non-electrical uses of geothermal resources is not receiving the attention it should. The consensus among these participants was that non-electrical uses could prove to be of more economic importance than is generally believed in the U. S. *than*

Thirdly, some presentations dealt with the delay in getting geothermal development underway in the U. S., with lack of economic incentive, and legal and institutional complexities most often cited as causes.

Just how much a part geothermal resources will play in easing the energy shortage is debatable. It is my opinion that when the industry thoroughly tests and accepts the Binary System for use in hot water fields, geothermal resources is going to be of great consequence for helping to solve the energy shortage. The Binary System, as you probably know, uses hot water to convert a liquid with a very low boiling point, such as Freon, to a gas. This gas is then used to power the turbine that will turn the electrical generators. The gas is then returned to the system to be reheated and reused.

Attached is an article on geothermal resources that you may find interesting.

POTENTIAL GEOTHERMAL RESOURCES OF THE  
UNITED STATES GULF COAST

By Myron H. Dorfman  
Associate Director for Geothermal Studies  
Center for Energy Studies, University of Texas  
Austin, Texas

The energy crisis has focused national attention on the need to become self-sufficient in energy. One partial solution to the energy crisis is accelerated development of geothermal energy for electric power generation. Geothermal energy is presently a small but viable contributor to the United States' energy supply. However, the geothermal resource must be developed rapidly if it is to contribute significantly to this nation's urgent energy needs.

In addition to known areas of geothermal resources in the western United States, a unique form of potential energy exists in geopressed aquifers underlying the United States Gulf Coast. Due to a unique combination of factors involving the accumulation and compaction of great quantities of sands and muds in the U. S. Gulf Coast area, overpressured aquifers, usually referred to as geopressed zones, have been created. The waters in these zones possess abnormally high temperatures. The principal geothermal zones are long, linear, high-volume aquifers extending from Laredo, Texas to the Mississippi border. They occur in successive parallel bands southward into the Gulf of Mexico. The top of the zone begins at depths of about 8,000 feet to 10,000 feet, and temperatures as high as 520° F have been recorded in Matagorda County, Texas. These abnormally pressurized geothermal zones have usually been considered a nuisance while drilling for petroleum. Future research may prove that they are more widespread than petroleum and perhaps as valuable. The very high temperature waters are essentially fresh water, with salinities as low as 1,000 parts per million. Upon reaching atmospheric conditions, a portion of the water will flash to steam, which may be used to generate electric power. Greater thermodynamic efficiencies may be achieved by the use of binary systems for power generation and also for heating and refrigeration purposes. Furthermore, observations have indicated that Gulf Coast geothermal waters contain significant quantities of natural gas in solution. This natural gas will also be released at surface conditions and can be separated from the other fluids and added to our present supply of this valuable fuel. Laboratory studies indicate that approximately 40 cubic feet of natural gas may be dissolved in each barrel of water. This means that production of every 50,000 barrels of geothermal water will release two million cubic feet of natural gas. In addition, after extraction of heat from the geothermal fluids, the comparatively fresh water may be of sufficient quality to be used for irrigation or consumption in the relatively arid areas of the Valley in South Texas. Preliminary calculations indicate that the major Gulf Coast geothermal sands have the capability of producing at least 22,000 MW (megawatts) of power for 50 years along coastal Texas. Studies in Louisiana have indicated a potential of at least 7,500 MW for a comparable time. Independent studies in progress by United States Geological Survey scientists suggest that reserves for the generation of electricity may be twice this figure.

Although actual costs of geothermal energy in the Gulf Coast cannot be determined at this time, it is noteworthy that the cost of operation of every geothermal facility to date has been less than that of other available fuels, aside from petroleum. The Atomic Energy Commission estimates costs of hot rock systems at 6.3 mills per kilowatt-hour, compared to 11.8 mill/kw-hr for nuclear generation. Most present geothermal costs are between 4 and 9 mill/kw-hr.

