

OIL & GAS CONSERVATION COMMISSION
Meeting: August 20, 1971
Mr. John Bannister, Exec. Sec.



OFFICE OF
Oil and Gas Conservation Commission
 STATE OF ARIZONA
 4515 NORTH 7TH AVE.
 PHOENIX, ARIZONA 85013
 PHONE: (602) 271-5161

A G E N D A

Meeting
 August 20, 1971
 The Maxwell House
 Show Low, Arizona

*10 AM
 Reg. Mic. May
 following*

10:00 a.m.

Call to order

- OK* 1. ✓ Approval of minutes of meeting of June 18, 1971
- OK* 2. Executive Secretary report
- OK* 3. Enforcement Section activity report
- OK* → 4. Geology Section activity report
- OK* 5. Old Business
- 6. New Business
 - a. Approve Budget Request 1972-1973
- 7. Adjourn

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

*1. Budget
 2. Hearing on Rules -*

JOHN J. RHODES
1st DISTRICT, ARIZONA

COMMITTEE:
APPROPRIATIONS

Congress of the United States
House of Representatives

Washington, D.C. 20515

July 12, 1971

Mr. John Bannister
Executive Secretary
Office of Oil and Gas Conservation
Commission
4515 North 7th Avenue
Phoenix, Arizona 85013

Dear Mr. Bannister:

Thank you so much for your letter of July 2nd with which you enclosed several articles that appeared in the Oil and Gas Journal. I am aware of much of the information, however, I am so pleased you took the time to forward the copies to me. I found them most interesting.

I will certainly try and work a visit to your offices into my schedule the next time I am in Arizona. I will be in touch with you to set up a mutually convenient time.

Yours sincerely,

John J. Rhodes, M. C.

plp

RECEIVED

JUL 15 1971

O & G CONS. COMM.

RUSSELL B. LONG, LA., CHAIRMAN
CLINTON P. ANDERSON, N. MEX. WALLACE F. BENNETT, UTAH
HERMAN E. TALMADGE, GA. CARL T. CURTIS, NEBR.
VANCE HARTKE, IND. JACK MILLER, IOWA
J. W. FULBRIGHT, ARK. LEN B. JORDAN, IDAHO
ABRAHAM RIBICOFF, CONN. PAUL J. FANNIN, ARIZ.
FRED R. HARRIS, OKLA. CLIFFORD P. HANSEN, WYO.
HARRY F. BYRD, JR., VA. ROBERT F. GRIFFIN, MICH.
GAYLORD NELSON, WIS.

TOM VAIL, CHIEF COUNSEL

United States Senate

COMMITTEE ON FINANCE
WASHINGTON, D.C. 20510

July 15, 1971

Mr. John Bannister
Executive Secretary
Oil and Gas Conservation Commission
4515 North Seventh Avenue
Phoenix, Arizona 85013

Dear John:

Thank you for your recent letter and enclosed articles which appeared in the Oil and Gas Journal.

As you are well aware, there have been extensive hearings in the Senate Interior and Insular Affairs Committee concerning the need for development of additional domestic oil and gas supplies. The President has proposed a national study group to be under the jurisdiction of the Committee. I can unequivocally state that I support this proposal. However, I also believe that all sources of energy and fuel must be studied, reviewed and inventoried. The development of future supplies of fuel and energy for environmental and economic reasons must be one of the first priorities in our nation.

Again, John, thank you for your comments and informational enclosures.

With kindest personal regards,

Cordially,

Paul

Paul Fannin
United States Senator

PF/jmd

BARRY GOLDWATER
ARIZONA

United States Senate

WASHINGTON, D.C. 20510

COMMITTEES:
AERONAUTICAL AND SPACE SCIENCES
ARMED SERVICES
PREPAREDNESS INVESTIGATING SUBCOMMITTEE
TACTICAL AIR POWER SUBCOMMITTEE
NATIONAL STOCKPILE AND NAVAL PETROLEUM
RESERVES SUBCOMMITTEE

July 7, 1971

Mr. John Bannister
Executive Secretary
Oil and Gas Conservation Commission
4515 North 7th Avenue
Phoenix, Arizona 85013

Dear Mr. Bannister:

Many thanks for your recent letter regarding the need for increasing exploration for natural gas in our State.

Let me assure you that it is essential we use every means at our disposal to explore for natural gas in Arizona. The energy needs of our State as well as the nation are growing at a rate that has far surpassed our domestic oil and gas production capability. As you know, we are dependent on foreign crude oil, and I need not point out the dangers that are inherent in this supply of energy. I am pleased the legislature recognizes the problem and has extended its support to the Commission.

Sincerely,

Barry Goldwater
Barry Goldwater

RECEIVED
JUL 9 1971
O & G CONS. COMM.

SAM STEIGER
3RD DISTRICT, ARIZONA

126 CANNON BUILDING
WASHINGTON, D.C. 20515
202-225-4576

PAUL G. ROSENBLATT
ADMINISTRATIVE ASSISTANT

Congress of the United States
House of Representatives
Washington, D.C. 20515

July 6, 1971

COMMITTEES:
INTERIOR AND INSULAR AFFAIRS
GOVERNMENT OPERATIONS
SELECT COMMITTEE ON CRIME

DISTRICT OFFICE:
5015 FEDERAL BUILDING
PHOENIX, ARIZONA 85025
602-261-4041

Mr. John Bannister
Executive Secretary
Oil and Gas Conservation Commission
4515 North 7th Avenue
Phoenix, Arizona 85013.

Dear Mr. Bannister:

Thank you very much for your letter of the 2nd and the attached articles which appeared in the June issue of the Oil and Gas Journal.

Needless to say, I appreciate your thoughtfulness in sending along the material for my perusal.

I appreciate the invitation to visit the Oil and Gas Conservation Commission the next time I am in Phoenix, and I do look forward to visiting with you at that time.

Best regards.

Sincerely,

Sam Steiger
SAM STEIGER, M. C.

SS:bh

RECEIVED
JUL 12 1971
O & G CONS. COMM.

MORRIS K. UDALL
2D DISTRICT OF ARIZONA

COMMITTEES:
INTERIOR AND INSULAR AFFAIRS
POST OFFICE AND CIVIL SERVICE

Congress of the United States
House of Representatives
Washington, D.C. 20515

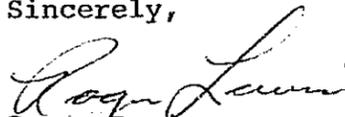
July 6, 1971

Mr. John Bannister
Executive Secretary
Oil and Gas Conservation Commission
4515 North 7th Avenue
Phoenix, Arizona 85013

Dear Mr. Bannister:

Thanks for sending the articles from the Oil and Gas Journal. The Congressman is out of Washington but I'll call these to his attention when he returns.

Sincerely,


Roger Lewis
Administrative Assistant

llh

RECEIVED

JUL 12 1971

O & G CONS. COMM.

July 2, 1971

Honorable Paul Fannin
United States Senate
Senate Office Building
Washington, D.C.

Dear Senator Fannin:

Enclosed, for your information, are reproductions of several articles which appeared in the June 21, 1971 issue of the Oil and Gas Journal. We know that you are aware of much of the information we are sending to you, but this Commission would like to direct your attention again to the growing and vital need for continued and additional exploration for domestic sources of oil and gas.

The Arizona Legislature recently instructed this Commission to expend its efforts to encourage further development of the oil and gas potentials of the State. Accordingly, the Commission increased its staff of geologists and is currently engaged in developing new geological information of Arizona which will be disseminated to all segments of this oil and gas exploration industry.

The Commission requests you to drop by our offices the next time you are in Phoenix and allow us to familiarize you with our efforts to accomplish this purpose. Your interest in our endeavor will be greatly appreciated.

Respectfully,

Oil and Gas Conservation
Commission

By

John Bannister
Executive Secretary

JB/vb

Original letters also sent to:

Enc.

Hon. Barry Goldwater
Hon. John J. Rhodes
Hon. Sam Steiger
Hon. Morris K. Udall

EDITORIAL

Big question now: Can U.S. afford imported oil?

IN A WORLD where OPEC has imposed its tight grip on oil supply, the American people have only one choice: develop their domestic reserves or lose their security of supply to foreign powers.

Economist John Emerson of Chase Manhattan Bank puts the choice for Americans and the prospects even more bluntly:

"They can require their Government to adopt policies forthwith which will permit the conversion of our vast untapped sources of energy producing fuels into useful output . . . or they can sit back and watch the control of this nation's destiny pass into foreign hands as we become more and more dependent upon foreign countries for our principal sources of energy. By merely closing the valve, these countries could set back our standard of living 50 years into the past."

Emerson might have added, as Journal International Editor Frank G. Gardner does on p. 71, that no matter what choice Americans make, the day of cheap oil is over. The price of oil everywhere is going up. Domestic oil in the long run will be the cheaper.

IMPLICATIONS of the higher OPEC-imposed prices are immediate for Western Europe, Japan, and other large oil importers. Their energy costs take a jump right now, reflecting their deep dependency on the Middle East oil fields.

U.S. consumers will be in the same price and supply squeeze within a few short years unless American energy policy swings its emphasis to a stronger reserve position.

Emerson cites a few figures. He projects U.S. demand for crude by 1980 at 25 million b/d of which only 12.5 million b/d will be produced domestically. Imports will furnish the rest—Canada 2 million, Venezuela 3.2 million, the Far East 0.2 million, and the Middle East 7.1 million. This means that, assuming no stepped-up domestic oil search, the OPEC-dominated area will supply 25% of U.S. demand within a matter of 8 years.

THIS TREND can be changed if Americans really want to maintain the present degree of energy self-sufficiency.

This nation has the potential reserves to do this, but prices must be allowed to rise to the point where it's profitable to develop these deposits. Emerson observes that "a nation as rich as the U.S. can well afford to pay an adequate price for one of the principal supports of its standard of living."

But affording higher oil prices is no longer the real question. "Cheap" foreign oil has been put on a price escalation. Its price is going up every year on present 5-year agreements, and new agreements later likely will shove it up faster. Comparing domestic and foreign prices for "bargains" is becoming irrelevant. And when price and unreliability of supply are considered together, it's obvious Americans can't afford to gamble their future on imported oil.

Time is growing short for Washington to realize this and translate this realization into incentives for a real domestic exploration campaign.

California gas pinch to become acute

Nonresidential customers face early cutback. Southern part of state bears brunt of shortfall as distributors search for sources to head off gap there of 1.35 billion cfd by 1975. Prices move upward.

CALIFORNIA's gas shortage has reached a point at which the projected demand for southern California cannot be met from present sources, and the supply for electric generation and other nonresidential customers must be cut.

That's the gist of a frankly pessimistic report to the California legislature last week on the status of gas supply for the growing California market. It was prepared by the California Public Utilities Commission.

The report says that, except for Canadian gas available through Pacific Gas Transmission Co., there are no pending applications before the Federal Power Commission for new gas from out-of-state sources to meet future requirements.

For more than a decade, CPUC said, California gas utilities have purchased about three-fourths of their gas supply from out-of-state. But these sources are drying up.

PGT probably will be able to deliver an extra 200 MMcfd to Pacific Gas & Electric Co. from Canada starting in November, and El Paso Natural Gas Co. has been authorized to supply southern California an extra 100 MMcfd in November. This, however, will not be enough for southern California, particularly for large interruptible gas service.

CPUC said El Paso Natural and Transwestern Pipeline Co., the southern California suppliers, have advised they cannot furnish more gas beyond the November increase.

"The situation has reached the point where Southern California Gas Co. plans to reduce the gas supplies it makes available for electric generation to Southern California Edison Co., the Los Angeles Department of Water & Power, various other Los Angeles area cities, and San Diego Gas & Electric Co.," the report said.

The demand. CPUC has obtained from the gas utilities these estimates of future unmet needs (cumulative).

- For southern California:
Jan. 1, 1972—400 MMcfd
Nov. 1, 1972—300 MMcfd
Nov. 1, 1973—300 MMcfd

Nov. 1, 1974—200 MMcfd

Nov. 1, 1975—150 MMcfd

These amounts would allow the companies to maintain the level of service to interruptible customers furnished in the past.

- For northern California:

Jan. 1, 1973—50 MMcfd

Jan. 1, 1975—150 MMcfd

Jan. 1, 1976—250 MMcfd

Jan. 1, 1977—50 MMcfd

Thus, for southern California the gas gap by 1975 would be 1.35 billion cfd, and for Northern California by 1977 500 MMcfd.

What's being done. California's two chief natural-gas-distribution companies—Pacific Lighting and PG&E—are pursuing active exploration programs to bring more gas to the state, CPUC said.

Pacific Lighting has joined with its supplier, Transwestern, in a program in the southwestern states, and PG&E has arranged for its Canadian subsidiary, Alberta & Southern Gas Co., to use for new exploration a portion of a price increase for Canadian gas.

Also Pacific Lighting is negotiating to bring liquefied natural gas to Southern California from Alaska's Cook Inlet or from South and Central America (OGJ, June 7, p. 30).

Meanwhile, production of gas in California has diminished. Production available to southern California has dropped from an average of 575 MMcfd in 1969 to 350 MMcfd at the start of 1971, exclusive of peaking sup-

plies. A primary reason for the drop, CPUC said, has been a cut in production from the Coles Levee fields to facilitate an oil-recovery project.

In northern California, gas production has maintained a level of about 650 MMcfd since 1963.

Prices. The growing shortage of gas has meant a succession of rate increase applications and authorizations.

From 1969 through Apr. 9, 1971, El Paso has received increases totaling \$106.7 million, Transwestern \$26.2 million, and Pacific Gas Transmission \$1.2 for a grand total of \$134 million. For the full year of 1971 the potential increases are \$3.4 million for El Paso, \$5.3 million for Transwestern, and \$27.3 million for PGT—for a total of \$36 million.

Producers in California are receiving more for their gas also. In southern California, where prices are based on the average paid for out-of-state gas from Mexico, the average price has increased from 30¢/Mcf in 1969 to 35¢ at present, or about \$5.1 million/year at present volumes.

In northern California the price has been stable at 30¢ since 1960 but will rise this year to about 34¢ for an annual increase of \$9.5 million.

The CPUC staff, the report said, has emphasized California's need for new gas at hearings of the Federal Power Commission and has supported higher prices for new gas. The staff recommended a 22¢ price for new Permian basin gas.

Standard & Poor survey sees oil holding top-energy role

WORLDWIDE expansion of industry and population, combined with an advance in diving standards, is expected to double oil demand by 1985.

Leading companies in the industry should witness favorable earnings growth in upcoming years as demand increases and price structures rise. And both factors will help oil main-

tain its role as the dominant energy source, according to a new Standard & Poor's (S&P) Basic Industry Survey on Oil.

