

OIL & GAS CONSERVATION COMMISSION  
Meeting: October 21, 1977  
Mr. John Bannister, Exec. Sec.



OFFICE OF  
**Oil and Gas Conservation Commission**  
 STATE OF ARIZONA  
 1645 WEST JEFFERSON, SUITE 420  
 PHOENIX, ARIZONA 85007  
 PHONE: (602) 271-5161

A G E N D A

Meeting  
 October 21, 1977  
 1645 West Jefferson, Suite 420  
 Phoenix, Arizona

10:00 a.m.

Call to order

- 1 ✓ Approval of minutes of meeting of August 19, 1977
- 2 ✓ Report of Executive Secretary
- 3 ✓ Report of Enforcement Section *Alaska trip*
- 4 ✓ Report of Geology Section
- 5 ✓ Old Business
6. New Business - *Approve DCC trip - Santa Fe*
7. Adjourn

*Ann - Butler says pay only travel*

*Appt. Monday with legs cut*

*Proposed legislation Energy Agency bill geo bill*

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

DEC. MEETING 12-16-77

ADMIN DISOLVE DRILLING UNITS



OFFICE OF

**Oil and Gas Conservation Commission**

STATE OF ARIZONA

1645 WEST JEFFERSON, SUITE 420

PHOENIX, ARIZONA 85007

PHONE: (602) 271-5161

ACTIVITY REPORT

October 12, 1977

John Bannister  
Executive Secretary

The next regular meeting of the Commission will be October 21 at 10:00 a.m. at our normal meeting location in Phoenix. Should you not be able to make this meeting, please advise this office.

Even though our budget, as approved by the Commissioners, has been submitted, we are in the process of reviewing this budget with the Joint Legislative Budget Committee. It is anticipated that some minor changes will have to be made to satisfy this body. You will be kept advised as to the progress.

I am pleased to report that our new geologist, Mr. Salvatore Giardina, has been hired. Mr. Giardina will not be with us at the forthcoming meeting inasmuch as he has some personal business requiring his presence in Houston. His background seems ideally suited for our needs at this time and we are looking forward to working with him.

At the request of Mr. Bill Lewis, Chairman of the House Natural Resources Committee, we are involved in preparing a bill concerning itself with the collection and recycling of used oil. We have contacted a wide variety of people who will be concerned with such a bill. There will be a meeting at this office on October 18th to begin preliminary work. It is Mr. Lewis' hope that before the January session of the Legislature this bill can be drafted in a manner satisfactory to those who will be involved and he anticipates early introduction. Should this bill pass, additional personnel, equipment, etc., will be required on the part of this Commission and the cost of same will be built into the bill.

It is anticipated that bills concerning a State Energy Agency

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Executive Secretary  
October 12, 1977

will again be introduced into the Legislature. Toward the end of the last session of the Legislature, this office was requested to present its thoughts on the form such an agency should take. In my opinion, two forms of an energy agency bill will be considered: One, the formation of an advisory type agency wherein the heads of the various state energy agencies will sit in an advisory and coordinating capacity with a small staff to carry out its directions. Two, a true energy agency wherein several of the existing commissions, agencies and departments will be combined into one authority. As these bills are developed, I will see that you are furnished copies.

M. J. Systems of Bakersfield, California, is presently micro-filming the public files of this Commission. M. J. Systems is a reliable company which furnishes information, upon request, to various energy developers. They apparently have had requests for information on Arizona. It is anticipated that their work in our office will be completed within a week to ten days.

As announced, I held a two hour seminar on energy at Peoria High School for various high school and grade school teachers. Prior to the program, I had a chance to talk to several of the participants and found they were not as energy sophisticated as I had anticipated and consequently I had to amend my program to make it much more basic in nature. The reception and response was gratifying and I have been asked to repeat this program for a similar group at some later date.

I have also cut a tape for Radio Station KMEO which will be aired on its "Aware" program in approximately two weeks. As you know, I made a similar appearance in March of this year and the response was such that they felt further appearances were warranted. I have been requested to do another program for them, probably early in 1978.

Radio Station KRFM has also requested that I do an interview program for them but to date no definite time has been set.

Professor John McKlveen of Arizona State University is securing a grant for possibly the summer of 1978 to hold a broad seminar on public affairs for college professors. He has contacted me and asked me to do an energy seminar for this group. Again, no definite date has been set.

After the October meeting, the next regular meeting of this

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Executive Secretary  
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Commission would be Friday, December 16th. Consideration might be given to moving this date, inasmuch as it might interfere with some of your holiday plans. If so, please be prepared to act on changing this date at the forthcoming meeting.



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ACTIVITY REPORT

October 11, 1977

W. E. Allen  
Enforcement Section

You are aware that several companies have been seeking approval to bring gas from the Prudhoe Bay area of Alaska to the lower 48 states. It seems that Alcan, a subsidiary of Northwest Pipeline Company, has been the successful applicant. El Paso Pipeline Company, one of the main contenders for permission to transport the gas, announced last week that they were withdrawing their application. Arctic Gas, another leading contender, has been practically eliminated by official government studies.