Environmental protection must be carefully considered when suggesting substitutes for petroleum. Based upon present knowledge, it is believed that production of hot fluids along the Gulf Coast will contain no minerals or noxious gases. The problem of subsidence may occur due to withdrawal of large volumes of fluids, although there is no assurance that this will happen. Studies of deep geopressed reservoirs which produce gas in South Louisiana show replenishment of reservoir fluids due to the influx of additional water from the shales adjacent to the sands in some cases, and no subsidence has been noted. However, the only way to determine if this problem may exist is to perform a field test and reservoir study. There are, of course, methods of counteracting the problem of subsidence. Water can be reinjected into oil and gas reservoirs which are often present

at shallow depths. Injection into partially depleted petroleum reservoirs may provide additional recoveries by these secondary and tertiary methods. Another potential solution to the problem of subsidence is to drill for geothermal reservoirs a short distance offshore in coastal waters. In this way, the geothermal waters can be utilized for other purposes, after heat is extracted, or returned to the Gulf.

The impact of the production of electric power on the environment can only be understood by analyzing the entire fuel cycle beginning with mining, processing, transportation, and ending with disposal of spent wastes. When viewed in this light, the environmental impact of geothermal generation appears minor compared with either coal or nuclear generation. The environmental impact of geothermal power is restricted to the generating site. Various sites in California are both aesthetically and environmentally attractive.

Geothermal energy appears to represent a "here and now" energy source which, with rapid development, may partially fulfill our energy requirements. Present technology is sufficiently advanced to explore for, drill, and develop geothermal fields. Costs are usually less than those encountered for power generation using other petroleum substitutes or alternatives. Environmental effects are also less troublesome than those reported using alternative power sources. The U. S. Gulf Coast contains areas of known and suspected major reserves of geothermal energy. Intensive research and development can lead to rapid utilization of this resource.



OFFICE OF

### Oil and Gas Conservation Commission

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ACTIVITY REPORT

July 10, 1975

J. N. Conley  
Director, Geology Section

#### PUBLICATIONS

Sales for the past month totaled \$52.00. Purchasers:

James Pickett, Phoenix  
George Sinclair, Columbus, Ohio  
Joseph Rominger, Scottsdale  
Cities Service Minerals, Tucson  
Keplinger & Assoc., Houston  
Petro Lewis, Denver  
Chartiers, Ltd., Midland  
Standard Oil Co. of Calif. Library, San Francisco

#### INVESTIGATIVE PROJECTS

"Macrofold" Map. Dr. George H. Davis has completed the manuscript which will accompany the "macrofold" map, entitled "Structure Map of Folds in Phanerozoic Rocks, the Colorado Plateau Tectonic Province of Arizona." We are currently editing the manuscript which will be published by the Office of Arid Lands Studies, University of Arizona, as OALS Bulletin 9. Some technical cartographic and reproduction problems have delayed completion of the map. A blueline print for editing purposes prior to printing a color proof of the map will be printed this week.

Holbrook Area Well Location Map A-1. Distribution of copies of this map and the accompanying well-data tabulation to governmental agencies and academic institutions has been completed.

Holbrook Area Geologic Map G-7. The geologic data for this map has been posted onto a reproducible base. A preliminary structural interpretation of the top of the Permian Coconino Sandstone has been completed. An additional interpretation of the large areas with only very scattered well subsurface control, utilizing surface and geophysical (gravity and magnetic) information, is now being prepared. The final integrated interpretation will not be made until Webb Resources completes its planned drilling program in the area.

Additional Holbrook Area Structural Studies. The gross image area of our Holbrook Area base map totals about 8,040 square miles. Geographically it roughly encompasses those portions of Apache, Navajo, and Coconino Counties between the Navajo Indian Reservation and the Mogollon Rim east of the town of Happy Jack (T. 16 N., R. 9 E.). Tectonically it is on a feature commonly called the Mogollon Slope. The sedimentary column (largely Paleozoic rocks) in the gross area ranges from zero to more than 4550

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feet. Minor shows of oil have been noted in Permian, Pennsylvanian, Mississippian, and Devonian rocks.

Approximately two-thirds of the area consists of lands owned by individuals, land companies, the State of Arizona, and the Federal government. The balance of lands lie within national forests (administratively controlled by the U. S. Bureau of Land Management and the U. S. Forest Service) and the Fort Apache Indian Reservation. This diverse ownership permits uncomplicated acquisition of lease blocks at reasonable bonus and annual delay rental prices, and normally a one-eighth royalty as opposed to the complicated red-tape procedures of acquiring comparatively expensive lease blocks with a one-sixth royalty on Indian Reservations.