Citing a variety of reasons for the encouraging outlook, S&P says demand during the 1970's will be stimulated particularly by improved demand for fuel oils as alternate sup-

World oil industry licks its wounds, plans ahead

FRANK J. GARDNER
International Editor

"THE moment of truth has arrived for the consumer." Unquote Sir David Baren, chairman of "Shell" Transport & Trading Co., Ltd., as he wound up a speech in London recently.

That short statement could well epitomize the turmoil that has beset international oil over the past 6 months.

For it is the consumer who must now accept the fact that the price of energy everywhere is going up. Most of that energy is supplied by oil, a commodity that for the past decade has sold on world markets at bargain prices while the cost of nearly everything else pushed steadily upward.

With the last major negotiations successfully concluded in the eastern Mediterranean (OGJ, June 14, p. 44), the oil industry can pause to see where it's been and where it's headed.

About where it's been, there's little doubt. Over the past 6 to 9 months, it's been through some of the most profound changes in its history. But those will pale beside the ones that lie ahead, as an oil-hungry world places ever-greater demands on it.

Most important change has been the shift from a buyer's to a seller's market—and intimately tied into that is the parallel shift of power from the international oil companies to the governments of the oil-producing countries.

The Organization of Petroleum Exporting Countries (OPEC) has emerged

from the recent negotiating sessions as a powerful force, and one that must be reckoned with in all future oil matters in the free world.

At a seminar at the Northwestern University Transportation Center in March, M. A. Adelman, professor of economics at Massachusetts Institute of Technology, said the power over oil has shifted dramatically to the OPEC countries, ending a 15-year buyer's market. He predicted more government-to-government roles in the oil trade, eroding the buffer role of the oil companies.

The producing countries, Adelman said, control the supply, and the consuming countries have few alternatives. So taxes and prices may well be increased several times without reducing sales. He predicted that the OPEC members will digest the recent increases and be back for more.

Whether one agrees with the Adelman's predictions or not, he did issue one clear warning to the industry, and one that must be heeded. "The genie," he declared, "is out of the bottle. The producing countries have had great success using the weapon of a threatened concerted stoppage, and they can't be expected to put it away."

At the same seminar, Paul H. Frankel of London's Petroleum Economics said that the target of the consuming countries will be to prevent the continued cornering of the market by a "water-tight oil-country cartel." The free world ex. U.S., he said, must cope with a "perilous situation" and the only escape

Where crude prices stand today . . . and where they're headed

Country of origin, type oil	Posted price							
	6-1-70	11-14-70 (Persian Gulf)	2-15-71 (Tehran)	3-20-71 (Tripoli-Caracas)	6-1-71	1-1-73	1-1-74	1-1-75
AFRICA WEST								
Nigeria								
Light 34.0/34.9° ex Bonny	2.17	2.42	2.42	3.212	3.212	3.357	3.506	3.658
Medium (27.0/27.9°) ex Bonny	2.03	2.28	2.28	3.104	3.104	3.246	3.392	3.541
Export blend (34.0/34.9°) ex Forcados	2.17	2.42	2.42	3.21	3.21	3.355	3.504	3.656
MEDITERRANEAN								
Algeria*								
Hassi Messaoud 44.0/44.09° ex Bougie Skikda	2.77	2.77	2.70	3.35	3.35	3.524	3.682	3.844
Hassi Messaoud 44.0/44.09° ex Arzew	2.785	2.785	2.715	3.365	3.365	3.54	3.699	3.861
Zarzaitaine 44.0/44.09° ex La Skhirra	2.73	2.73	2.67	3.32	3.32	3.494	3.651	3.812
Iraq								
Grade "A" 36° ex Tripoli or Banias	2.21	2.41	2.41	3.211	3.211	3.335	3.462	3.593
Libya								
40° ex Brega	2.23	2.55	2.55	3.447	3.447	3.617	3.771	3.928
Saudi Arabia								
34° ex Sidon	2.17	2.37	2.37	†3.181	†3.181	†3.305	†3.432	†3.562
Syria								
Suwaidiyah 25° ex Tartus	1.41	1.87	1.98	1.98	2.60	(Subject to government decree)		
ASIA-PACIFIC								
Brunei								
Indonesia								
Minas 35.3° ex Dumai	1.67	1.67	1.67	2.21	2.21	(Subject to negotiation)		
Rantau 48° ex Pangkalan Susu	2.45	2.45	2.45	2.45	2.72	(Subject to negotiation)		
WESTERN HEMISPHERE								
Venezuela								
Bachaquero 16° ex La Salina	1.85	1.85	1.85	‡2.38	‡2.38	Subject to government decree after 1-1-72		
Lagocinco 36°/36.9° ex Bachaquero	2.73	2.73	2.73	‡2.74	‡2.74			
Lagomar 31°/31.9° ex Cardon	2.55	2.55	2.55	‡2.66	‡2.66			
Lagotresco 28°/28.9° ex Bachaquero	2.31	2.31	2.31	‡2.62	‡2.62			
Tia Juana Light 31°/31.9° ex La Salina	2.52	2.52	2.52	‡2.66	‡2.66			
Tia Juana Medium 26°/26.9° ex Amuay	2.30	2.30	2.30	‡2.59	‡2.59			
Oficina 35°/35.9° ex Puerto La Cruz	2.80	2.80	2.80	‡2.725	‡2.725			
Tia Juana Pesado 12°/13° ex Puerto Miranda	1.67	1.67	1.67	‡2.26	‡2.26			
PERSIAN GULF								
Abu Dhabi								
Murban 39° ex Jebel Dhauna	1.88	1.88	2.235	2.235	2.341	2.449	2.561	2.675
Umm Shaif 37° ex Das Island	1.86	1.86	2.225	2.225	2.331	2.439	2.550	2.664
Dubai								
32.0°/32.09° ex Fateh	1.68	1.68	2.13	2.13	2.233	2.338	2.446	2.557
Iran								
Iranian Light 34° ex Kharg	1.79	1.79	2.17	2.17	2.274	2.381	2.491	2.603
Iranian Heavy 31° ex Kharg	1.63	1.72	2.125	2.125	2.228	2.334	2.442	2.553
Cyrus 19° ex Cyrus	1.34	1.34	1.83	1.83	1.926	2.024	2.124	2.227
Darius 34° ex Kharg Island	1.63	1.63	2.16	2.16	2.26	2.37	2.48	2.59
Sassan 34° ex Lavan Island	1.70	1.70	2.17	2.17	2.274	2.381	2.491	2.603
Rostam 38° ex Lavan Island	1.76	1.76	2.23	2.23	2.34	2.44	2.56	2.672
Iraq								
Basrah 35° ex Khor al Amaya	1.72	1.72	2.155	2.155	2.259	2.365	2.475	2.586
Kuwait								
31.0°/31.9° ex Mina al Ahmadi	1.59	1.68	2.085	2.085	2.187	2.292	2.399	2.509
Neutral Zone								
Khafji 28.0°/28.09° ex Ras Khafji	1.46	1.55	1.97	1.97	2.069	2.171	2.275	2.382
Hout 35.0°/35.09° ex Ras Khafji	1.81	1.81	2.185	2.185	2.29	2.397	2.507	2.62
Oman								
33° export blend ex Mina al Fahal	1.82	1.82	2.205	2.205	2.31	2.418	2.528	2.641
Qatar								
Dakhlan 41° ex Umm Said	1.93	1.93	2.28	2.28	2.387	2.497	2.609	2.724
Offshore 38° ex Halul Island	1.83	1.83	2.20	2.20	2.305	2.413	2.523	2.636
Saudi Arabia								
Arabian Light 34° ex Ras Tanura	1.80	1.80	2.18	2.18	2.285	2.392	2.501	2.614
Arabian Medium 31° ex Ras Tanura	1.59	1.68	2.085	2.085	2.187	2.292	2.399	2.509
Arabian Heavy 27° ex Ras Tanura	1.47	1.56	1.96	1.96	2.059	2.161	2.265	2.371

*Prices shown are those decreed by the government on Apr. 12, 1971. An extra freight factor of 25¢/bbl is decreed until June 30, 1971, subject to further decree of extension. †Reported offer by Aramco. ‡Government prices good until Jan. 1, 1972.

How the new posted prices are derived

PERSIAN GULF (Fehran)	(\$/bbl)	LIBYA (Tripoli)	(\$/bbl)	NIGERIA (Lagos)	(\$/bbl)	IRAQ (Baghdad)	(\$/bbl)
Ex.: Arabian light 34°		New base posting	\$3.07	New base posting	\$2.88	New base posting	\$2.850
Old posting	\$1.80	First escalation:		First escalation:		Flat addition	.05
Flat addition	.35	Flat addition	.05	Flat addition	.05	2½% of \$2.85	.071
Gravity adjustment	.03	2½% of \$3.07	.077	2½% of \$2.88	.072		
New posting	\$2.18						
As of June 1, 1971:		Freight premiums:		Freight premiums:		Freight premiums:	
Flat addition	.05	Suez allowance	.12	Suez allowance	.12	Suez allowance	.12
2½% inflation factor (2½% of \$2.18)	.055	Temporary freight allowance	.13	Temporary freight allowance	.09	Temporary freight allowance	.12
New posting	\$2.285	Total posting	\$3.447	Total posting	\$3.212	Total posting	\$3.211

may be "a transfer of wealth to oil-exporting centers that is unprecedented in the history of commodity trade."

Another speaker at the March seminar, Egypt's former oil minister Mahmoud Younes, predicted an increase in direct government-to-government dealings in oil. He also forecast an increased participation downstream by exporting countries. As of now, he said, none of the producing countries is prepared to completely run its own oil business. But such a thing should not be ruled out, although it may require several decades. Younes further predicted a continuing role for the oil companies, but the exporting nations, he declared, want control.

NIOC sets pace. What of these government-to-government deals? There have been a few already, of course, but usually on a barter basis, as in the Brazilian-Algerian exchange earlier this month (OGJ Newsletter, June 7). How practical are such arrangements?

One industry observer, Milton Lipton, of Walter J. Levy Consultants Corp. of New York, says the temptation to make such arrangement will be there, but that there's reason to believe that they'd not be constructive, either as to terms of trade or to security of supply. He points to the French-Algerian blowup as an example.

Lipton also feels that as long as the world oil flow is subject to threats of interruption or unstable terms, the consuming countries would be wise to put more emphasis on stockpiling and development of alternate energy sources.

Walter Levy himself, when queried, said the government-to-government approach would be "disastrous." Every economic problem, he says, would be-

come a political problem, as in Algeria. Such negotiations, he believes, should be left to the oil companies, since they are the only parties competent to handle them.

Some of the developing countries, and nearly all the East European countries, have used the barter approach to the big producing countries, but it has little appeal for large industrialized lands such as those of western Europe and Japan.

Brazil's state oil company, Petrobras, freed by the government to make nearly any kind of oil agreement abroad, has signed a 5-year pact with Iraq, which provides for exchange of \$5 million worth of Iraqi crude for Brazilian products. Petrobras may make a deal with Iraq National Oil Co. for participation in exploration and production of Iraqi oil fields. It also expects to arrive at similar agreements with Venezuela's state oil company, Corp. Venezolana del Petroleo.

Thus it becomes clear that the principal competitor to the international oil companies in the future is to be the state-owned companies, which will serve as the vehicle for intergovernment oil agreements.

Ahead of the pack in this regard is the National Iranian Oil Co. (NIOC). Starting in 1965, it made 50-50 participation exploration agreements with a host of oil companies for its Persian Gulf continental shelf. Since then, it has moved into downstream participation via the refining route. It now holds part interest in refineries in South Africa and India and expects to achieve privileged entry into Pakistan markets through a pact entitling the Pakistanis to develop an offshore Iranian oil field.

NIOC has sealed barter agreements with Czechoslovakia, Romania, Hun-

gary, Bulgaria, Poland, and Spain. It now is courting the Japanese with an eye to direct import of Iranian oil into Japan. It has also signed agreement with Austria for furnishing Iranian oil in exchange for Iranian participation in refining and downstream functions there.

Thus members of the Iranian producing consortium eye NIOC's activities as increasingly competitive to their own. It's a trend that will become steadily more apparent.

Nationalization threat. Another problem for international oil is the threat of seminationalization, if not total, as has occurred in Algeria. There's little doubt that Sonatrach, Algeria's state oil company, will become a major competitor on world oil markets.

So far, Algeria is the only major oil producer (1 million b/d or more) to resort to the nationalization approach. But the threat exists in other lands—Venezuela, Iraq, and Libya. Already, Venezuela is in the process of nationalizing gas reserves (as Algeria did), and Iraq, India, and Libya are constantly voicing the warning.

OPEC on march. Following its successes at Tehran and Tripoli, OPEC may be expected to follow an increasingly aggressive approach toward the international oil companies as it pursues its goals in the future.

Principal among these is participation. This is expected to occupy a prominent place on the agenda of OPEC's next conference in July, along with a production-programming scheme which was hatched by Venezuela.

Production programming was tried by the OPEC countries in the mid-1960's and failed miserably amid inter-member bickering and disagreement. How the new Venezuelan pattern will

function isn't known, but it should have become obvious by now that any kind of prorating of world markets among the big producing countries is doomed to failure.

Participation is something else. If OPEC wants it, it may well get it. The members proved that at Tehran. The method of approach by the 10 member countries isn't clear from earlier OPEC statements on the subject, but Iraq may have given a clue.

Iraqi Oil Minister Saadoun Hamadi on June 10 declared that Iraq will work "unilaterally and collectively" to get its hands on 20% of the interest in Iraq Petroleum Co. (23.75% each British Petroleum, Shell, CEP, 23.75% Mobil and Jersey Standard, 5% Gulbenkian).

IPC played down Hamadi's statement at the time, but the possibility of such an approach by a unified OPEC membership cannot be ruled out.

Under the Tehran agreement, the OPEC countries "guaranteed" no more financial demands on the companies for a 5-year period ending Jan. 1, 1976. Any demand for financial participation in the shares of the operating oil companies would be a clear violation of that agreement. But the organization conceivably could set Jan. 1, 1976, as a target date for achievement of its participation goal.

Some oilmen doubt the 5-year "guarantee" will hold. OPEC, with its newfound strength and confidence, cannot be expected to hold still for that long, they feel, without pushing the companies further.

OPEC has already openly threatened France with an oil cutoff because of the call for a boycott of Algerian oil by French oil companies. Dr. Nadim Pachachi, secretary general of the organization, said the French action threatened the interests of French companies in other OPEC countries.

Pachachi, in praising the Libyan settlement, on Apr. 21 described the low-sulfur oils of Abu Dhabi and Indonesia as "underposted." The Libyan agreement tacked on a 10¢/bbl low-sulfur premium to the posted price there. Is Abu Dhabi now to breach the 5-year "guarantee" by demanding a similar premium?

Prices will go up. Whether the agreement holds for 5 years or not, one thing is certain: Posted prices will continue to rise. All the recent agreements call for a 2½% inflation boost and a flat increase of 5¢/bbl at each

escalation stage (see p. 73). In addition, Libya's agreement calls for the sulfur premiums to go up 2¢/bbl/year.