Alcan's proposed line will follow the Alaska oil pipeline from Prudhoe Bay to Fairbanks. From Fairbanks, it will follow the Alcan Highway to a point north of the U.S. - Canadian border, where it will divide. Part of the gas will then go to the midwest area and part to the Pacific coast market.

The Administration's appeal to conserve oil and gas doesn't seem to be working very well - demand continues to increase, production continues to decline, and imports continue to climb. The latest API report shows that a total of 8.96 million barrels of oil are coming into the United States every day. This is an increase in imports of 30.4% over last year.

Meanwhile, ever increasingly large amounts of public land continue to be withdrawn from the multiple use category to be designated as wilderness areas, national parks, wild river areas, etc., without regard to the possibility that much of this land might contain valuable minerals, oil, gas, uranium, etc., which are urgently needed in this country.

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Enforcement Section  
October 11, 1977

When the Commission, by an act of the Legislature, was given approval to charge for its various publications, we established a policy of giving the first requested copy of the rules and regulations free. Due to the demand for these rules and regulations by those who have no real interest or capability for drilling for oil, gas or geothermal resources within the state, we felt it necessary to start charging for all requested copies of these booklets.

Mr. Bill Lewis, Chairman of the Natural Resources Committee of the State House of Representatives, has informed us that the oil recycling bill will be reintroduced in the next session of the legislature. As a result, I have been contacting the firms and individuals who would be affected by the passage of this bill. We will have a meeting at our office on October 18th at 2 p.m. to discuss this proposed legislation and attempt to draft a bill which will be workable and also beneficial to the state.

Pyramid Oil Company has resumed drilling on its Federal No. 2 well located in the NE/SW/4 Sec. 18, T40N, R9W, Mohave County. At the last report, this well was drilling below 4190 feet.

Permits have been issued to Energy Reserves Group to drill the Navajo "0" No. 6, located in the SW/NW/4 Sec. 25, T41N, R30E, Apache County; and to Frances Whitmore for a shallow test located in the SW/SW/4 Sec. 6, T7S, R25 E, Graham County. This well is projected to 1100 feet and was drilling below 400 feet at last report.

Energy Reserves Group have set surface casing at 802 feet in their Navajo "0" No. 5.



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ACTIVITY REPORT

October 11, 1977

J. N. Conley  
Director, Geology Section

PUBLICATIONS

Sales since September 12 total \$149.85.

OIL & GAS LEASING ACTIVITY

Grynberg and Associates, Denver, have applied for approximately 12,500 acres of oil and gas leases on state lands in the Strip Country portion of Mohave County. The tracts involved are in T35-36-37N and R9-10-11W. They are in the area west of the Hurricane fault.

Several years ago this same firm acquired approximately 600,000 acres of oil and gas leases on federal lands in this same trend in Mohave County, on north into Utah.

ENERGY RESOURCE & MINERAL EXPLORATION

Oil & Gas. No on-the-ground exploration reported. Sales of publications, visitors, and mail and phone requests, however, indicate that some companies and persons (mostly consulting geologists) are interested in the oil and gas potential of the state. In most instances the consultants are probably being retained by energy companies.

The Four Corners Regional Commission grant in the amount of \$5,000 that we requested this past June is still in a state of limbo. The last official word from the Governor's Office was that this request would be reconsidered after October 1, 1977. However, no action can be expected until after Governor Castro's departure. Secretary of State Bolen has announced that he intends to appoint a new representative to the Four Corners Regional Commission.

Uranium. The search for uranium resources continues active by both industry and government.

Geothermal. ERDA Grant - The previously reported grant to the Arizona Bureau of Geology & Mineral Technology (formerly Arizona Bureau of Mines) for an overall evaluation of Arizona geothermal energy potential is underway. The grant, in the amount of \$100,000, was obtained from the Federal Energy Research & Development Administration, Division of Geothermal Energy. Our Commission is participating in this investigative project.

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U.S. DEPARTMENT OF INTERIOR SPONSORED STUDY

Recently we received a new report entitled, "An Appraisal Study of the Geothermal Resources of Arizona and Adjacent Areas in New Mexico and Utah and Their Value for Desalination and Other Uses" (NMEI Report #006). This report was prepared by the New Mexico Energy Institute at New Mexico State University for the New Mexico Energy Resources Board. The study was sponsored by the U.S. Department of the Interior.

Exhibit A of this Activity Report consists of a map showing regions of high geothermal potential and an abstract of the report. Most of the potential areas shown were known previously. Their "rediscovery," however, verified the validity of present technique. Some of the anomalies represent new potential areas. The NMEI report is not exhaustive. We have semi-isolated other potential areas that warrant some investigation.

VISITORS

Milton B. Vaught  
Steve Bredall, Bass Enterprises Production Co., Denver

JNC:os

  
J.N.C.