For these reasons plus the anticipated drilling activity which will furnish more structural control and information as to petroleum potentialities of the area, we are planning on investigations of the Paleozoic rocks below the Permian Coconino Sandstone.

Paleozoic "Folio". The recently completed master theses of two N.A.U. students, pertaining to facies studies of the Paleozoic Mississippian and Devonian rocks in the Colorado Plateau province of Arizona, will be useful to us in this project. We hope to be able to borrow copies of these theses later this summer.

Another graduate student at the University has commenced a study of the Pennsylvanian facies in the same area. We will assist him in procuring sets of well samples and logs.

#### OIL & GAS EXPLORATION

Holbrook Area. Webb Resources has requested a copy of our most recent Rules & Regulations booklet. Gus Falconer, senior geologist for the firm, advised me in a phone conversation this week that they still plan on commencing an exploratory drilling program next month.

East Dineh-bi-Keyah Area. Petroleum Information reports that Petroleum Energy's wildcat test in SE NW 5-26N-19W, San Juan County, New Mexico, has set casing for a completion attempt. Unofficial reports indicate that approximately 2200 feet of oil was recovered on a drillstem test in the Mississippian section at about 5960-6087 feet. Ashland Oil has staked locations for two offsets.

About eight miles east of this area Consolidated Oil & Gas may have a Pennsylvanian oil discovery offsetting an unnamed one-well Mississippian pool discovered in 1963 by Sinclair Oil & Gas.

Petroleum Energy's indicated oil discovery is about 13 miles east of the Dineh-bi-Keyah field, which produces oil from an igneous sill intruded into Pennsylvanian rocks. The Mississippian in this field has a thickness of 100-150 feet -- no shows of oil reported. The Mississippian Redwall Formation is oil- and gas-productive in the Dry Mesa field near the northeast corner of Arizona. The area between this field and Dineh-bi-Keyah is prospective for oil accumulations in Pennsylvanian, Mississippian, and Devonian reservoirs.

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North-Central and Northeastern Arizona. Theodore Sheldon, Rocky Mountain Region geologist for Trio Petro Inc., a Canadian oil company, has advised me that his firm is genuinely interested in investigating the oil potentialities of several areas in northeastern Arizona, including the Holbrook area. They have purchased aerial photos covering several broad areas of current interest and retained a consultant photo-geologist to examine the photography. They are purchasing Bouguer gravity meter maps and basic data from a commercial geophysical firm for structural interpretations in several areas by Consolidated Geophysical Surveys. They have also contracted with this firm for two gravity meter crews for surveys in south-central Utah close to the Arizona boundary and on the Colorado side of the Four Corners marker. The company is contemplating approaching the Navajo Tribal Council for permission to conduct some gravity meter surveys on the reservation.

Sheldon spent two days in our offices earlier this year inquiring about potential areas of interest and examining maps, well records, and reports in our files.

#### GENERAL

##### GEOHERMAL

Energy Sources. At the last meeting there was some discussion concerning the number and location of dry steam fields in the United States and the possible future importance of using hot water for heating purposes and the generation of electricity.

Dry Steam. I reported that I knew of only two dry steam fields; the Geysers in northern California, and one in the Valles Caldera in northern New Mexico. According to a news item in the Casper, Wyoming, STAR-TRIBUNE, June 22, officials of the U.S.G.S. Area Geothermal Supervisor's Office, Menlo Park, California, report that a successful geothermal test has been completed in Utah. The well was drilled by Phillips Petroleum Co. on a Federal lease in the Roosevelt Hot Springs Known Geothermal Resource Area (KGRA). It is located about 15 miles north of the town of Milford in Beaver County in the southwestern part of the state. It was completed at a depth of 2728 feet, with initial flows in excess of 200,000 pounds per hour mass flow rate at a temperature of over 400°F.

Phillips Petroleum was one of the three companies who bid on leases in the Gilliard Hot Springs area in southeastern Arizona at the only Federal geothermal lease sale held to date in Arizona. This is the area mentioned at the meeting where there is a jurisdictional dispute between Federal agencies.