This means the consuming countries can only look forward to higher product prices and higher crude prices for their refineries.

The reaction of the big consuming countries to the first round of increases was mixed. From some, there was little outcry. But from others—notably Japan and India—a howl of protest went up. Neither has achieved any reduction, however.

Japan wanted the increases to be shared by consumers, the government, and the oil companies. But it got nowhere. The Japanese are still mulling the best approach to the problem.

Italy took a unique stand, one that had strong appeal for OPEC. It cut excise taxes on some products in order to lighten the burden on the consumer and refiner. The cut amounted to about 73¢/bbl (1.8¢/gal) on gasoline, 63¢/bbl on gas oil, and 49¢/bbl on heavy fuel oil.

But other governments have simply let the consumer bear the price increases. Higher product prices cropped up worldwide, protests or not.

The higher posted prices have had some unusual effects. Immediately following the Tehran settlement, realized prices for Persian Gulf crudes began to rise and by Apr. 1, had improved by as much as 35¢/bbl—on a few large shipments by as much as 43¢/bbl.

The reasons cited for the increase at the time were the surging demand in Europe, the then-unsettled East Mediterranean prices, the initial expensive Libyan agreement last fall and some softening in tanker rates.

There's some evidence that Persian Gulf crudes, despite their higher delivered prices, may edge out Libya in some of its European markets, where recently they have held less than half the total. Even with the Suez Canal closed, Gulf crudes could lay down at Rotterdam at costs near to or even below those for Libyan, especially as tanker rates decline (see chart).

If Suez were to open, Libya probably would find that it had priced itself right out of its lucrative European marketplace. It would still have the advantage, of course, of geography and low-sulfur crudes.

The chart shows how four crudes might compare in delivered cost (taxes, royalties, and production costs) at various tanker rates. At worldscale

70 (considered about "normal"), Libyan oil would cost \$2.52/bbl at Rotterdam, or 17¢ bbl more than Qatar oil. The Petroleum Press Service study assumed production costs of 12¢/bbl in Iran, 15¢/bbl in Qatar, 30¢/bbl in Libya, and 35¢/bbl in Nigeria.

Even at the Mediterranean port of Lavera in southern France, Qatar crude could be delivered for 7¢/bbl less than Libyan should tanker rates fall back to normal.

What to do. Will oil prices ever decline to their earlier levels? Highly doubtful, if only because of the surging demand for petroleum worldwide. A glance at production figures alone reflects this.

Crude output in the Middle East countries soared 18.3% in the first 4 months of the year to average 15,945,000 b/d. Asian countries increased production by 21.7%, while Africa showed only a slight gain of 0.07% thanks to a near-shutdown in Algeria after the French boycott.

In a recent study, Petroleum Industry Research Foundation, Inc. (Pirinc) forecast total world cumulative petroleum consumption during this decade at nearly twice that of the 1960's. "Yet the oil industry's physical capacity is not keeping pace with the growth in demand," Pirinc said. "And given the likely prospect that the average cost of providing a daily barrel of new capacity will increase, the industry's needs for capital will rise relatively faster and could exceed \$300 billion during the 1970's—more than twice the amount required in the previous decades."

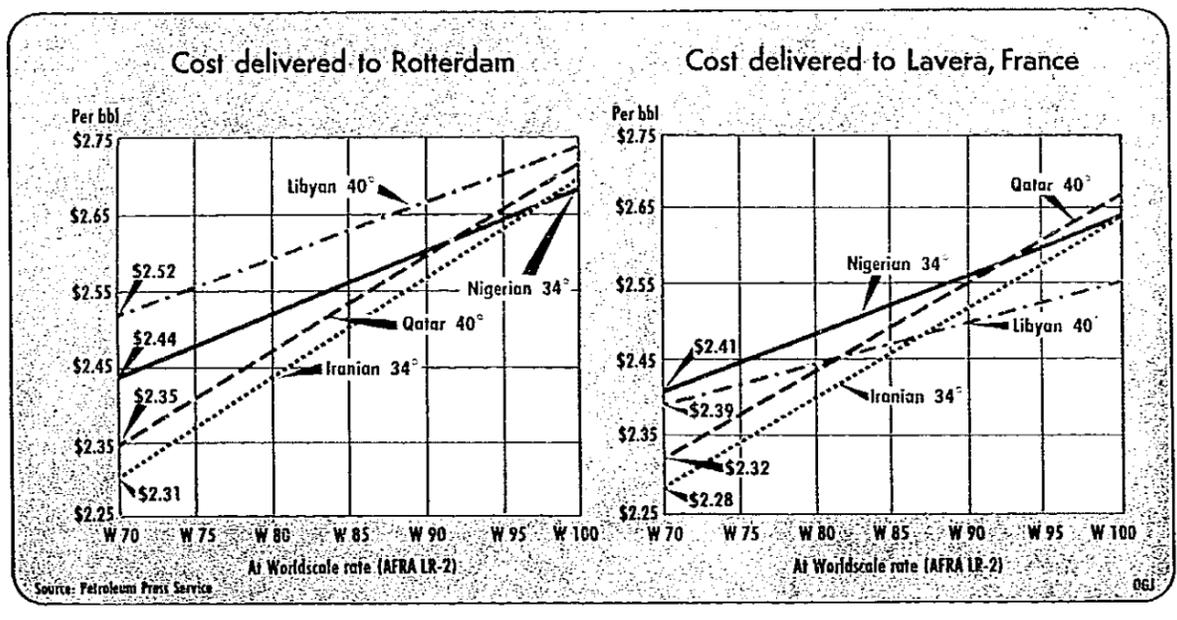
"Present and future increases in tax and other major costs cannot be absorbed by petroleum companies," Pirinc added, "but must be promptly reflected in product price levels in order to assure continued adequate supplies from diverse sources."

What, then, can the consuming countries with no indigenous oil do to cope with the near-guaranteed continuing boosts in oil and product prices?

There's no sure approach to this, but several countries are devising ways to cope, in anticipation of the increases that are almost assured for the next 5 years.

The Italian approach by cutting government taxes on oil is one way, but few governments are in a mood or politically empowered to do this. Oil and its products have always been a favorite target of the tax collector,

How tanker-rate decline would change cost of key crudes



and this is not likely to change.

Stockpiling at today's prices for tomorrow's consumption is another approach, but this has a definite limit and may even sharpen the shock of buying oil at future prices.

All consuming countries are shopping world markets for oil at bargain prices. A few have succeeded, but most have been able to make only short-term arrangements. French officials are looking at possible Russian cooperation in refining and possibly future supply arrangements, as are the Japanese.

France is also considering an Iraqi proposal for joint downstream operations in France, which would tie Iraq to France as a supplier-partner.

More importantly, the European Common Market is taking a close look at this type of deal in its pursuit of a permanent oil policy. It would like to establish mutual relationships with the producing countries without putting too much reliance on any one source of supply.

Diversification of sources is the key word in all consumer countries now. And that includes indigenous sources which are being ardently sought by India, Japan, the West European countries bordering the North Sea, and Spain in the Mediterranean.

Higher crude prices have also directed the big consuming countries

toward accelerated buildup of nuclear power as a replacement for petroleum energy. Coal, in some countries, is becoming competitive again. And Canada and the U.S. are resuming interest in their vast deposits of tar sands and oil shales.

Particularly worried over the rise in prices are the developing countries, such as India. She has shopped the world for cheap oil and in vain. She hasn't much to offer in the way of barter, and purchase is the only course open to her. So indigenous oil is her best approach, and this is being

vigorously sought.

No way out. In short, the price of energy is up, and is going up farther in the years ahead. Those who shop for "cheap" oil are wasting time and money. OPEC has marked up its price tags 5 years ahead and is determined to keep them there.

The best approach for the big consumers remains—new sources of oil in non-OPEC lands. But to keep up with world demand, the industry must uncover many more Alaskas, North Seas, Spains, and Arctics. There's no other way out.

Texas allowable for July set at 68.7%

A SUBSTANTIAL drop in nominations brought a corresponding cut in the Texas allowable factor last week with the Texas Railroad Commission fixing the July factor at 68.7%

July production at this level is expected to be 3,273,750 b/d compared with nominations of 3,272,806. Nominations were down 71,471 b/d from June.

Only six major purchasers changed their nominations from June. Humble Oil & Refining Co., however, chopped its request 64,000 b/d, while Atlantic Richfield Co. cut 20,000, Gulf Oil went down 10,000, and Continental Oil Co.

trimmed back 5,000 b/d.

Two major increases were posted, Phillips Petroleum Co. adding 25,000 b/d and Chevron increasing its bid 3,600 b/d.

Nominations by company in b/d, were: Amoco Production 420,000; ARCO 190,000; Chevron 71,950; Cities Service Oil Co. 100,000; Conoco 37,000; Diamond Shamrock 30,000; Gulf 210,000; Humble 480,000; Mobil Oil Corp. 255,700; Phillips 120,000; Shell Oil Co. 160,000; Sun Oil Co. 225,700; Texaco 225,000; and Union Oil Co. of California 72,500.

Nebraska still needs more drilling

GEORGE P. STOEPPELWERTH II
 President
 Stoepfelwerth Drilling Inc.
 McCook, Neb.

IN OCTOBER 1956, an article entitled "What Nebraska Needs is Wildcats . . . Hundreds of Them" appeared in The Oil and Gas Journal.

This prophetic title is as true in 1971 as it was when written. The wildcats of 1971, however, can be based on better subsurface control and the comforting knowledge that the area is geologically and economically attractive. Faith is confirmed by facts.

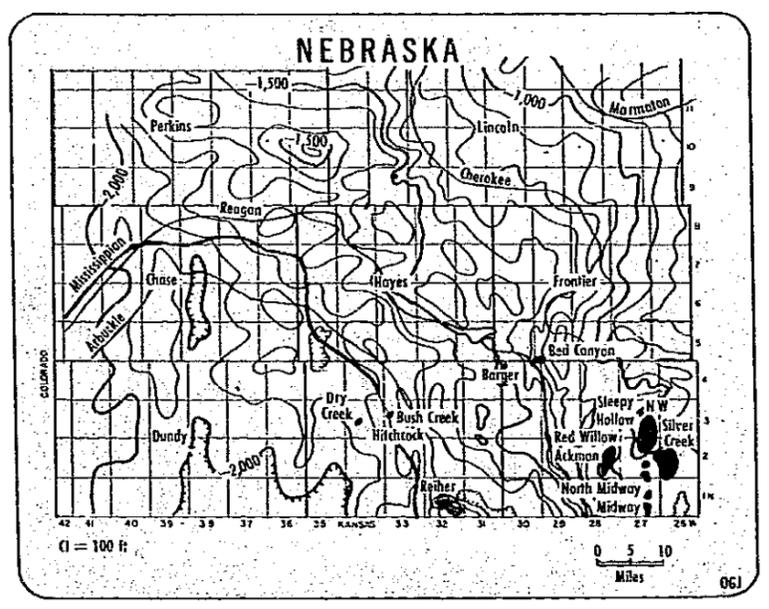
To the end of 1956, total cumulative production from the area shown as Fig. 1 was 12,492 bbl of oil. To the end of 1970, this total had increased to over 42,000,000 bbl. Prior to the end of 1959 only 122 wildcats had been drilled in this area and cumulative production was then just over 1,000,000 bbl. To the beginning of 1971, approximately 700 dry holes had been drilled in the area of 6,500 sq miles covered by Fig. 1. This average of 6.5 sq miles per dry hole is significant in itself as Sleepy Hollow field (28,000,000+ bbl produced to 1/1/71) covers only 11½ sq miles, Ackman field (3½ million bbl)—3½ sq miles, and Reiher (2 million)—2 sq miles.

The virgin nature of most of the area is better illustrated by eliminating the nine southeasterly townships in Red Willow County, where most of the production and consequently the highest dry hole density are located; the totals then become 525 dry holes in 6,200 sq miles or 11.8 sq miles per dry hole. Possibly as many as 100, certainly over 50, of the dry holes in the not yet productive areas recovered some oil on drill-stem test or core; some actually produced oil at non-commercial rates through casing; and Fig. 2 shows that the area around many of these shows has not been evaluated.

Began in 1959. The discovery of Ackman field in November 1959 started a drilling campaign which peaked in 1961 as approximately half of all dry holes were drilled in 1960, '61, and '62.

This drilling provided invaluable structural and stratigraphic control

Precambrian surface in Southwest Nebraska



Nebraska production data

Field	First produced	Number of wells	Cumulative to 1/1/71	Cumulative per well	1970 total	Daily per well 1970	Wells producing 1/1/71
RED WILLOW CO.							
Ackman	11/59	53	3,441,502	65,000	259,995	19.8	36
Barger	6/56	9	212,593	22,400	6,485	5.9	3
Base	7/68	3	16,257	5,400	5,110	4.7	3
Bed Canyon	6/66	14	456,663	32,600	90,140	19.0	13
Fondo	4/63	2	27,311	13,600	6,256	8.6	2
Midway	3/61	23	974,773	42,300	66,986	18.3	10
Midway, North	6/63	11	188,879	17,300	18,629	6.4	11
Missouri Ridge	7/62	8	125,876	15,700	10,302	5.6	5
Silver Creek	7/60	136	3,617,896	26,600	253,960	7.0	99
Sink	4/65	6	143,629	24,000	47,880	32.8	4
Sleepy Hollow	9/60	219	28,817,239	131,500	3,470,101	95.0	104
Lansing		88	5,756,817	65,400	457,655	33.9	37
Basal Sand		131	23,060,422	176,000	3,012,446	121.4	67
Sleepy Hollow, N.W.	7/63	10	1,370,432	137,000	117,797	64.5	5
Zenith	7/61	1	41,724	41,724	3,929	10.8	1
HITCHCOCK CO.							
Culbertson	8/60	3	70,090	23,400	3,352	4.6	2
Dry Creek	6/63	10	301,433	30,100	35,538	16.2	6
Reiher	12/58	29	2,172,261	75,000	142,300	16.9	23
		537	41,978,558				
Basal sand		155	24,887,517	160,500			
Lansing		382	17,091,041	44,700			

and allows the area now to be explored with a good understanding of the geology which was not previously available. Comparison of Figs. 1 and

2 will vividly illustrate the problem. The structural trend is almost due north from Sleepy Hollow and the updip limit of Cherokee rocks general-