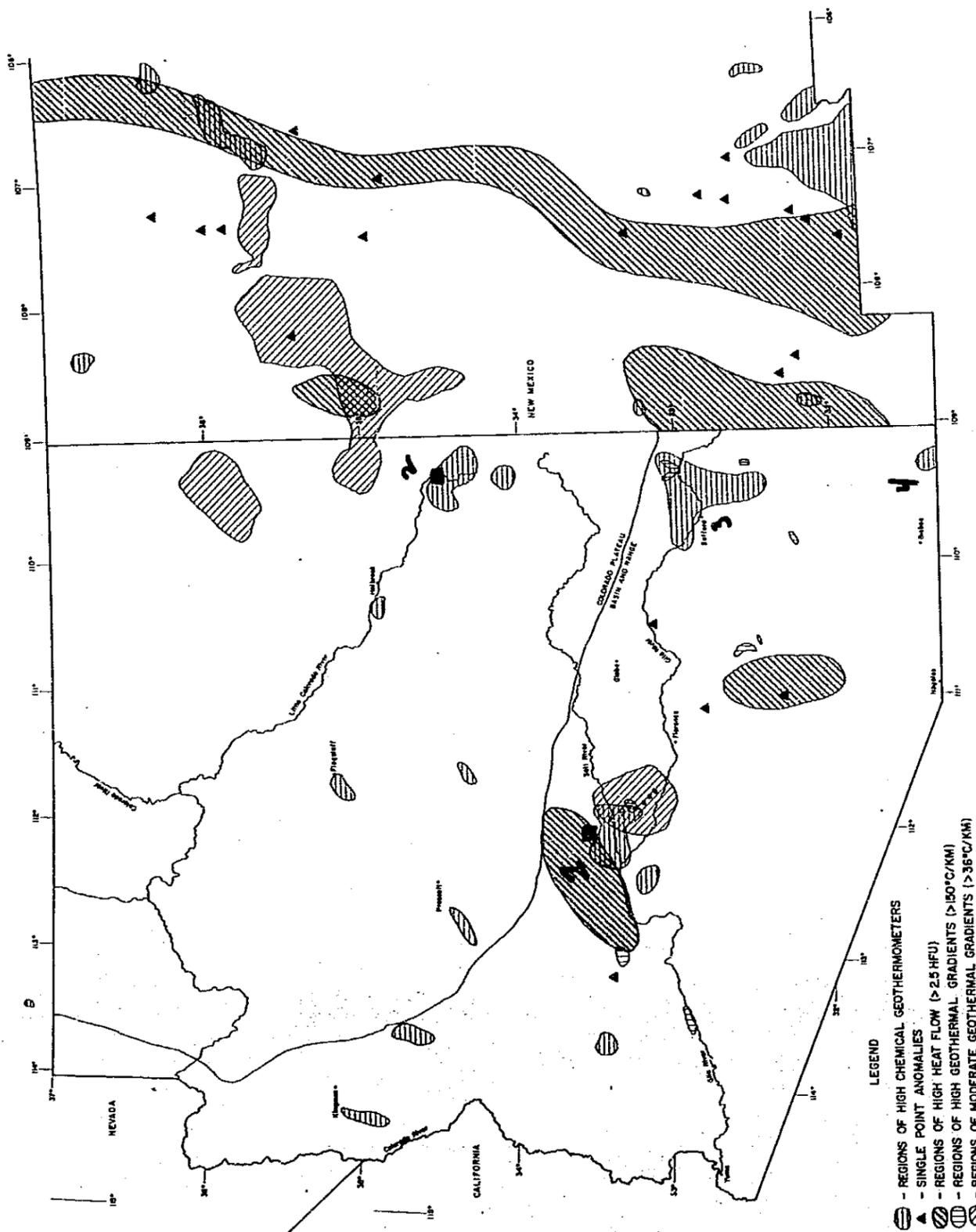


Figure 8. Regions of high geothermal potential as indicated by geochemical data, heat flow and temperature gradient data for Arizona and western New Mexico

From NMEI Report #006

From NMEI REPORT #006

ABSTRACT

This report is an appraisal investigation of the geothermal resources of a portion of the "Lower Colorado River Region" of the U.S. Bureau of Reclamation. The study area includes most of Arizona, part of western New Mexico west of the continental divide, and a small part of southwestern Utah. Southern California and southern Nevada, which are also part of the Lower Colorado River drainage basin, have not been included.

Almost 300 water samples have been collected from the study area and chemically analyzed. These samples include hot wells and springs in addition to nearby nonthermal waters to help establish background chemistry. Further, almost 10,000 chemical analyses of groundwaters were obtained from the U.S. Geological Survey's "water quality file". Routine geothermal interpretative techniques were then applied to these chemical data to identify geothermal anomalies which might indicate the presence of exploitable geothermal resources. These geochemical anomalies were then evaluated in terms of available geophysical data such as heat flow, gravity, magnetics, basement linears, earthquake epicentral locations, depth of sedimentary basins, quaternary volcanics, recent fault scarps, etc. to further delineate the size and shape of the prospective geothermal sites and help establish their production potential. On the basis of the data contained herein, the following conclusions can be drawn.