Hot Water. Union Oil Co. has announced a large-scale drilling program in the Imperial Valley of California. Past exploration in this valley has established the presence of large volumes of hot water. A heat-exchange method will be necessary to generate electricity (temperatures above 302°F required currently). The large quantities of undesirable brines in these waters has discouraged development in the past.

Hot Dry Rock. Natural geothermal-energy systems to date have not contributed significantly to total world-energy production largely because they are small and scarce. If this source is to become genuinely important in the future, new means of extracting it must be developed. The dry-hot-rock method is one that is under investigation.

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This method involves drilling a hole into hot, dry impermeable rock. Hydraulic fracturing is then used to create fractures, which serve as heat-exchange surfaces. A nearby shallower hole is drilled directionally to intersect the fractures and establish subsurface circulation. Cold water injected down the deeper hole is heated by the exposed hot rock surfaces, rises, and returns to the surface as a pressurized liquid via the shallower hole. After surface energy extraction, the pressurized water can be returned down the deeper hole, producing essentially a closed system.

An attempt to utilize this method at Marysville, Montana, failed because the hot dry rock indicated by geophysical and geological studies was not encountered. Current experiments by the Los Alamos Scientific Laboratory of the University of California in the Valles Caldera of New Mexico offer encouragement for this method of extracting geothermal energy from hot, dry rock.

A deep hole, 9610 feet, drilled about 52 miles west of Los Alamos, found hot, dry rock. The bottom-hole temperature was 384°F (196°C). Fracturing experiments at 6537 feet were successful and large volumes of water were injected and recovered from the hot basement rocks.

The Valles Caldera is a late-Cenozoic collapse feature. The surface rocks at the site are part of the Bandolier Tuff, which was ejected from the caldera 1.1 to 1.4 million years ago. Precambrian rocks were topped at 2409 feet.

Exploration in Arizona. To date only three geothermal test holes have been drilled in Arizona. All three, unsuccessful, were drilled in search of dry steam. Currently, the U.S.G.S. is investigating the geothermal potential of the San Francisco Peaks volcanic field. The Federal Earth Resources Development Administration is reportedly conducting some kind of exploratory work in the Basin and Range province. Some studies are underway at the three principal academic institutions. The State Land Department has outlined several potential KGRA using water-well temperature data supplemented with some remote sensing data.

We have in Arizona hot springs, hot water wells, and numerous and extensive young volcanic rocks. An expanded and coordinated effort to investigate the potential of our energy resources from dry steam, hot water, and hot dry rock is needed.

#### COAL

Kennecott Copper Co. is under anti-trust orders from the Federal Trade Commission (FTC) to sell its Peabody Coal subsidiary, which operates the Black Mesa open-pit mine on the Navajo Indian Reservation. There is a possibility that the Tennessee Valley Authority (TVA) may buy the subsidiary, as FTC has listed TVA as one of three qualified bidders. This arrangement makes it possible for the Government to slip more deeply into the energy business without private companies having a chance to voice opposition or without a vote being taken. TVA does not have a good "track record" in generating electricity at prices comparable to privately-owned utility companies. I noticed recently where the Federal government had canceled a \$400,000 debt.

Cities Service Co. has withdrawn its offer to acquire Peabody Coal - financing problems within the time limit set by FTC.

El Paso Natural Gas Co.'s proposed coal gasification complex on the Navajo Indian Reservation in northwestern New Mexico, which upon completion would have alleviated Arizona's dependence upon Texas gas, is involved in another controversy. Navajo Tribal chairman, Peter McDonald, has endorsed a proposed moratorium that would block the diversion from the San Juan River of the water vital to the gasification project.

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#### SALT - OIL STORAGE

The U. S. Senate has passed a bill to create a national oil reserve equivalent to three months' imports to be stored in tanks and salt caverns as a hedge against another embargo by OPEC. The reserve to be stored, according to varying news items, ranges from 550 to 594 million barrels.