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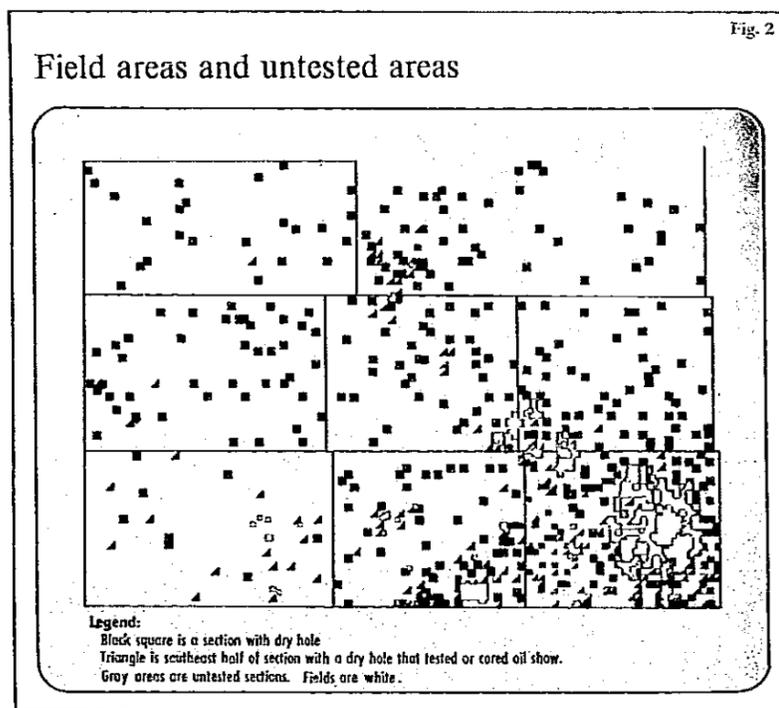
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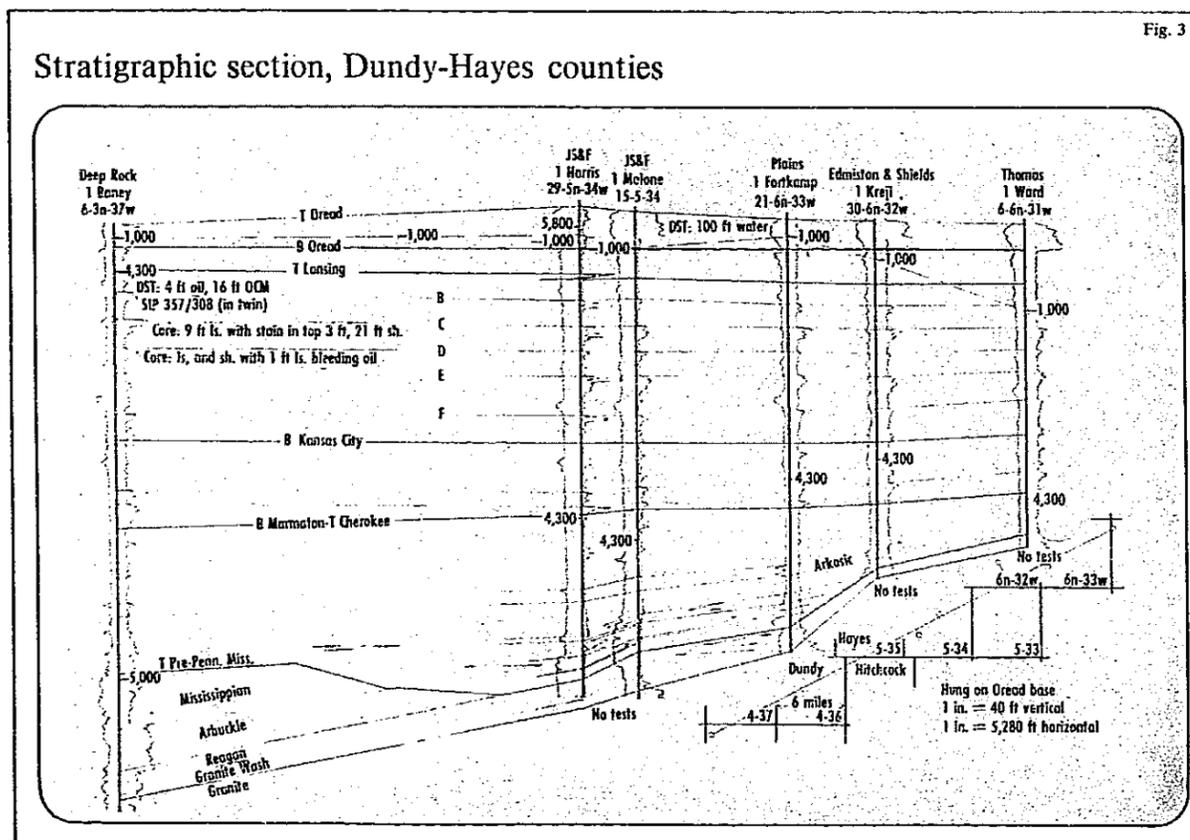
ly parallels this for at least 35 miles. On Fig. 2, however, the trend of dense drilling is to the northwest from Sleepy Hollow field. If these wells were drilled looking for another Sleepy Hollow field with Marmaton sands pinching out across a structural nose, they were drilled in exactly the wrong place; too high on local structural features and downdip from the downdip limit of the Marmaton sands. This is not to say that prospects do not exist in that direction, Bed Canyon is a fine small field, but only to show the lack of data available when most of the exploration was done.

Fig. 1, the Precambrian surface in southwest Nebraska, shows the general structural configuration of the area with the updip limits of various rock units. This map shows the western flank of the Cambridge arch on the east with a regional dip rate of approximately 25 ft/mile which decreases on the "shelf" to approximately 10 ft/mile. Imposed on the basic north-south pattern is a pronounced set of generally east-west trending features, probably due to the influence of the Siouxana arch to the north and the northeastward extension of the Los Animas arch to the south. Within



this general pattern, local areas of steeper dip as high as 400 ft/mile may be encountered. These steep dips may be associated with faulting, al-

though missing or repeated section has been encountered in few, if any, wells. In addition to these older force systems, the entire area was influ-



enced by the Cretaceous westward tilting into the Denver-Julesburg Basin. The net result is an area of slightly complicated generally low magnitude structural features.

After deposition of the Cambrian Reagan and Arbuckle the area was subjected to erosion until Mississippian time. Mississippian rocks were deposited over the western part of the area and later eroded, leaving the area shown covered by Osagian through Kinderhookian rocks. Upper Mississippian and lower Pennsylvanian rocks are not reported in southwest

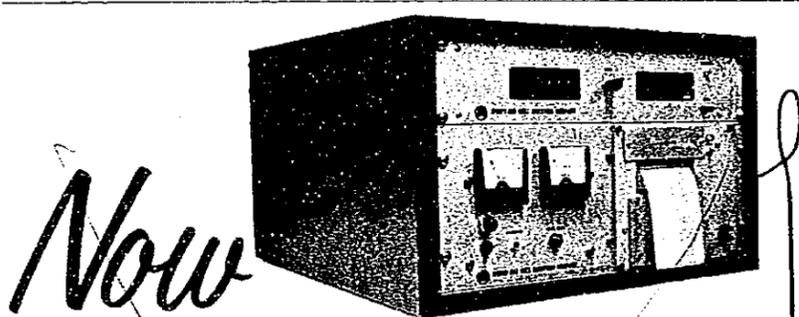
Nebraska. During this time the exposed Precambrian of the crest of the arch was eroded and large quantities of "Granite Wash" and Reagan sand were left to be reworked by the encroaching Pennsylvanian seas. This reworking produced the "Basal Pennsylvanian sands" which may be Cherokee or Marmaton in age and which were deposited on the pre-Pennsylvanian erosion surface, filling in the irregularities and leaving the higher local areas without sand. This planation was completed by the end of the Marmaton as the base of the Kansas

City group, which is or is close to the top of the Marmaton, is an easily correlated marker which covers almost the entire area. It is the oldest of the upper Pennsylvanian which is characteristic of stable area deposition with alternating shales, limestones, and a few sandstones blanketing the entire area. This stability continued into the Permian. Limestone porosity is believed to be produced in part by algal reefs and is best developed where water depth, etc. were optimum for their growth.

The targets. All rocks from the Permian through the Reagan may be considered as objectives, although to date almost all the production in the area has come from the Basal Pennsylvanian sands, or the upper Pennsylvanian.

The trap at Sleepy Hollow field, which has produced over 23 million bbl from the basal sand and nearly 6 million from the Lansing, is created to the north by permeability pinchout in both reservoirs. Such stratigraphic closure is present in at least one direction in all basal sand fields and with the possible exception of Reiher is also present in the major Lansing accumulations.

The basal sand fields have yielded over half of the area's cumulative production from reservoirs which will recover approximately 500 bbl/acre ft or 200,000 bbl from 10 ft of pay under 40 acres. After trucking and taxes, Bed Canyon oil is currently selling for an average of \$2.83/bbl, \$2.48 to 87½% working interest. At Sleepy Hollow, where the oil is pipelined, the average is \$3.05/bbl, \$2.67 to the working interest. Allowing \$0.48 for lifting cost leaves a net of at least \$2.00/bbl to the working interest or \$400,000 per well. The first well on a lease can be completed to the tanks for \$40,000 or less to 3,750 ft and subsequent wells for under \$35,000. The Lansing-Kansas City fields, which have produced essentially all of the other half are less prolific but also less difficult to find. The average per well cumulative to Jan. 1, 1971, from Reiher was 75,000 bbl, Sleepy Hollow Lansing-65,400 bbl, and Ackman-65,000 bbl. Still using \$2.00/bbl this is \$130,000 to \$150,000 per well to the working interest. To determine the downside risk, a study was made of 17 Lansing-Kansas City reservoirs in northwest Kansas and Southwest Nebraska which had been abandoned, in other words, the small-



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est, least attractive fields. This study showed that 75% of these poorest wells recovered more than 400 bbl/acre or 16,000 bbl/40-acre location. Assuming \$20,000 to the casing point and \$15,000 to complete, this \$32,000 is sufficient to pay out the well when salvage is considered. Therefore, there is no downside risk if production is established.

Payout times, of course, vary with the well but without the complications of proration. The best wells have paid out in as little as 1 month, 7 to 8 months is common, and the poorest discussed above may take up to several years.

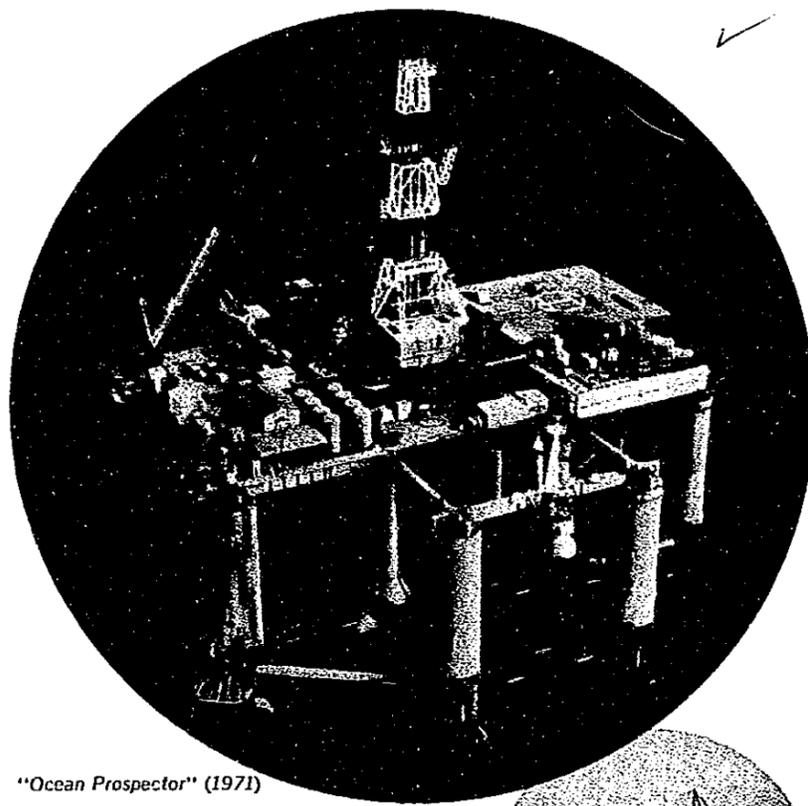
From September 1962, the approximate end of the wild wildcatting, to July 1967 a random series of 68 exploratory wells resulted in 3 significant discoveries; a 1:23 success ratio. The 68 wells cost approximately \$1.15 million and consequent development cost was near \$1.1 million for a total of \$2.25 million. To Jan. 1, 1971, these three fields had produced 2.13 million bbl, worth at least \$4 million leaving a net profit of \$1.75 million. An additional million bbl should be recovered from these three fields, for a total net profit of \$3.75 million, a net profit of \$3.25 per dollar risked on the entire series. If considered on a prospect basis, the return varies from a minimum of \$23.75 up to \$39.65 net profit per dollar risked—adequately to meet almost any company standard.

For the geologist this area has the attractions of sufficient control for good subsurface geology with good reservoir rocks and untested areas large enough to hold major oil accumulations. For the money manager, there are low drilling and completion costs, no proration, and excellent economic return.

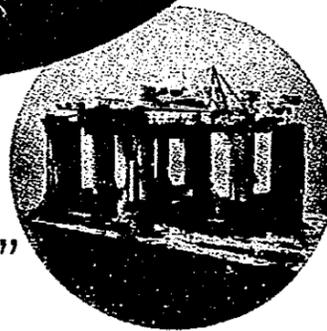
What Nebraska still needs is wildcats . . . hundreds of them.

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ODECO

June 30, 1971
P. O. Drawer 1200
Douglas, Arizona

Mr. John Bannister
Arizona Oil & Gas Conservation Commission
4515 North 7th Avenue
Phoenix, Arizona

Re: Oil & Gas Journal, 6-21-71
Page 96, "California gas pinch to
become acute."

Dear John:

It has been a known fact for sometime that California was in serious trouble from a lack of "Energy", namely natural gas, because of it's cleanliness in burning and that most all house heating there is by gas and also the generation of other power has been to a great extent done by gas.

In our past discussion we have talked about making trips to the Head Offices of several oil companies and taking along our latest geology and geophysical information.

At this time, I think our first visits should be made to California and to Pacific Gas and Electric Co., Southern California Gas Co., San Diego Gas & Electric Co. and Pacific Lighting. As the article says, these Companies are in dire need of natural gas now. They are apparently planning now to bring in L.N.G. from Alaska or South America or both. This will cost a lot of money for the L.N.G. and also for equipment to make, transport and store this gas.

It is most important that we interest them in Arizona as a possible source of gas and to urge them to explore for it here, before they commit many millions of dollars to L.N.G. After they commit money to a project it will be very difficult to change them.

In other additions of the O. & G. Journal I have read articles where gas companies were putting up the money for exploration companies to drill for gas, so why not these California gas companies? It may be that they are doing so now.

After talking to A. P. S., in some way or another we might let them know that we are trying to interest the California gas companies, this might get them to hurry a bit more.