1. There are eight prime and numerous potential geothermal anomalies located within the study area which appear to offer excellent opportunities for geothermal desalination. The prime anomalies are located near Phoenix (2), St. Johns (2), Safford, and Bisbee in Arizona, near St. George in Utah, and south of Lordsburg, New Mexico. Several of the anomalies had previously been known and these rediscoveries verify the validity of the present technique. Other anomalies are located near Quaternary volcanics or at the intersection of major basement linears and thus might have been predicted on the basis of their geologic setting. The remaining anomalies represent potential new geothermal discoveries.
2. There are regional variations in geothermal parameters throughout the study area. For example, groundwaters from the Basin and Range province are routinely hotter and yield substantially higher Na-K-Ca and silica geotemperatures than groundwaters from the Colorado Plateau province. This phenomenon is interpreted to represent higher heat flow, deeper circulation of groundwaters, and greater geothermal potential within in the Basin and Range province as opposed to the Colorado plateau. These data also establish background values for the various geothermal parameters and thus make it possible to more readily recognize and evaluate groundwaters showing geothermal potential.
3. About 400 thermal waters ( $T > 30^{\circ}\text{C}$ ) have been examined during the present study. Some of these waters also show geothermal potential on the basis of their geochemistry and tectonic setting and are

considered to be prime prospects for geothermal desalination. Other thermal waters show no such promise and their development may be restricted to low temperature uses.

4. The most promising prospects appear to be associated with quaternary volcanics, deep sedimentary basins, and intersecting basement linears, an association which may reflect the origins of the thermal waters.

AGENCY Oil & Gas Conservation Commission

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

1	2	3	4
CLAIMS PAID YEAR TO DATE	OBJECT CODE NO.	DISTRIBUTION OF EXPENDITURES CLASSIFICATION	CLAIMS PAID MONTH OF Sept. 1977
150 00	71140	1 Per Diem: Commission Members	1 150 00
20,960 80	71150	2 Salaries: Staff	2 10,378 62
137 50	71510	3 Workmens Comp.	3 69 55
125 86	71520	4 Unemployment Insurance	4 62 31
1,121 70	71530	5 F.I.C.A.	5 502 69
1,467 26	71542	6 Retirement	6 726 51
498 75	71550	7 Health Insurance	7 199 50
60 00	71570	8 Personnel Comm. Pro Rata Charges	8 60 00
60 00	72167	9 Professional Services: Engineer	9 60 00
318 50	72199	10 Professional Services: Cartographer	10 285 25
112 50	72511	11 Travel-State: Mileage - Private Vehicles	11
	72512	Mileage - State Vehicles	12
237 50	72520	13 Subsistence	13
56 00	72531	14 Air Fare	14
	72541	15 Registration Fees	15
	72543	16 Parking	16
382 35	72560	17 Travel-Out of State: Subsistence	17 210 35
659 64	72571	18 Air Fare	18 393 64
55 25	72574	19 Taxis	19 28 00
25 00	72581	20 Registration Fees	20
90	72589	21 Other-Telephone, etc.	21 90
	72711	22 Occupancy: Office Rent	22
	72713	23 Warehouse Rent	23
	72821	24 Mtn. & Repairs: Furniture	24
43 00	72824	25 Adders & Calculators Typewriters	25
168 00	72826	26 Copy Machine, Other	26
	72827	27 Mimeo, Reader-Printer, etc.	27
	73111	28 Office Supplies: Printed Stationery & Envelopes	28
	73113	29 Carbon & Ribbons	29
	73117	30 Reproduction Supplies	30
433 18	73119	31 Misc.	31 213 17
	73259	32 Field Supplies: Logs, etc.	32
	73514	33 Printing - Large Maps, etc.	33
53 91	73524	34 Legal Advertising	34
	73531	35 Subscriptions: Newspaper	35
29 00	73533	36 Technical Journals	36
155 00	73541	37 Postage Stamps	37
67 78	73551	38 Telephone Service: Central System	38 15 24
241 65	73552	39 Equipment Rental	39 80 55
70 21	73553	40 Long Distance	40 25 99
100 50	73554	41 ATS Service Charge	41 33 93
1,500 00	73720	42 Organization Dues	42
	73730	43 Technical or Reference Books	43
600 00	73741	44 Insurance	44
250 00	79220	45 Revolving Fund	45
450 45	74312	46 Capital Outlay: Map Cabinet	46 450 45
115 35	73519	47 Blue Printing	47 115 35
287 96	74313	48 Capital Outlay: Light Table	48
	49		49
	50		50
	51		51
	52		52
	53		53
	54		54
	55		55
30,995 50		TOTAL	14,062 00

OFFICE

DO NOT WRITE BELOW THIS LINE

FIELD

**MONTHLY FINANCIAL REPORT**

1 RECEIPTS MONTH OF Sept. 1977	2 CLASSIFICATION	3 APPROPRIATED RECEIPTS	4 UNAPPROPRIATED RECEIPTS	5 TOTAL ALL RECEIPTS YEAR TO DATE
25 00	1 Permits to Drill		25 00	50 00
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
25 00	TOTAL CURRENT MONTH RECEIPTS		25 00	XXXXXXXX
	TRANSFERS IN			
XXXXXXXX	BALANCES BROUGHT FORWARD		3,726 83	XXXXXXXX
25 00	TOTALS - MONTH AND YEAR TO DATE		3,751 83	50 00