Arizona has at least two very large salt masses in which caverns sufficiently large to store the oil could be created. One of these is Red Lake in Mohave County; and the other one is Luke, adjacent to the Luke Air Force Base. Red Lake is about 30 miles north of the Four Corners pipeline, which transports crude oil from the Greater Aneth field to the Los Angeles, California, area. The Texas-New Mexico pipeline transports oil from this same field to several terminals in Texas, where other pipelines exist for transporting oil to refineries in Oklahoma, Kansas, and Illinois. Therefore, a stored oil reserve at Red Lake would be strategically located to fill emergency oil requirements of refineries on the West Coast or Texas Gulf Coast and even in the Mid-Continent and Great Lakes states.

The U. S. House has approved legislation to permit extraction of oil from the Elk Hills, California, naval oil reserve. I have seen estimates as high as one billion barrels of recoverable oil from Elk Hills. A good many years will be required to produce this volume. But perhaps some sort of a deal could be negotiated with the major companies to supply the initial reserve for storage at Red Lake, with a dedication of an equivalent volume of oil from Elk Hills to the companies during its producing life. This might save the taxpayer some money.

#### SOLAR ENERGY

At the energy and water-requirements symposium in Tucson, Arizona, May 8 and 9, 1975, one session was devoted to new fuel sources from oil shale, geothermal energy, coal gasification, nuclear energy, coal, and solar energy. The matter of solar energy has been mentioned at several Commission meetings this past year, as Arizona has an abundance of sunshine. One paper that evoked a lot of interest was presented by Dr. Howard T. Odum, University of Florida. Following is a news item about the paper from the ARIES DIGEST (published by the now defunct Arizona State Fuel and Energy Office):

"Dr. Odum precipitated a controversial discussion over his statement that it takes more energy to make a solar rooftop with a ten-year life span than the roof would generate over the same period. He stated emphatically that when a complete assessment was made of the economic and energy systems, and all the components were totaled, more energy was needed to produce solar energy equipment than solar energy produces in return."

ARIZONA'S NATURAL RESOURCES - INFORMATION DISSEMINATION. With the demise of ARIES and CPEAC (Colorado Plateau Environmental Advisory Council) there is no Arizona governmental agency or academic institution that I know of publishing periodically a list of completed reports and in-progress investigations dealing with Arizona's natural resources. Possibly there is some exchange of information between our academic institutions to keep to a minimum any duplication of investigative and research effort of which I am not aware; but if so, the specifics of the efforts are not distributed to state agencies.

I wish to suggest that the Commission consider requesting Governor Raul Castro's office to charge some agency with the responsibility of periodically publishing a

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list of completed reports and in-progress investigative projects dealing directly or indirectly with our natural resources produced by or being performed by any state agency or academic institution. I believe that the Arizona Resources Information System (ARIS) would be the logical agency to be so charged.

#### VISITORS & PHONE INQUIRIES

Several of our visitors this past month were graduate students from the State universities. They were interested in acquiring well logs and samples and information pertaining to their respective master theses' studies.

Two geologists from the Water Resources Division of the U.S.G.S., Flagstaff, spent a day examining electric logs in southern Apache County.

A Scottsdale consulting exploration geologist was interested in seeing what kinds of maps and reports pertaining to oil and gas were available for Arizona.

Most of the phone calls were requests for miscellaneous information concerning Arizona's natural resources. The most recent calls were from a Scottsdale oil operator, George Potter, for information concerning the availability of some master theses dealing with the geology of the mountains near Sonoita. Potter has a Midland, Texas, consulting geologist investigating the oil possibilities of the local basin in the Sonoita area.

Another visitor, a consulting geologist from Albuquerque, New Mexico, is in the office today. He is interested in getting copies of a large number of electric logs in the Holbrook area.

JNC:os



J.N.C.