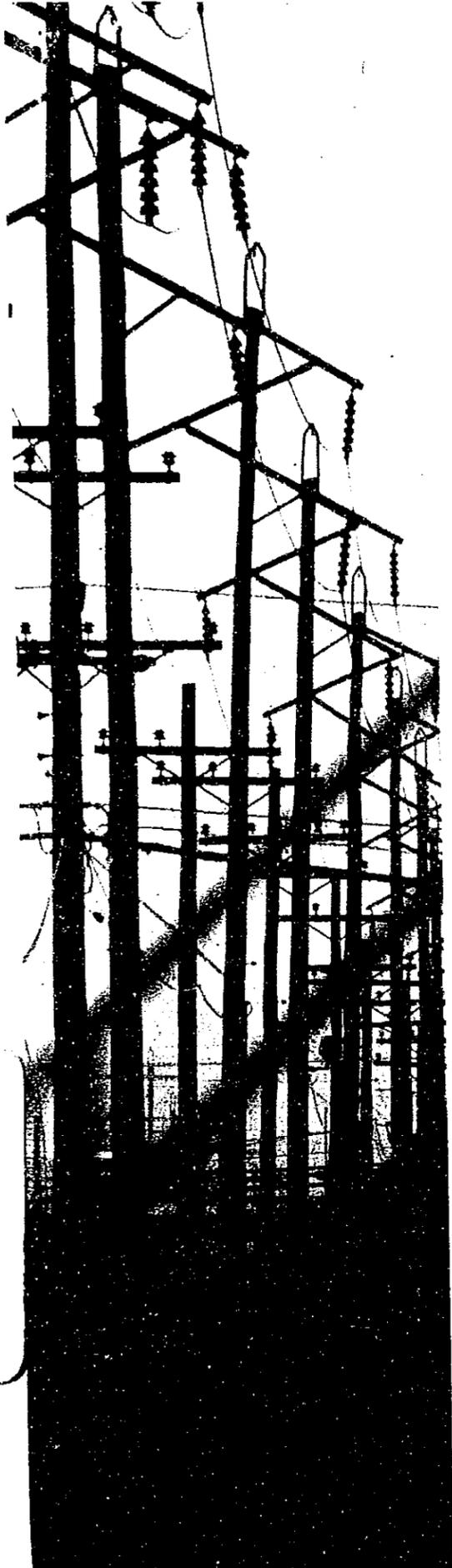
Sincerely yours,

Frank
Frank E. Moore

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HEADING OFF AN ENERGY CRISIS

Shortages amid plenty
—that's the story on
the power supplies
that keep our country
going; here is a
fact-packed report
on the situation now
and on the outlook
for the years ahead

Mankind has consumed more energy in the past 30 years than in all history before 1940. And in the next 30 years we will use far more than that.

Six per cent of the world's population is in the United States. Yet the U. S. consumes 32 per cent of the world's energy production. More gas, oil, coal and nuclear power are used in this country than in the Soviet Union, Britain, West Germany and Japan combined.

Can anyone wonder that Western Man—and particularly *Homo Americanus*—has marched to the brink of an energy crisis? Indeed, some executives and economists in the energy field say there is a crisis now.

The predominant opinion, however, is that—although there may be temporary shortages—we are not yet in a crisis, and one can be avoided. An amplitude of the energy sources we now use is available, and dramatic new ways to produce energy are in the offing.

Certainly, we may have brownouts in some areas this summer, when demand for electricity outpaces supply. And next winter we may have some failures in heating supplies due to mechanical breakdown or human error, or because supplies simply weren't in the right place at the right time.

But a crisis?

Not where that prime supplier of energy, the U. S. electric power industry, is concerned—according to one spokesman, President W. Donham Crawford of the Edison Electric Institute.

Mr. Crawford, whose organization is the principal trade association for the nation's investor-owned electric power companies, says that “on an over-all basis, reserve generating capacity is on the upswing.”

He adds, however, that in some areas “reserves are less than desirable,” and explains:

“These shortages of reserves are

Electricity to run America's industry and home appliances may sometimes be in short supply this summer—but there is no real crisis yet.

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for housing the radiator core and for mounting the radiator shutters. The system includes 1200 square inches of frontal area—1500 square inches for engines over 350 HP.

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basically attributable to an inability to bring in planned capacity additions on time due to construction delays, strikes, late equipment deliveries and, in a few instances, prolonged regulatory proceedings or opposition from conservationists."

The energy-environment conflict is an old one. After all, the first time a settler at Jamestown in the Virginia Colony cut down a tree in 1607, he was opting for energy over scenery.

But it was inevitable that there would be a greater ruckus during a period when energy consumption is soaring as it never has before.

The cleaning of America

The conflict continues despite the many measures businessmen take to lessen the environmental impact of their efforts to meet the demand for energy:

Their replenishing of the earth where strip mining of coal has sheared it off, their improving of techniques for removal of sulfur from oil and coal emissions, their perfecting of devices to cool water which pours from nuclear plants, their efforts to quiet the machines which roar and clatter while doing man's work. . . .

In speech after speech, U. S. business leaders tell with pride how much money, time and effort their companies have invested in the great cleanup. Some feel the cleaning of America will be as great an accomplishment in the '70s as the landing of man on the moon was in the '60s.

Many executives argue that what the U. S. energy producer needs most right now is the cooperation of government in forming an over-all American energy program which will permit him to increase energy sources without undue interference of the ecologists.

Says M. A. Wright, chairman of

STERLING G. SLAPPEY, author of this article, is senior editor of *Nation's Business*.

the board, Humble Oil & Refining Co.: "We have reached the point where a more coordinated, consistent approach to energy policy issues is essential. We will not be able to resolve our energy problems by continuing to manage our individual energy resources each in isolation from the other."

It seems reasonable, Mr. Wright goes on, "that the objective for the coordination of United States energy supply should be to provide an adequate supply of energy for both present and longer term needs, at a reasonable balance between cost, dependability and protection of the environment.

"A critical corollary to this is the development of contingency plans for disruptions in foreign supply which recognize the probability and possible nature of such disruptions."

A national energy program seems to be in the making as various government and industry leaders discuss and study the matter.

Meanwhile, the demand for energy and the effort to supply it grow and grow.

Edison Institute Chairman D. Bruce Mansfield, who is also president of Ohio Edison Co., reports that during 1970 the electric power industry put more than 200 new generating units on the line. This, he says, "represented some 26 million kilowatts of new capacity, a record amount to be added in a single year."

He continues: "As of the beginning of 1971, total electric capability in the contiguous United States was 339,050 megawatts. By the end of 1975, estimated capacity is expected to be 533,500 megawatts, an increase of 57 per cent over the five-year period."

Sen. Jennings Randolph (D.-W. Va.), one of the most knowledgeable legislators on energy matters, has some ideas about what's needed over a longer pull:

"In the next 20 years," he says,

"we must triple our national power capacity to meet projected population and industrial demands. This may require 250 new power plant sites with an estimated capital need of as much as \$350 billion. Such an expansion will require approximately eight million acres of land and may require over half a million miles of transmission lines."

And those increases in capacity will have wide impact in the fuel supply field. Our electricity is produced from a variety of sources: coal (46.4 per cent in 1970), oil (11.8 per cent), gas (24.1 per cent), water power (16.2 per cent), nuclear power (1.4 per cent) and even from burning wood and waste (0.1 per cent).

Sweating out the summer

While there is little government-industry argument over long-range need for electricity, there is disagreement over what might happen this summer.

President Nixon held a special Cabinet session last spring to study what could be done about what was called a forthcoming summer of power shortages. The meeting was an echo of events last Labor Day week when there was a temporary power crisis in the Northeast due to an unexpected, long, very hot, dry spell. Mechanical breakdowns added to the problems.

The Federal Power Commission and industry agree that reserve power of 20 per cent is needed to insure against power failure. But they do not agree on how much of a reserve is available this summer.

About 16.3 per cent, says the government; 18.3, says the Edison Institute. Last year the over-all reserve margin was actually 19 per cent—which means that while electricity supply has increased, the margin of reserve is down.

In 1972, the industry says, reserve margin will be 21.5 per cent, and it will rise to 23.9 in 1975. By then more nuclear reactors will be coming

ENERGY CRISIS *continued*

into service ending—hopefully—fears of vast blackouts and brownouts.

In any event, utilities have foreseen the possibilities of power disruptions this summer and have increased orders for turbines and transformers. Orders for equipment placed two to six years ago are now being filled and much of it is going on the line in the next few months. Utilities not only ordered equipment in the United States, they also placed huge orders with Swiss, German, British and Japanese firms.

New technology and better exchange of power between electric companies have also helped to increase peak-load current. To help make up for delayed equipment installations, utilities are installing large numbers of gas turbines—modified aircraft engines—along with the more conventional steam turbines.

In some cases, utilities—in addition to vigorously helping themselves—ask help from their customers.

Consolidated Edison in New York has an educational program, "Ten Ways to Save a Watt." Users are urged, among other things, to turn off air conditioners and other power consuming machinery when not actually needed, to wash dishes and clothes at night when power demands of industry have tapered off and to buy the right size—not necessarily the largest—air conditioner.

In the future, of course, the electric power people—and the suppliers of other forms of energy that move our vehicles and heat our buildings—hope it will be unnecessary to ask anyone to hold back on consumption.

"Burning" the ocean

They hope to be able to come up with plenty of the conventional fuels. And companies, government and others are working on a variety of energy sources, some of which sound very science fictional, some less so.

A fantastic source of energy could be the "burning" of ocean water—fusing hydrogen atoms and creating steam with heat generated by the fusion. (Hydrogen is fused now, in H-bomb explosions, but controlling the reaction is another matter). British and Soviet scientists are conducting experiments, and Americans are collecting data. It's pretty far-out,

but so—a generation ago—was the splitting of the atom which made it possible to produce atomic power as well as atomic bombs.

Then there's the long-discussed possibility of harnessing ocean tides.

Geothermal energy—harnessed heat from the earth's interior—is being produced by Pacific Gas and Electric Co. north of San Francisco, and several other companies are well along in research on use of this energy source. Italy and New Zealand lead the world in geothermal energy production.

There's solar energy, too—already, Americans can buy radios which operate on power from the sun.

Tiny fuel cells, which may have great potential, are being tested in homes and stores by the Pratt & Whitney Division of United Aircraft Corp., and by 32 gas and electric utility companies.

Breeder reactors far in advance of present nuclear reactors—considered certainties before the turn of the Twenty-first Century—will actually produce more fuel than they consume.

Only last month, President Nixon sent a message to Congress asking increased funds for research on breeders, which have long been under development by the Atomic Energy Commission. He said they will have "far less impact on the environment than the power plants which are operating today," and could "extend the life of our natural uranium supply from decades to centuries."

Other hoped-for weapons in the fight to overcome energy shortages are widespread production of oil from coal, shale and tar sands, and large production of liquefied gas and of high-grade gas from coal.

The President's June message to Congress noted he was opening up oil shale fields in Colorado, Utah and Wyoming to private bidders, and asked funds to strengthen research on extracting gas from coal.

These are some of the energy sources of the future. In the meantime the U. S. must get along primarily on oil, gas, nuclear power and coal supplies which sometimes are short because of men's shortsightedness.

In the following four sections, NATION'S BUSINESS takes up in detail the situation for each.

Oil: No Need to Scrape the Bottom of the Barrel

The oil industry is in the predicament of settlers facing attackers coming over every wall.

The industry is under heavy siege in the Middle East, Alaska, South America, in Washington, and nearly everywhere there's a whiff of exhaust fume or an oil splotch on the water.

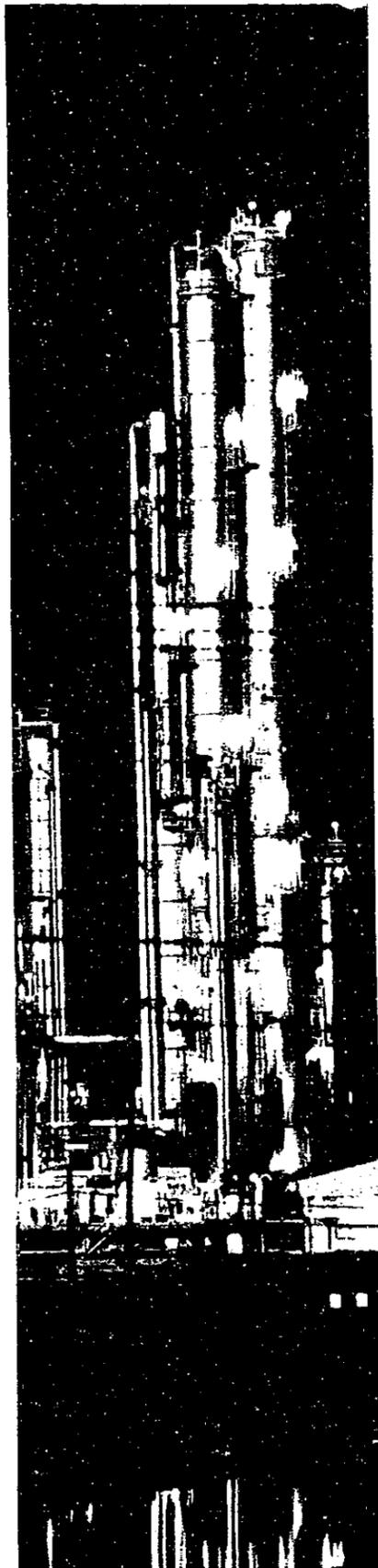
Fortunately for oil there's plenty of ammunition to fight back with. Besides, a relief column—in the form of growing recognition of the industry's value—is discernible on the horizon, riding hard to the rescue.

Oilmen can fight with figures:

The industry's product accounts for 44 per cent of Americans' total energy needs. It provides one fourth of their industrial energy, almost half of their commercial and household heating requirements, virtually all of the energy they use to transport themselves and their goods. Americans use 15 million barrels of oil a day—half again more than 10 years ago. In another 10 years, the figure will be half again larger than that.

Oilmen are consoled by the knowledge that many Americans obviously realize how much their activities will be hampered if extreme environmentalists stop the Alaskan pipeline and retard offshore drilling, if the government refuses to make more federal lands available for exploration, if petroleum-rich nations overseas send the price of oil out of sight.

Domestic reserves of this relatively cheap, convenient fuel are down to 39 billion barrels—enough for less than 10 years at the current rate of consumption.



Crude oil passing through U. S. refineries is now primarily from this hemisphere, but more and more will come from elsewhere.

That's a pittance compared to what's beneath the Middle East—at the very least, 319 billion barrels.

America presently gets only 4 per cent of its petroleum from that corner of the world, where turmoil easily can interrupt or hinder the flow of oil, and has done so.

Why, it's often asked, should Americans worry about Middle Eastern oil, since practically all of it goes to Europe and the Far East?

Their troubles are ours

The answer is threefold: Our Western European and Far Eastern allies can't prosper without oil, and we need them in peace or war. Second, practically all major oil companies—British Petroleum and Shell are exceptions—are American owned. And finally, the U. S. will be using more Middle Eastern oil in the future.

Says Humble Oil Chairman Wright: "If we have a crisis and Middle East production is curtailed, we will all be in trouble. Europe depends about 85 per cent on Eastern Hemisphere crude. The United States isn't dependent on the Eastern Hemisphere at the moment, but we have no surplus capacity to aid Europe. . . .