6 CLAIMS PAID MONTH OF Sept. 1977	7 EXPENDITURES FUND TITLES	8 TOTAL AMOUNT AVAILABLE YEAR TO DATE	9 CLAIMS PAID YEAR TO DATE	10 OUTSTANDING ENCUMBRANCES	11 UNENCUMBERED BALANCE
10,528 62	1 Personal Services	29,200 00	21,110 80		8,089 20
1,680 56	2 Emp. Related Exp.	5,030 00	3,471 07		1,558 93
285 25	3 Professional Services	925 00	318 50		606 50
	4 Travel - State	1,725 00	406 00	1,318 90	10
632 89	5 Travel - Out of State	2,000 00	1,123 14		876 86
484 23	6 Other Operating Exp.	7,419 95	3,827 58		3,592 37
450 45	7 Capital Outlay-Equipment	800 00	738 41		61 59
	8				
	9				
	10				
	11				
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	25				
	26				
	27				
	28				
	29				
	30				
14,062 00	TOTALS	47,099 95	30,995 50	1,318 90	14,785 55



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ACTIVITY REPORT

September 7, 1977

John Bannister  
Executive Secretary

The next scheduled meeting of the Commission will be held in Phoenix on October 21st at the Commission offices at 10:00 a.m. You will be further notified as this time approaches.

I (Donna, too) would like to again express my appreciation for the raise you granted me in Executive Session following our last meeting.

The budget as approved by you on August 19th was timely submitted to the Governor's budget analyst. One change was made in the budget as you approved. This concerned itself with an adjustment in the employee related expenses percentage figure. This change was made after consultation with the Governor's budget analyst and, in reality, has no direct affect upon the activities of the Commission. The purpose of this section of our budget is basically to cover such things as the State's share of social security, retirement, workmen's compensation, unemployment insurance, health insurance, etc.

As approved by the Commission at our August meeting, I will go to Anchorage on September 14th to attend the Interstate Oil Compact Commission executive session. I am pleased to report that the opportunity is being made available to us to fly the Alaskan pipeline and inspect the Prudhoe Bay drilling and facilities. As you are aware, the Alaskan contribution of oil and natural gas to the lower 48 states will be impressive, even though once it hits the market it will not materially decrease the demand made for foreign oil, still the massive amount of the product will help alleviate the Nation's energy shortage.

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Executive Secretary  
September 7, 1977

I will also have the opportunity to visit some of the offshore drilling platforms at Cook Inlet, as well as the onshore facilities whereby most of the Cook Inlet gas is liquified and shipped to Japan. I feel this will be a most informative meeting.

Preparations for the seminar I will give on September 21st to a group of high school and college teachers at the Peoria High School are progressing satisfactorily. I have ordered several short films to further illustrate various points which I desire to bring forth at that time. I feel that exposure such as this is of value to the Commission.

Some time ago I was interviewed by radio station KMEQ here in Phoenix concerning Arizona's energy picture and that of the Nation. I was recently requested to appear for another interview, in effect updating my prior program. I anticipate that this interview will occur some time toward the end of September.

As set forth in our 1977-78 budget (current), we have secured the cabinets for safe storage of the mylar prints and fortunately had sufficient monies left to replace our old light table. These purchases, essentially, put the equipment used by the Geology Section in excellent shape.

In general, the time between our last meeting and this time have been comparatively quiet.

We have just now received the initial list of applicants for the position of geologist. Hopefully, one of them may prove to be satisfactory. We will keep you advised of our progress.

Due to new directions from the Finance Office, it will now be necessary that you furnish this office accurate odometer readings as to mileage traveled on Commission business (map mileage can still be used if you just desire to claim travel from one town to another), as well as submit receipts for such expenditures as parking, taxis and hotel costs.



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ACTIVITY REPORT

September 6, 1977

W. E. Allen  
Enforcement Section

The Executive Vice President of the Rocky Mountain Oil and Gas Association has declared the energy bill presently moving through Congress "is a tax bill rather than an energy bill." This bill, as it now stands, "would cost the American people \$18 billion a year through 1985 and would do nothing toward decreasing our dependence on foreign oil; it will not increase domestic oil production, and it will not remove obstacles to energy growth and production." This bill advocates the use of coal, nuclear fuels, solar energy, geothermal resources as alternate or supplemental sources of energy to oil and gas and yet neither the administration nor congress does anything or advocates anything to relieve the various governmental and environmental control that has the petroleum industry hogtied. Rather, the Carter administration, so Interior Secretary Cecil Andrus tells us "has elevated environmental concerns above development." Andrus said the policy represents a reverse of the traditional approach toward natural resources, which emphasized development ahead of environmental protection.