**MONTHLY FINANCIAL REPORT**

1 RECEIPTS MONTH OF	2 CLASSIFICATION	3 APPROPRIATED RECEIPTS	4 UNAPPROPRIATED RECEIPTS	5 TOTAL ALL RECEIPTS YEAR TO DATE
June 1975 100 00	1 Permits to Drill		100 00	650 00
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100 00	TOTAL CURRENT MONTH RECEIPTS		100 00	XXXXXXXX
	TRANSFERS IN			
XXXXXXXX	BALANCES BROUGHT FORWARD		3,826 83	XXXXXXXX
100 00	TOTALS - MONTH AND YEAR TO DATE		3,926 83	

6 CLAIMS PAID MONTH OF	7 EXPENDITURES FUND TITLES	8 TOTAL AMOUNT AVAILABLE YEAR TO DATE	9 CLAIMS PAID YEAR TO DATE	10 OUTSTANDING ENCUMBRANCES	11 UNENCUMBERED BALANCE
July 1975 11,896 31	1 Personal Services	116,700 00	116,128 88	-	571 12
1,616 08	2 Emp. Related Exp.	15,200 00	14,849 16	245 69	105 15
4,011 17	3 Other Operating Exp.	36,019 30	31,775 40	300 35	3,943 55
4,114 00	4 Prof. & Outside Serv.	4,535 85	3,931 44	365 40	239 01
946 20	5 Travel - State	9,200 00	8,120 65	387 38	1,391 97
788 75	6 Travel - Out of St.	3,494 30	3,494 30	-0-	-0-
-0-	7 Cap. Outlay - Equip.	4,100 00	4,031 38	-	68 62
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17,372 51	TOTALS	189,949 45	182,331 21	1,298 82	6,319 42

AGENCY Oil & Gas Conservation Comm.

DIVISION \_\_\_\_\_

IDENTIFICATION CODE NO. \_\_\_\_\_

1	2	3	4
CLAIMS PAID YEAR TO DATE	OBJECT CODE NO.	DISTRIBUTION OF EXPENDITURES CLASSIFICATION	CLAIMS PAID MONTH OF <i>June 19 75</i>
2,460 00	7111	1 Per Diem: Commission Members	1 210 00
113,668 88	7112	2 Salaries: Employees	2 11,686 31
		3	3
334 11	7151	4 Industrial Insurance	4
203 35	7152	5 Unemployment Insurance	5
5,985 18	7153	6 F.I.C.A.	6 692 42
6,521 52	7155	7 Retirement	7 667 41
1,420 00	7156	8 Health Insurance	8 160 00
385 00	7159	9 Personnel Comm.	9 96 25
		10	10
	7215	11 Professional Services: Engineer	11
3,931 44	7219	12 Professional Services: Other	12 1,114 00
		13	13
1,548 96	7221	14 Travel-State: Mileage	14 171 30
3,310 50	7222	15 Subsistence	15 232 00
171 40	7223	16 Public Transportation	16 50 52
2,617 14	7224	17 Vehicle Expense	17 483 18
472 65	7225	18 Reg. Fees; Parking; etc.	18 4 20
		19	19
1,122 00	7232	20 Travel-Out of State: Subsistence	20 295 00
1,921 83	7233	21 Public Transportation	21 468 75
1 02	7234	22 Airport Parking	22
449 45	7235	23 Reg. Fees; Telephone; etc.	23 25 00
		24	24
19,448 67	7251	25 Occupancy: Office Rent	25
1 00	7261	26 Warehouse Rent	26
	7263	27 Maintenance & Repairs	27
659 53	7272	28 Mtn. & Repairs: Furniture & Equipment	28 184 53
2,934 74	7280	29 Office Supplies	29 222 50
1,198 50	7280.1	30 Orthophoto Quads.	30
565 68	7300	31 Field Supplies: Film; Am.Strat; P.I.; etc.	31 190 02
979 34	7331	32 Printing: Reports; Large Maps; etc.	32 277 08
524 06	7332	33 Legal Advertisement	33
104 50	7333	34 Court Reporter	34
856 47	7334	35 Postage	35 151 93
2,993 04	7335	36 Telephone	36 235 11
	7337	37 Drayage; Express; etc.	37
61 80	7339	38 Rental, Misc.	38
174 80	7360	39 Dues & Subscriptions	39
1,223 27	7390	40 <i>move - Furn + Equip.</i>	40
497 87	7431	41 Capital Outlay: Office Equip.	41
	7434	42 Spec. Equip. (Geol.)	42
3,533 51	7436	43 Automobile	43
		44	44
-	7913	45 Revolving Fund	45 [250 00]
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		54	54
		55	55
182,331 21		TOTAL	17,372 51

OFFICE

DO NOT WRITE BELOW THIS LINE

FIELD