"Our present forecasts indicate that 10 years from now this country will rely on the Eastern Hemisphere for 30 per cent of its oil. This figure points out the need for accelerating exploration and development of our offshore and Arctic areas.

"We assume that Canadian and Venezuelan oil will be available to us, but in 1980 the demands of this coun-

try will be about 22 million barrels a day, of which six million must come from the Eastern Hemisphere."

Our inadequate domestic supplies and our insatiable appetite for oil are two principal reasons why oilmen were forced last winter to pay higher prices to Middle Eastern countries for crude.

In five years the over-all bill for crude will have been \$5 billion higher. This, of course, brings America much closer to the time when a gallon of gasoline may cost 60 cents or more, and Europe to the time when a gallon costs at least \$1.25.

With turbulence in the Middle East, oilmen turned to many other areas for exploration—Australia, Indonesia, Africa, the North Sea and Spitsbergen as well as South America (Venezuelan oil now flows at the rate of 3.7 million barrels a day, but that country's reserves are down to 2.6 per cent of the world's reserves).

Nowhere did they hit anything like the vast ocean of oil lying beneath northern Alaska and adjacent Canada. Exploration there has hardly begun and no one knows just how much will eventually be found. Already it's accepted that at least 9.4 billion barrels are waiting beneath Alaska which eventually will be added to American reserves.

The problems in Alaska include weather, mileage, demands of the ecologists and attendant need for billions of dollars.

The government is expected to give permission this fall for contracting for work on the \$2.3 billion dollar

ENERGY CRISIS: Oil *continued*



The eternal search for oil, oil, more oil, started on shore, then moved also to inlets, and then to gulfs . . . Now oilmen, the great majority of whom are Americans, even seek "black gold" in the open seas of the world.

pipeline from Prudhoe Bay to Valdez, Alaska. The line would take two to three years to build and carry two million barrels a day, reducing dependence on Middle Eastern oil.

Cozy caribou

Environmentalists have fought the pipeline for nearly two years, saying it would melt the tundra and foul up the fauna and vegetation. They were particularly concerned that the pipeline would be a threat to the caribou in the area.

Oilmen produced new proposals, made new engineering studies, promised all sorts of favors for the caribou. It's now reported that the caribou would be a greater threat to the pipeline than the pipeline would be to the caribou. The animals can be expected to huddle close to the line and the warm oil it would contain.

Mr. Wright sums up this fight and others by saying: "Many environmentalists seem to feel industry should not look for oil off populated coastlines or in relatively untouched wilderness areas such as Alaska. They seem to feel we should find oil in locations where they would like it to be—rather than where oil actually exists. . . ."

"But the evidence is clear that most of the large prospective reserves yet to be discovered in the United States are in the waters of the continental shelf or in remote frontier areas such as Alaska.

"The relative amount of flexibility

granted to the petroleum industry in future years to explore for oil, to produce it, and to transport it from these areas—much of which are federally owned—may depend in large measure on our environmental performance.

"We think the record of our industry in handling the environmental issue may also affect our credibility with the public on other, unrelated issues of great significance to our business. Therefore we are working very hard to improve that record."

Environmentalists have been on the oil industry's neck, of course, not only when it comes to producing oil but when it comes to burning it. There is much public and private research on how to remove pollutants from emissions when petroleum is consumed. President Nixon last month asked Congress for an extra \$15 million to find methods of extracting sulfur dioxide from oil and coal stack gases.

From all sources the United States until recent years had a comfortable five million-barrel-a-day surplus producing capability. Now, the country just barely has a surplus capability. This is considered a dangerous situation, especially due to the needs of national defense.

Many oilmen feel the United States must find and develop 105 billion barrels between now and 1985.

(The heavy fuel oil situation is particularly bad. Until two years ago, consumption of this fuel, used in

power plants, large industrial installations, schools and commercial heating, increased annually about 2 per cent. In 1969 it leaped 8 per cent and last year, 11 per cent. Practically all heavy fuel oil has to be imported.)

Because we still manage to keep ahead by a nose, and because some experts say more than half of the discoverable oil in the United States is still waiting to be discovered, many oilmen avoid describing the situation as a "crisis."

'Disincentives' for drilling

But exploration within the United States has been drastically reduced. Says Frank N. Ikard, president of the American Petroleum Institute in Washington:

"While demand for petroleum products has reached an all-time high, the number of wells drilled in search of new petroleum supplies in 1970 dropped to the lowest point in 22 years. Over the past 15 years, the number of exploratory wells drilled per year has declined 48 per cent.

"And more than 80 per cent of the 8,400 exploratory wells drilled last year turned out to be dry holes.

"There is no question that the lack of adequate incentives is the primary cause of this sharp decline in drilling. In fact, we have seen a whole series of 'disincentives' laid in the path of petroleum producers.

"These have included the higher taxes imposed on petroleum companies during the past year; the un-

realistically low prices set by the federal government on natural gas sold interstate; the continuing proposals to undermine the domestic oil industry by permitting excessive amounts of imports; and the restrictions that involve offshore leases and the movement of Alaska North Slope petroleum."

Early in the Age of Oil it was realized that the United States would depend increasingly on petroleum. Government policies provided incentives for a strong oil industry.

More recently, the incentives became targets for criticism.

The depletion allowance developed into an emotional political issue. Congress reduced it from 27½ per cent, where it had been for 40 years, to 22 per cent. Along with other tax measures, this increased the oil industry's annual tax bill by \$700 million.

And the Mandatory Oil Import Program, established in 1959, has been under new attack. Oilmen acknowledge that oil importing is necessary, and also say it inevitably will increase. But they want controls so as to nurture the domestic industry.

The present Administration is sympathetic in many ways to the oil industry.

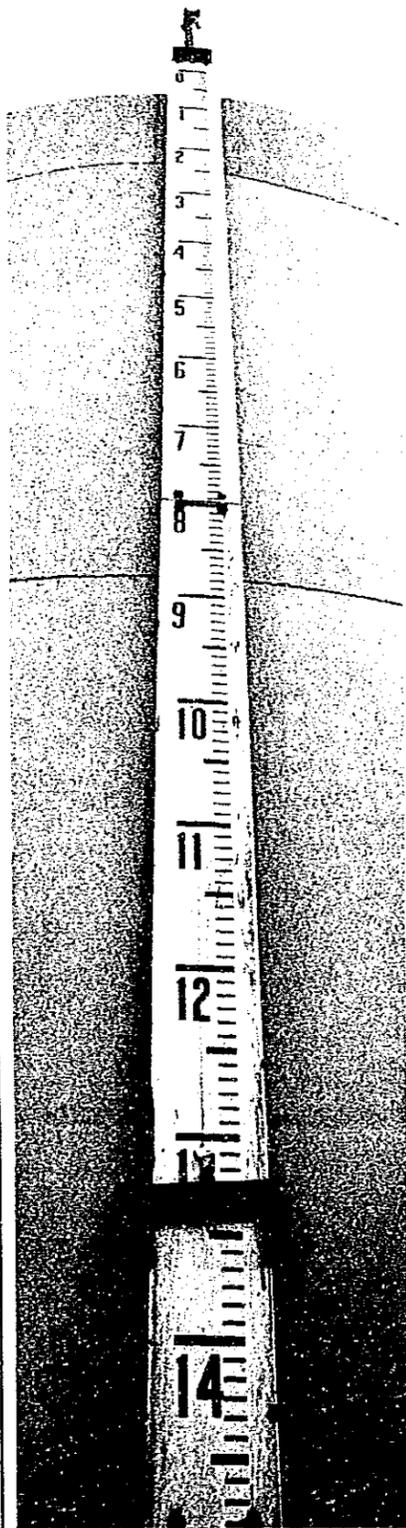
Although Dr. Hendrick Houthakker, of President Nixon's Council of Economic Advisers, called talk of a pending oil crisis "exaggerated," he said construction of the Alaskan pipeline is a "matter of high priority."

Interior Secretary Rogers C. B. Morton will be the man to decide if the pipeline will be built, and in mid-May he gave a hint of how he feels. He put energy ahead of ecology.

"Ecology," he said, "is the most important thing in the world until the lights go out."

The Secretary said he is not "altogether sympathetic to the oil industry's belief that outspoken conservationists are contributing to a world-wide energy shortage." However, he added, "some people" are "expressing totally unrealistic opposition to progress."

Talk of action that would "shut this important source of energy down or restrict it from developing," he said, is "'Alice in Wonderland' type rhetoric."



The supply of natural gas in the tanks and pipelines of America is often low—dangerously low, say alarmed men of the industry.

Gas: Enough for Present Customers, but How About the New Ones?

Natural gas producers say their big troubles began in June, 1954, when the Supreme Court affirmed that the Federal Power Commission had the right to regulate gas prices at the wellhead.

Prices were set so low, gasmen say, that producing companies could not get enough money to find and develop resources. Gas exploration became an adjunct of oil exploration. At the same time, consumers were turning to this type of fuel in increasing droves one major reason being its cleanness.

Last year the U. S. burned 22 trillion cubic feet. Usage of gas now goes up about 7 per cent per year.

Although low prices were a ready complaint of gasmen, as long as more natural gas was being located each year than burned, the industry looked like a winner for decades to come.

But that utopian situation of constantly increasing reserves has been a thing of the past since 1968. With exploration slowed due to lack of funding, additions to reserves fell five trillion cubic feet below production in that year. The gap was more than 10 trillion cubic feet in both 1969 and '70.

Today, the nation continues to use more gas than it finds, a situation growing more serious because the U. S. now has only a meager 12- to 13-year supply in reserve—some 265 trillion cubic feet.

It's known that there is a great deal more gas beneath the continental

ENERGY CRISIS: Gas *continued*

United States—estimates go as high as 1,500 trillion cubic feet—but companies say they lack the huge sums required to locate it, get it out of the ground and pipe it to customers.

Optimists in government point out that although the U. S. is using up its treasure trove of reserves—the supply was estimated to be enough for 22 years in 1955—more gas can be bought in Canada and there is plenty of gas in Alaska.

Actually, North Slope discoveries of the past three years have produced only 26 trillion cubic feet of proven reserves thus far. That's little more than a year's supply. Potential reserves are said to be enormous, but as of summertime 1971, they remain just that—"potential."

The shortage of reserves would be less serious if natural gas were merely a supplemental fuel. But it is second only to oil in the energy field, accounting for 32 per cent of all energy consumed.

Higher prices ahead?

There is hope down the road for natural gas because the FPC is relaxing the rigid price structure.

It is generally accepted in Washington that the FPC must move decisively, and soon too, or the gas industry will be permanently injured and a major energy crisis will be touched off.

The FPC is now looking into claims that the gas industry is keeping quiet about certain reserves so it can put pressure on the government for better prices. In effect, some government people say that reserves listed as "potential" are "proven."

The industry denies this and says the gas reserve shortage is all too real. Many companies, it points out, now must decline to accept new customers because they simply don't have the gas to service them with. One company has a waiting list of 17,000.

Shortages in immediate supply for existing customers are not unheard of.

In Cleveland, a number of factories halted operations when the fuel ran out in the winter of 1969-70.

Walter E. Rogers, president of the Independent Natural Gas Association of America, looks for a doubling

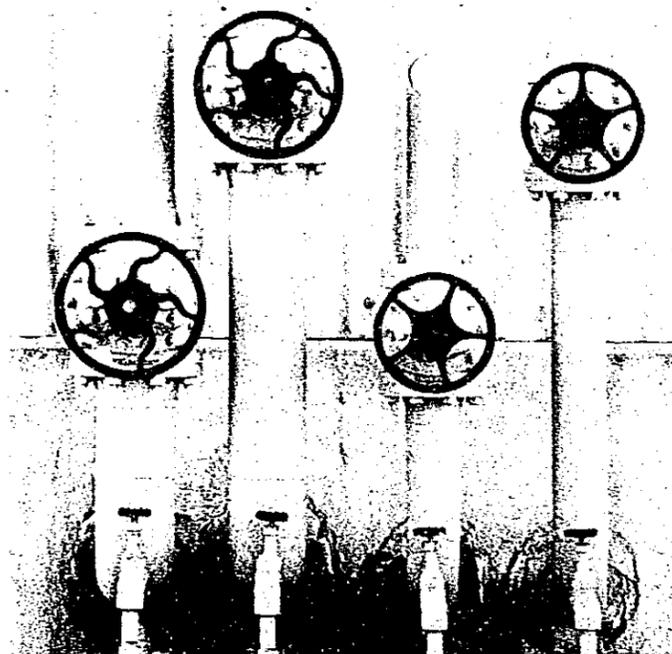


PHOTO: YOICHI OKAMOTO

Industry will be in sorry shape indeed if the valves that regulate our supplies of energy are turned to "slow," much less to "off."

of today's natural gas consumption, assuming supplies are available.

He warns: "Our basic energy resources are decreasing at an alarming rate. Unless this trend is reversed, this country could be in a very tragic situation well before the turn of the century."

G. J. Tankersley, president of the American Gas Association, urges higher wellhead prices to spur exploratory drilling and he wants the government to open more lands under its control for exploration.

At the same time, he says, "There is a misconception that we are running out of gas. . . . Most companies have adequate supplies for present users, are covered by long-term contracts, and are bringing some new gas to market or utilizing new storage facilities to improve load factor. The principal concern is in regard to potential future customers."

Various supply steps being advocated by the gas industry should start new gas flowing for new customers "within a relatively short period," Mr. Tankersley says.

New sources of supply

Two new sources of fuel are in the offing for the industry, though large supplies from either source are several years away.

A number of companies hope to get liquefied natural gas from Algeria, and possibly from other countries.

U. S. gas men have been studying Canvey Island terminal in the River Thames, at which England for several years has been receiving ships bearing large quantities of Algerian gas.

Meanwhile, at least three processes are being developed (and others are under laboratory research) to make high-quality gas from coal.