A local valley firm, Talley-Frac Corporation of Mesa, has been awarded a \$12 million contract by the Energy Research and Development Administration. This project is part of an ERDA program to speed application of several types of in situ methods for processing oil shale. Talley-Frac has proposed a method which involves fracturing a 40 foot thick shale section some 400 feet underground, first with high pressure water, followed by a slurry explosive. The shale is then heated to 900°F, at which temperature kerogen within the shale is converted to oil. The oil will then be removed by conventional methods.

Page 2  
Enforcement Section  
September 6, 1977

The use of explosives as a fracturing medium has been under development for a number of years. The primary problem with fracing a formation with explosive fluids has been the instability of the explosive. Talley claim that they have now developed an explosive that allows the user complete control of the operation.

Some 20-odd years ago I had the opportunity to witness an attempt to frac a well using an explosive in the fracturing fluid. On the first attempt the explosive would not detonate - on the second try the explosive detonated prematurely. The operator gave up after that.

Pyramid Oil is moving in a rig of its own to complete the drilling of its Federal No. 2 in Mohave County. Operations have been suspended on this hole since July 5 of this year.

Energy Reserves Group have at long last secured a rig to drill their Navajo "0" No. 5 in Apache County. They anticipate spudding this well about the middle of September.

We have had no indication of any proposed new drilling activity in the near future. There is still some leasing going on and we still have visitors in to check well files and logs but these investigators are either college students or mineral explorationists.

Arizona Fuels Corporation, as you know, operate a small refinery just north of Fredonia, Arizona. This refinery has more than doubled its size recently. Their capacity has increased from approximately 40,000 to over 90,000 barrels. Products manufactured at this refinery include diesel, No. 4 and 6 fuel oils, asphalt and a small amount of naptha and gasoline. The crude oil is produced in Utah with small amounts coming from Nevada and California. Products are disposed of in Utah and Arizona.



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ACTIVITY REPORT

September 7, 1977

J. N. Conley  
Director, Geology Section

PUBLICATIONS

Sales since August 15 amounted to \$231.00.

New. Subsurface temperature maps, State of Arizona, GT-3A Basement rocks and GT-3B Suprabasement rocks. By keyed symbols, these two maps present bottom-hole temperature in wells measured by geophysical surveys and bottom-hole or shallower temperatures measured in connection with drill-stem or reservoir productivity tests. Keyed patterns show areas of Quaternary volcanic rocks and areas of Tertiary/Laramide volcanic and igneous rocks. The companion text presents additional data.

OIL & GAS LEASING ACTIVITY

None reported.

ENERGY-RESOURCE & MINERAL EXPLORATION

Oil & Gas. No on-the-ground exploration reported. However, based on recent requests for publications and information, there is some interest in the oil and gas potential of those portions of the state outside Indian Reservations.

Uranium. Continues to be active.

EXPLORATION ITEMS

New method may reveal untapped mineral resources. By matching surface chemical "signatures" of a known mineral district with those of an unexplored or partially explored region, it may be possible to outline new targets for mineral exploration, according to scientists with the U.S. Geological Survey.

Joseph M. Botbol, a geologist at the Survey's National Center in Reston, Virginia, and senior author of the report, said the new method employs basic geochemical and computer techniques. He said:

In essence the method is similar to finger print matching. First, an area is selected where there is a known history of mineral exploration, development, and production. Then, geochemical analyses are made of the surface material -- rock or soil -- in the area. Once a chemical "profile" is established, a search is made to find similar profiles in regions outside the known area. The computer aids in determining the degrees of

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similarity of the profiles. If there is an obvious similarity for a particular area, the area is considered a logical target for further exploration.

Clues developed to possible mineral deposits represent indirect evidence only. Intensive exploration efforts would be necessary to confirm the actual presence of any deposits that might have commercial significance.

"Fingerprinting" techniques applicable to search for petroleum, geothermal, and uranium energy resources. Somewhat similar "fingerprint matching" techniques have been applicable to the search for undiscovered petroleum and geothermal energy resources. Drilling near visible oil seeps in past years has resulted in the discovery of many oil and gas fields throughout the world. Geochemical detection of microseepage has also been responsible for some discoveries, particularly in Russia. Based on the results of some comparatively recent investigations, it now appears that in some instances microseepages can be detected by studies of satellite imagery and spacecraft/aircraft photography.

The best example reported to date occurs over the Cement oil field in Oklahoma. Conclusive evidence has been presented that hydrocarbons escaping from now-productive oil and gas reservoirs for millions of years along the crest of the Cement anticline have caused bleaching of Permian red beds which are now exposed at the surface. Ancient seeps passing through gypsum beds on their way up have produced hydrogen sulfide, a strong reducing agent, which has bleached the red beds to white and pastel colors over several areas of exposed outcrop.

By analogy, any slight anomalous indications of alterations of surface sediments noted on space imagery or aircraft/spacecraft photography in areas with a potential for petroleum should be suspect.

Somewhat similar techniques are also applicable to the search for uranium and geothermal energy resources.