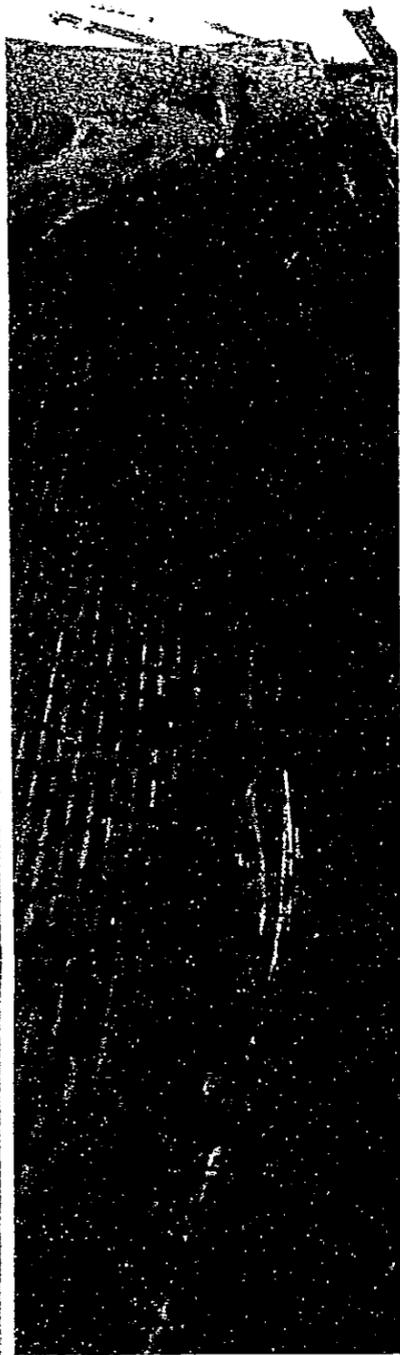
Production of gas from coal is nothing new. The manufactured gas burned in much of the U. S. until the late '40s came from coal. But it was more expensive, and didn't heat as efficiently as natural gas.

Now, the Hygas Process is being tested in Chicago by the Institute of Gas Technology, under contract from the U. S. Office of Coal Research. A plant to test Consolidation Coal Co.'s Acceptor Process is under construction at Rapid City, S. Dak. And a pilot plant for a process developed by Bituminous Coal Research, Inc., and the Office of Coal Research is planned at Homer City, Pa.

It is anticipated that gas produced from these sources would be more expensive than most natural gas but that it would be competitive in price with Alaskan or Algerian gas.

The supply of gas can hardly improve appreciably by next winter, although there may be slightly more of it. So it is toward the winter that gasmen are looking, hoping it won't be a winter of discontent.

PHOTO: CHARLES HOFFMAN—UPI



When Americans turned their backs on coal in years past, foreign orders helped save the industry. Huge amounts of coal are still shipped abroad.

Coal: "You Can Paint a Rock Black and Sell It"

The words "blackout" and "brown-out" have been unwelcome additions to millions of American conversations during recent summers—especially the long, hot one of 1965.

The situation they describe—when lights and air conditioners go off, elevators and transit system trains halt and stoves won't cook—often stems from inadequate use of a magnificent black treasure, the nation's almost inexhaustible supply of coal.

Ecologists are partially responsible. Their onslaughts have retarded mining. It makes human lives grubby, they claim, and drives away animal life. Strip mining wrecks the landscape and causes flooding, they complain; underground mining causes acid drainage.

Coal men admit there's truth in much of what they say.

But ecologists fail to nominate a substitute source for the needed energy derived from coal. And, they fail to give the coal people credit for making tremendous strides in allaying ill effects of mining.

Progress is being made—in the way land is cut for strip mining, in beautifying and restoring terrain after the coal is removed, in filling in low places to turn useless valleys into useful level lands, in nullifying mine acid with lime.

Another reason for coal shortages we have had, and still have, is that during the '50s and early '60s much

misinformation was published about nuclear energy. It was claimed that atomic power was prepared to do all things for all men and right away, too. Coal was made to appear a faltering source of energy and much mining activity was curtailed, because utilities were reluctant to sign long-term contracts for coal.

Three or four years ago it became obvious that nuclear energy was still largely something for the future. Coal mining began to come back and today it's a booming business.

As one mine owner puts it: "In this market you can paint a rock black and sell it."

Up, up—and still not enough

Last year 596 million tons were mined and still there was a shortage. This year 615 million tons are expected to come out of the earth, and still there may be a shortage.

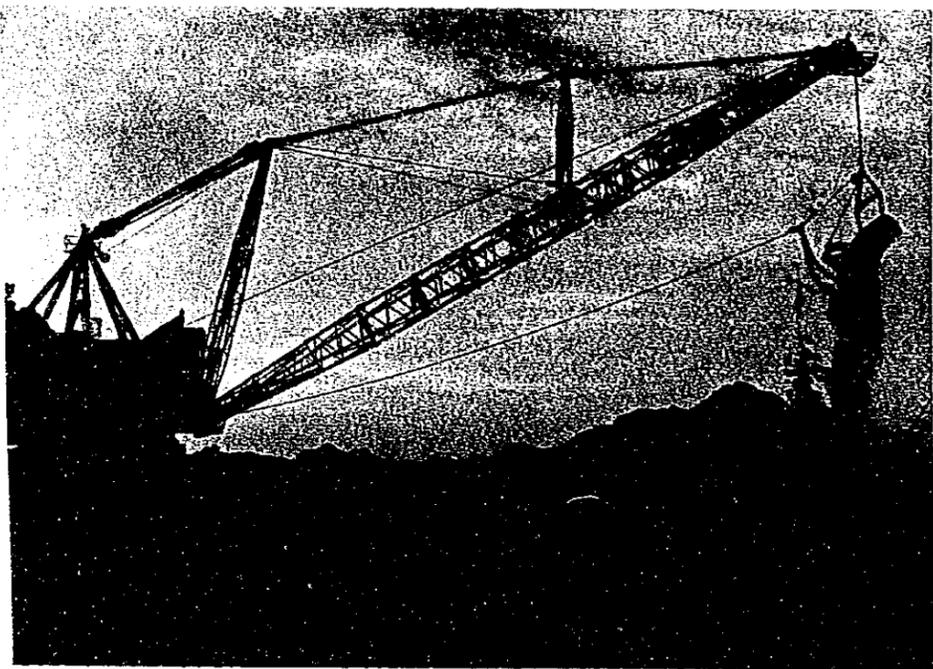
In 1961, 403 million tons were mined.

Coal's all-time record year was 1947, when 630 million tons came up. That, however, was in a period when coal was far more widely used for heating than it is now. Its big use today is in generating electricity.

Electric utilities gobbled up 320 million tons last year; coking coal took 96 million tons; 91 million tons went to general industry; 10 million tons were retailed.

In addition, 71 million tons were

ENERGY CRISIS: Coal *continued*



To many environmentalists there's no greater villain than a strip miner who scrapes land to bring up coal. Yet coal is vital to the country.

exported—an amount second only to the 76 million tons sent abroad in 1957. Uncle Sam's balance of payments problem was eased by very nearly \$1 billion in 1970, thanks to coal.

If there's a coal shortage at home, many ask, why are we shipping so much to Japan, Canada and Europe?

The answer is that shipments go out under long-term contracts, some for 20 and 25 years, signed in the days when some Americans were turning their backs on the ugly duckling of mining. Furthermore, most exported coal comes from mines opened specifically to fill foreign contracts.

The economics of coal mining point up why long-term contracts are sought after by mine operators.

Capital cost of a new underground mine is \$12 to \$14 per ton of annual production and a mine easily can yield one million tons per year.

Huge reclamation projects

Though it's less expensive than underground mining, strip mining isn't a cheap way to get coal from

the earth either. Coal companies are now under reclamation bonds required by laws in the 21 main coal producing states. If the companies don't redress strip-mined land to the satisfaction of authorities, states keep the bond money and do the job themselves.

Last year 39 per cent of all coal came from strip mines and the figure will go higher this year.

A National Coal Association survey shows that 58,000 acres were reclaimed in 1970, 64,000 in 1969, 72,000 in 1968 and 57,000 in 1967. More acreage has been reclaimed in some years than others because of catching up on a backlog of stripped land.

Despite progress in reclamation, there are bills in the House and Senate in Washington to ban strip mining altogether. The Coal Association, which favors redressing stripped land, says passage of the bills would be disastrous.

Ecologists jump on coal from all directions.

One favorite attack is to charge that burning coal pollutes the air.

This is true, but here again progress is being made in cleaning up.

Fly ash from burning coal can now be collected by electrostatic precipitators and other devices which are more than 99 per cent effective. Therefore, fly ash is less of a problem.

Sulfur in coal is a tougher obstacle. Some states want it removed before burning, which people in the industry say is nearly impossible. The industry is now setting about proving that the way to cleaner energy is to regulate the sulfur dioxide content of the emissions.

A wide range of removal processes are being developed and some of the best already are installed in full-scale demonstration plants at electric utilities. In the next five or six years this problem should be very near solution.

There is plenty of coal with less than 1 per cent sulfur content in the West but unfortunately it is far from markets and costly to transport. Low sulfur coal is scarce in the East.

Hoppers are a hurdle

A big contributor to the coal shortage last year was a shortage of railroad hopper cars.

Railroads have somewhat relieved the situation by installing a "permit system" under which they won't haul a producer's export coal unless he supplies the name of the ship for which the coal is destined and the vessel's arrival date. This bars a producer from sending coal to a port on speculation, and then storing the coal in hoppers until somebody buys it.

As a result 7,500 hoppers have been freed this year for hauling coal to domestic users.

The Interstate Commerce Commission is helping by requiring prompt return of hoppers to the owning railroad as soon as they are unloaded. And the railroads have beefed up their hopper fleets.

Looking eight or 10 years down the road, there are interesting developments in coal which should go far toward heading off an energy crisis.

Eventually, synthetic petroleum will be obtained from coal—one reason, undoubtedly, why oil companies have bought into the coal industry and now account for 21 per cent of production. And, as noted previously,

gas will be obtained from coal. Both processes are known to be entirely achievable.

The United States has far more coal than any other source of energy—in fact, at the present rate of consumption it has more than 1,000 years of supply in proved reserves. Reserves amount to 88 per cent of those of all energy fuels, including oil shale and uranium. Almost half the known coal in the world is in this country.

Men and money

Huge amounts of it will be coming out of the ground in the next generation or two. Herbert S. Richey, president of Cleveland's Valley Camp Coal Co. says that in a few years we will be mining 900 million tons yearly—up nearly 50 per cent over the projected 1971 total.

Money will be needed.

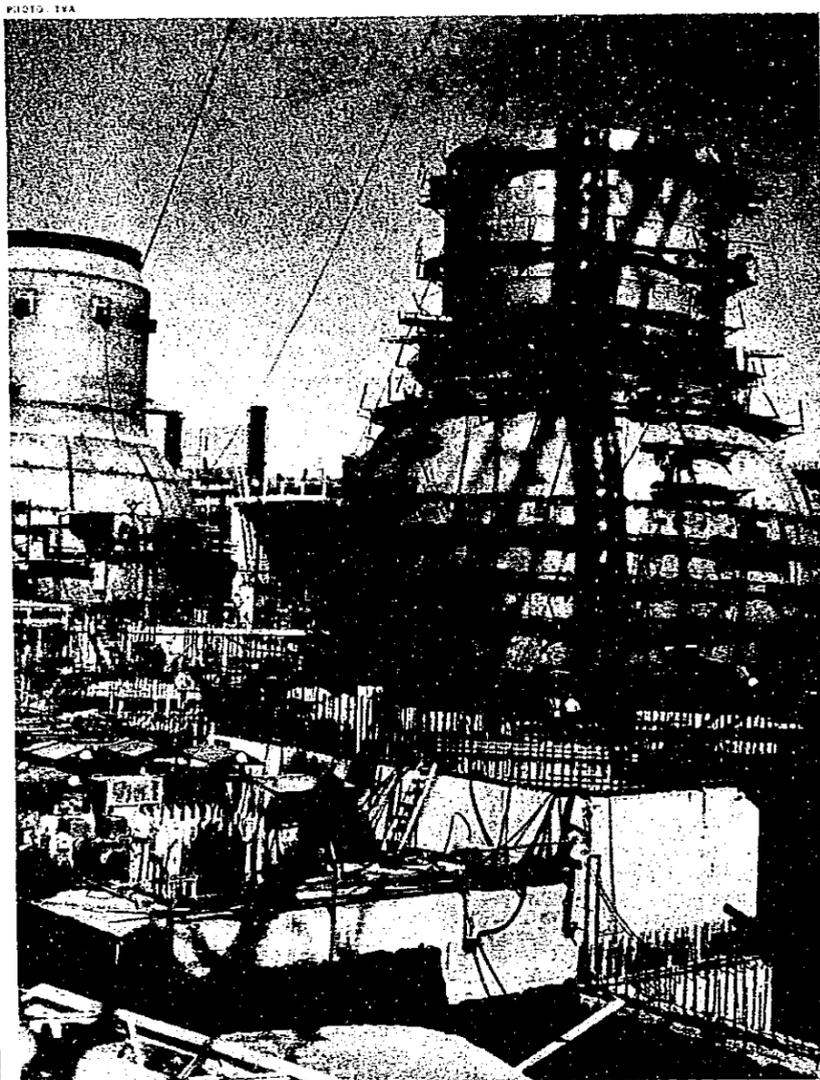
In addition to the capital costs of opening a new mine, there's the United Mine Workers of America. W. A. Boyle, UMW president, says he will demand \$50 a day per miner, instead of the current \$37, in the next contract (the present one expires Oct. 1) as well as 50 cents a ton for the union's welfare fund instead of the present 40 cents.

Men will be needed too.

Besides the \$24 million to \$30 million needed in capital expenditures to launch a deep mine producing two million tons a year, Mr. Richey says, "The most serious problem is hiring and training approximately 500 employees to operate the mine. Included in this group would be highly skilled supervisors, engineers and technicians. Today there is a distinct shortage of such people, as well as a shortage of skilled miners.

"One reason is that many trained mining people are retiring. Secondly, the lack of a long-term energy policy in this country permitted the government to make various statements regarding the ease and economy of converting the national energy sources from fossil fuels to nuclear fuels. This has failed to materialize.

"This lack of national policy thoroughly discouraged the coal industry from acquiring and developing properties and training men to supply the fuel now needed."



The world is waiting impatiently for plentiful nuclear power. It's not here yet, but it will come. Even TVA is beginning to go nuclear.

Nuclear Power: A Brighter Power Source Tomorrow

The prospects for nuclear energy were being oversold as long ago as 1914.

In his book, "The World Set Free: A Story of Mankind," H. G. Wells outlined what could be done with the atom. The noted British visionary and writer told not only of the atom bomb, but of peaceful uses of atomic power, at a time when few men knew what he was talking about.

Mr. Wells was on the mark in a great deal he said. But he was off on

ENERGY CRISIS: Nuclear Power *continued*

his time element, and subsequent writers have been, too.

Many times they have had us on the threshold of the Atomic Age. Soon, they have predicted, the atoms would "heat, operate, fuel, cure, create."

Today, total U. S. nuclear power production is only a fraction of the latest one-year increase in over-all electricity capacity.

One reason for the disappointment of so many nuclear power fans has been a misconception about how long it takes to get a nuclear plant into operation. It's now realized that from seven to 10 years are required—and not three to five years, as once was supposed.

Another reason has been worry.

During the 1960s, we were steadily warned—often incorrectly—that nuclear plants could cause immense trouble.

People stewed about radiation, about what would happen if there were accidents at the plants, or earthquakes. Ecologists claimed that injection of heat from the plants into the air or bodies of water would muck up the environment. Others said the huge, bubble-shaped reactor buildings, and the cooling towers and ponds would mar the landscape.