Petroleum geochemical exploration. The basis for petroleum geochemical exploration is the migration of hydrocarbon gases to the surface from undiscovered oil and gas accumulations directly below. Surface manifestations of the reservoir may take many forms, but the most reliable indication and the most independent variable is the vertically migrating hydrocarbon microseepages themselves.

Petroleum geomicrobiological (microbial) exploration. This method of prospecting technique have been recognized for many years. Until recently the methods developed have failed to fully meet expectations. It now appears that a method utilized in Texas may have considerable merit as an exploration tool. Microbial surveys, at least in some areas, can be used to develop prospects for the drill or a means of narrowing down an area for detailed seismograph, gravity, or other geophysical methods.

Applicability of remote sensing (geophysical and telegologic), geochemical, and geomicrobiological prospecting techniques in Arizona. Surface and subsurface geological studies are basic in searching for petroleum and minerals exposed on the surface or buried in the subsurface of the earth. In most instances geophysical surveys (normally seismic, gravity, and magnetic in order of usefulness) are necessary to develop a drillable petroleum prospect. However, geophysical surveys are very expensive.

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Page 3

Most of Arizona lacks detailed surface geological maps. Very little detailed subsurface mapping is available. Geophysical coverage available to the public is limited to reconnaissance-type gravity and aeromagnetic surveys. However, there are a few areas in the Colorado Plateaus portion of the state possibly warranting geochemical, microbial, and telegeologic investigations.

The Dineh-bi-Keyah oil field in Apache County, which has produced more than 14 million barrels of oil since discovery in 1967, possibly offers an excellent site for testing the effectiveness of microbial or geochemical surveys. The productive reservoir is a sill intruded into sedimentary rocks. Customary exploration methods are presently not capable of locating oil accumulations of this nature. There may be similar undiscovered accumulations of oil. One area of possible interest is located about 13 miles north of the Dineh-bi-Keyah field where a test hole penetrated 1182 feet of an igneous body containing numerous minor but positive shows of oil.

The land surface in the area encompassing several oil and gas pools near the northeast corner of the state (Four Corners region) consists of siltstones, sandstones, and shales predominantly red or reddish in color of the Jurassic Morrison Formation and San Rafael Group and the Triassic Glen Canyon Group. Microseepages of hydrocarbons passing upward through the evaporites of the Permian Cutler Formation overlying the oil accumulations might have produced hydrogen sulfide required for bleaching red colored surface rocks.

The oil and gas pools in the Four Corners region possibly offer excellent sites for testing a combination of telegeologic, geochemical, and microbial prospecting techniques.

#### FEDERAL FUNDING - GEOLOGIC AND MINERAL RESOURCE SURVEYS AND MAPPING

For the past few years the U.S. Geological Survey budgets have placed more emphasis on earthquake, volcanic and nuclear reactor hazards, and mineral land assessment-wilderness programs than on the basic geologic mapping programs sorely needed by Arizona and other western states. Energy Resources and Development Administration (ERDA) officials to date cannot be considered a good source of funds for geologic mapping and petroleum assessment surveys.

However, some federal funds may be available through the Department of the Interior for:

- 1) Cooperative state-federal geologic mapping programs, and
- 2) Specific mineral/fossil fuel investigative projects on Indian lands.

Legislative approval will be required before a cooperative program can be commenced. However, there is a possibility that the U.S. Geological Survey might wholly fund some specific petroleum investigative projects, such as those mentioned previously in this report, on Navajo Reservation lands. The Survey has a continuing program underway for evaluation of mineral and fossil fuel resources on Indian lands throughout the United States. In Arizona a photogeologic mapping program on the Papago Indian Reservation has been completed and a gravity survey is currently in progress.

On Navajo and Hopi Indian lands an investigative project has been completed (An Integrated Interpretation of Geophysical and Landsat Data, for which our Commission furnished a considerable volume of subsurface geologic and geophysical

Activity Report  
September 7, 1977  
Page 4

data to the project investigators). Upon receipt of this report and subsequent integration of our subsurface information, a proposal for several specific follow-up investigative projects can be prepared for submission to the U.S. Geological Survey.

VISITORS

Edward Surabian, Phoenix  
Roy B. Ralston, Phoenix  
Lance W. Simpson, Phoenix  
Alan R. Hansen, Denver  
Floyd C. Moulton, Denver

JNC:os

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J.N.C.

OIL AND GAS CONSERVATION COMMISSION  
1645 West Jefferson Street  
Suite 420  
Phoenix, Arizona 85007

Minutes of Meeting  
August 19, 1977

Present:

Mr. Hal Butler, Vice Chairman  
Dr. J. Dale Nations, Member  
Mr. Robert A. Gallaher, Member

Absent:

Mr. Ralph W. Bilby, Chairman  
Mr. Norman D. Levitt, Member

The regular Commission meeting of August 19, 1977 was called to order by Vice Chairman Butler at 10:00 a.m.

Minutes of the meeting of June 10, 1977 were approved as written.

Reports of Executive Secretary, Enforcement Section and Geology Section were accepted.

It was moved and approved that the Executive Secretary attend the Executive Committee meeting of the Interstate Oil Compact Commission in Anchorage, Alaska on September 16, 1977.

After general discussion of the proposed 1978-79 budget for the Commission, it was moved and passed that the budget be approved as drafted.

Meeting adjourned at 11:05 a.m. to go into Executive Session.

Approved                      October 21, 1977

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**MONTHLY FINANCIAL REPORT**

RECEIPTS MONTH OF Aug. 19 77	CLASSIFICATION	APPROPRIATED RECEIPTS	UNAPPROPRIATED RECEIPTS	TOTAL ALL RECEIPTS YEAR TO DATE
	1 Permits to Drill			25 00
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
- 0 -	TOTAL CURRENT MONTH RECEIPTS		- 0 -	XXXXXXXX
	TRANSFERS IN			
XXXXXXXX	BALANCES BROUGHT FORWARD		3,726 83	XXXXXXXX
- 0 -	TOTALS - MONTH AND YEAR TO DATE		3,726 83	25 00

CLAIMS PAID MONTH OF Aug. 19 77	FUND TITLES	TOTAL AMOUNT AVAILABLE YEAR TO DATE	CLAIMS PAID YEAR TO DATE	OUTSTANDING ENCUMBRANCES	UNENCUMBERED BALANCE
6,827 22	1 Personal Services	29,200 00	10,582 18		18,617 82
1,161 60	2 Emp. Related Exp.	5,030 00	1,790 51		3,239 49
33 25	3 Professional Services	925 00	33 25		891 75
406 00	4 Travel - State	1,725 00	406 00	1,318 90	10
	5 Travel - Out of State	2,000 00	490 25	225 00	1,284 75
758 69	6 Other Operating Exp.	7,221 30	3,343 35	397 07	3,480 88
287 96	7 Capital Outlay-Equipment	800 00	287 96	450 45	61 59
	8				
	9				
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	26				
	27				
	28				
	29				
	30				
9,474 72	TOTALS	46,901 30	16,933 50	2,391 42	27,576 38

AGENCY Oil & Gas Conservation Commission

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. 1977
	71140	1 Per Diem: Commission Members	1
10,582 18	71150	2 Salaries: Staff	2 6,827 22
67 95	71510	3 Workmens Comp.	3 43 84
63 55	71520	4 Unemployment Insurance	4 41 00
619 01	71530	5 F.I.C.A.	5 399 36
740 75	71542	6 Retirement	6 477 90
299 25	71550	7 Health Insurance	7 199 50
	71570	8 Personnel Comm. Pro Rata Charges	8
	72167	9 Professional Services: Engineer	9
	72199	10 Professional Services: Cartographer	10
112 50	72511	11 Travel-State: Mileage - Private Vehicles	11 112 50
	72512	12 Mileage - State Vehicles	12
237 50	72520	13 Subsistence	13 237 50
56 00	72531	14 Air Fare	14 56 00
	72541	15 Registration Fees	15
	72543	16 Parking	16
172 00	72560	17 Travel-Out of State: Subsistence	17
266 00	72571	18 Air Fare	18
27 25	72574	19 Taxis	19
25 00	72581	20 Registration Fees	20
	72589	21 Other-Telephone, etc.	21
	72711	22 Occupancy: Office Rent	22
	72713	23 Warehouse Rent	23
	72821	24 Mtn. & Repairs: Furniture	24
	72823	25 Adders & Calculators	25
168 00	72826	26 Copy Machine, Other	26 168 00
	72827	27 Mimeo, Reader-Printer, etc.	27
	73111	28 Office Supplies: Printed Stationery & Envelopes	28
	73113	29 Carbon & Ribbons	29
	73117	30 Reproduction Supplies	30
220 01	73119	31 Misc.	31 220 01
	73259	32 Field Supplies: Logs, etc.	32
	73514	33 Printing - Large Maps, etc.	33
53 91	73524	34 Legal Advertising	34
29 00	73531	35 Subscriptions: Newspaper	35 29 00
	73533	36 Technical Journals	36
155 00	73541	37 Postage Stamps	37 155 00
52 54	73551	38 Telephone Service: Central System	38 15 56
161 10	73552	39 Equipment Rental	39 80 55
44 22	73553	40 Long Distance	40 15 00
66 57	73554	41 ATS Service Charge	41 32 57
1,500 00	73720	42 Organization Dues	42
	73730	43 Technical or Reference Books	43
600 00	73741	44 Insurance	44
250 00	79220	45 Revolving Fund	45
	74312	46 Capital Outlay: Map Cabinet	46
287 96	74313	47 Tracing Table	47 287 96
33 25	72169	48 Professional Services: Blue Prints	48 33 25
		49	49
43 00	72824	50 Mtn. & Repairs: Typewriter	50 43 00
		51	51
		52	52
		53	53
		54	54
		55	55
16,933 50		TOTAL	9,474 72

OFFICE

(DO NOT WRITE BELOW THIS LINE)

FIELD