The financial community was troubled because nuclear installations are so expensive in their early stages; many men wondered if they would ever pay off. And finally, nuclear plant builders were asked, "What will be done with radioactive waste materials?"

Such attitudes have held up approval to build several nuclear plants which otherwise would now be contributing massive doses of electricity to regional grids. Three major plants which were delayed for months for some of these reasons are located in Michigan and Minnesota and on Long Island.

Deactivating the doubts

The Atomic Energy Commission is working on safety measures while also licensing reactors and trying to get more production—as it has in the past two decades. The AEC's attention to safety is notable. It says no member of the general public ever has been endangered by radiation at

a nuclear plant it licenses—and all U. S. nuclear plants must be AEC-licensed.

Advocates of nuclear power contend it has less effect on the environment than other forms of power generation. As for worries in the financial community, money outlays now planned or under way indicate a lot of confidence in nuclear energy's fiscal feasibility.

And the radioactive waste disposal problem seems to be on the way to solution. The plan now—it's meeting some opposition—is to solidify liquid waste, transport it in huge stainless steel canisters within lead and cement containers, and bury the canisters far underground in an abandoned salt mine near Lyons, Kans. The area is isolated, dry, and free of earthquakes. And salt is an excellent shield against radiation.

During the last 10 to 15 years the word periodically has gone out that we were running out of uranium. Not true. And, before the uranium in Utah, Colorado, Wyoming, Texas, New Mexico and other states is gone, the uranium-stretching breeder reactor should be coming into its own. Also, we should be using more thorium, which is in plentiful supply.

There is every indication that we are finally launched on the age of widespread development of nuclear energy sources. Already this year 13 reactors have been ordered—as against 14 during all of 1970 (peak year was 1967, when 31 were ordered). In 1969 only seven were ordered.

Bigger reactors are being built than heretofore.

Early in May, for example, the Carolina Power & Light Co. ordered the first of four reactors of 900,000 kilowatts each for a plant near Raleigh, N. C., which will cost \$1 billion and should begin operation by 1977 (and be fully completed in 1980).

Westinghouse Electric Co., which landed the reactor business, says the order is the largest ever placed in the industry. The reactors and the initial fuel supply will cost \$175 million.

At present, 21 U. S. nuclear plants have a combined capacity of 8.3 million kilowatts. By 1980 nuclear electric generating capacity will have reached about 150 million kilowatts, which should then be almost one

fourth of our nation's total power capacity.

How much will expansion cost between now and 1980? By today's reckoning, \$25 billion. Inflation can send the figure far higher.

Approaching the ultimate

Farther down the road, breeder reactors should be commercially available by about 1985. They will approach the ultimate for them, in effect, recycle old fissionable materials and—through an enriching process—actually produce more fuel than they consume.

By 1985, nuclear energy is expected to furnish 11 per cent of our total energy requirement, as against only .3 per cent now.

Atomic Energy Commission Chairman Glenn T. Seaborg, commenting on the financial payoff of breeders and their ability to stretch fuel supplies, says that if certain breeders are available in the mid-1980s—and he thinks they will be—the "gross benefit to the nation from electrical energy savings in the 35-year period following could be more than \$350 billion in terms of today's dollars."

By the year 2,000, Dr. Seaborg says, electricity generated in this country will be six times as much as at present, and half of this will be produced at nuclear plants—about 1,000 of them.

Half of those nuclear facilities, he adds, will be powered by fast breeder reactors.

And many of the reactors will have been operating long enough to produce sufficient new fuel to refuel themselves and an equal number of other reactors.

Since Dr. Seaborg feels America will need coal, oil and gas, far into the future, he cautions the country to develop its fossil fuel resources.

However, those in the nuclear energy industry—both the government and private sectors—feel they have the power source of tomorrow.

For a sign of the times, they point to the Tennessee Valley Authority. Created to harness hydroelectric power, and forced by the burgeoning demand for electricity to turn increasingly to coal, it is now converting to nuclear energy at several plants. **END**

*Meeting
Friday*

August 11, 1971
P. O. Brawer 1200
Douglas, Arizona

Mr. John Bannister
Arizona Oil & Gas Conservation Commission
4515 North 7th Avenue
Phoenix, Arizona

Dear John:

Enclosed is a copy of an article from the O. & G. Journal,
August 2nd. Federal control of ground water in Arizona would
be a disaster for the state, in my opinion.

I am wondering how our Congressional Delegation is thinking
on the subject?

It might be a good idea to bring this matter up at the next
Commission meeting.

Sincerely yours

Frank
Frank E. Moore

energy. The experts serving McKetta included several of the known names in the energy industry. Co-chairman was Willis A. Strauss, chairman of Northern Natural Gas Co. Members were Dr. Richard Gonzalez, chief economist; Dr. Michel T. Douy, consulting geologist and petroleum engineer; William F. Kieschke, Jr., vice-president, Atlantic Richfield Co.; Thomas M. Lydon, vice-president, Peabody Coal Co.; James Sorensen, consulting engineer of Alameda, Calif.; and Francis P. Cotter, vice-president, Westinghouse Electric

Copies of the report are available for \$3 each through the National Technical Information Service, Department of Commerce, Springfield, Va.

Review sought for Alaska line case

THE DEPARTMENT of Justice has asked for a transfer of the Alaska pipeline case from U.S. District Court in Washington, D.C., to Alaska. The Department of Interior, whose job is to issue a permit for the project, says that the spring were blocked by environmentalists, said the Alaska court would be better acquainted with conditions on the pipeline route. The agency also noted the Alaska court docket is less crowded, and it expects more favorable treatment in that jurisdiction. Conservationists oppose the change of grounds they couldn't afford to make their case in so distant a court. U.S. District Court Judge George L. Breyer, Jr., granted an injunction April 1970, barring issuance of permits by the secretary of Interior. The decision was based on objections by the Gwich'in Village, which claimed land damaged by the pipeline, and by conservationists who argued successfully that the secretary had not complied with the National Environmental Policy Act. Under terms of the injunction, the secretary must give 14 days notice before issuing permits for the Prudhoe Bay pipeline. The case presumably is now in the hands of environmental review by the Alaska Pipeline Service. The review has been completed.

WATCHING WASHINGTON



with GENE KINNEY

Water bills hold seeds of federal production control

THE MORE than 100 bills on water-pollution control now before Congress are full of dynamite for the industry.

No provisions is more explosive than the one extending jurisdiction over ground waters to the federal Government.

Bills under consideration in House and Senate committees provide for federal regulation of methods of injecting water into subsurface strata. The language covers simple disposal of brine produced with oil or injection of water for secondary recovery.

The purpose is "to protect ground and surface water quality." But the effect surely is to give de facto control over virtually every oil field in the U.S. to the administrator of the Environmental Protection Agency.

Draft bills require states to get EPA administrator approval of plans for control over "disposal of materials on land, in wells, or in subsurface excavations" to avoid pollution of ground and surface water. This authority now rests with states alone. New legislation would give EPA veto power and thus effective control. It could lead to requirements for federal permits for reinjection or other disposal of water produced with oil.

The American Petroleum Institute opposed this provision in testimony July 29 before the House Public Works Committee. P. N. Gammelgard, API's senior vice-president for public and environmental affairs, urged the committee to keep control in state hands. California and several other states already have made the same point.

THE BILLS offer plenty of other reasons for oilmen to worry. There is the idea that minimum national water-quality standards should be fixed by law, following the example of air-pollution legislation. New water standards may be set by the U.S.—either as part of the discharge permit program, or as a requirement that state plans be changed before getting federal approval.

There is also the proposed absolute ban of ocean disposal of wastes, requiring permits for discharges of salt water from offshore operations. Citizen suits against alleged violators of water-pollution control rules and orders are also a good possibility for passage. The legislative trend, furthermore, is toward tougher penalties.

All of these provisions are important, and some will surely find their way into law within a year. But none is so far-reaching as giving the EPA jurisdiction over ground waters.

Passage appears likely by the Senate Public Works Committee, and some federal ground-water role may be put in the House bill too. Unless changes are made, normal producing operations are going to get caught up in the web of federal control.

From Philip Friedman

RECEIVED

AUG 9 1971

O & G CONS. CO.

SOUTHWEST KANSAS ROYALTY OWNERS ASSOCIATION

Hugoton, Kansas 67951
June 30, 1971

BULLETIN

TO: All Association Members

HIGHLIGHTS OF ANNUAL MEETING:

CANCELLATION OF GOVERNMENT HELIUM CONTRACTS

The keynote speaker at our annual meeting was the Hon. U.S. Senator JAMES B. PEARSON, R-Kan.

Speaking before over 250 members and guests, Senator Pearson disclosed information which he believes sheds a new light upon last January's Department of Interior's decision to terminate the helium production contracts in the Hugoton Field. He cited a report from the Government Accounting Office which indicates that the previously published governmental requirements for helium for the next 30 years "may or may not be accurate."

Quoting the report, Senator Pearson said that, "The Department of Interior has projected a significant increase in pure helium sales beginning in fiscal 1973. If these projected sales should materialize, the full current Bureau of Mines production capabilities would soon be required, and the need for a cut-back in Bureau production would be negated."

In past years, the federal government has used up to 90% of all helium produced in Kansas. The January 1971 cut-back was justified on the basis of reduced helium consumption at the present time. However, Senator Pearson's statement is an indication that there has been some wavering in Washington.

"That no one apparently took the time to give the matter sufficient consideration raises serious questions in my mind over whether termination of the contracts was advisable or even wise," Senator Pearson said.

"Clearly, it is the business of government to ensure that a more economical and advantageous means of providing its people with a better standard of living is assured. Whether or not new uses for helium can, in fact, become a part of this better standard is a question which the government, in its decision to cut off a major portion of the helium activity, is failing to face."

In his speech, Senator Pearson also attacked the recent Federal Power Commission's ruling that makes royalty owners subject to its jurisdiction by considering them natural gas companies. Senator Pearson said that, "This decision has set a bad precedent, and it could have an adverse effect, both on the benefits which royalty owners can expect to accrue as well as future rulings of the Commission and the courts. The decision deserves reconsideration, and you can be assured that I will stand behind any effort to achieve this end."

Senator Pearson, responding to questions from the floor, stated the basic reasons given in the General Accounting report for a reappraisal of the helium program was the possible

leveling off of the demand for helium, the potential for discovery of new helium reserves throughout the country, including the Tip Top Field in Wyoming, and the improvement in helium extraction technology which permits economical extraction of gas from resources not previously considered in estimating recoverable helium resources.

(Secretary's note:) A few hours before the deadline set for cancellation of the helium contracts, an injunction was issued by U.S. District Judge Frank Theis in Topeka, blocking cancellation of the four government contracts. The injunction was to remain in force until further order of the Court.

Four helium producers had filed the action against the Interior Department. They are National Helium Corporation, Cities Service Gas Company, Phillips Petroleum and Northern Helex.

An appeal has been taken by the United States from the order enjoining the cancellation of the contracts. The United States is seeking to expedite the hearing on appeal.

It does seem that the action of the government in cancelling the contracts was unwarranted under all of the circumstances, and it is hoped that efforts now being made for reconsideration of the action will be effective.

REVIEW OF HELIUM DECISION

Gerritt Wormhoudt, of Wichita, a partner of Fleeson, Goosing, Coulson & Kitch, Association general counsel, reviewed the history of the helium litigation. He also reported on the status of the helium appeals, and the effect of the helium decision on royalty owners in the Hugoton Field.

Wormhoudt noted that, at the time of the annual meeting, the helium cases were still before the Tenth Circuit Court of Appeals in Denver pending determination of petitions for rehearing filed by the Helex companies. In March, the Denver Court reversed the holding of the United States District Court of Kansas that neither the royalty owners nor the producers were entitled to be compensated for the helium accompanying the production of natural gas.

In setting aside the District Court's decision, the Court of Appeals said,

"In our opinion, the Helex companies must account to the lessee-producers for the reasonable value of the helium contained in the processed gas and the lessee-producers must pay royalty on such value to the landowners." (Emphasis ours.)

If the decision of the Court of Appeals stands, then the case will go back to the District Court for the purpose of determining the amounts to be paid for the helium. Wormhoudt pointed out that this step cannot be taken, however, until the petitions for rehearing are decided. If the petitions are denied by the Court of Appeals, the parties may also seek appellate review by the United States Supreme Court before further proceedings in the District Court take place. Wormhoudt stated that the landowners will probably also ask the Supreme Court for further relief on the grounds that the leases did not cover helium.

Both the District Court and the Court of Appeals disagreed with the royalty owners' contentions that their

title to the helium never passed, although both courts found that the landowners never intended to part with title to the helium when they executed the oil and gas leases in question.

Wormhoudt emphasized that, according to the Denver Court, only about 44 percent of the produced gas goes through separation plants which supply the government, and, therefore, not all royalty owners will be compensated under the terms of the decision.

(Secretary's note: Following the annual meeting and on May 20, 1971, the Denver Court of Appeals denied the motion for rehearing filed by the Helex Group. The members of that group have announced their intention to file petitions for certiorari in the Supreme Court of the United States and all 88 of the appeals disposed of by the judgments entered on March 2, 1971, and have moved for a stay of mandate in each case.

The Court has ordered that the mandates in all cases be stayed until August 18, 1971. In the event that on or before August 18, petitions for certiorari are filed in all cases by the Helex Group in the Supreme Court of the United States, the stay shall continue until the final disposition of the cases in the Supreme Court.

We are hopeful that the Supreme Court will deny the relief sought by the Helex Group. In such event, the cases will then be sent back to the Federal District Court in Wichita on the issue, among other things, of how much is to be paid to the landowners.)

The question foremost in the minds of most members in attendance at the annual meeting was how could a landowner determine whether he would receive helium royalty. Wormhoudt advised that the four government contracts were with Northern Natural Gas Company, Panhandle Eastern Pipe Line Company, Cities Service Gas Company, and Phillips Petroleum Company. If the company producing gas from your land sells its gas to one of these four companies, and if the gas is being processed by one of the plants owned by Northern, Panhandle, Cities Service or Phillips, or their affiliates, then you will be paid helium royalty.

Wormhoudt also told those in attendance that once the question of liability is finally determined by the courts, landowners have the right to recover helium royalty from the date of the first purchase under the helium contracts in 1962.

ADDITIONAL HELIUM SUITS FILED

At the annual meeting, it was announced that two class actions involving helium were being filed in Kansas state district courts at the request of royalty owners. In discussing the cases, John Conlee, also of the Fleeson firm, explained that the actions involved ownership of helium not sold to the federal government under government helium contracts and, therefore, not covered by the Denver Court's decision.

Conlee advised that the helium being extracted at helium plants near Elkhart and Scott City constituted the property in question in these two class actions.

Since the annual meeting, one such class action was filed in the District Court of Morton County, Kansas, by Wylie Gore, and others, on their own behalf and on behalf of all

affected landowners, as plaintiffs, against Amerada Hess Corporation, Anadarko Production Company, Champlin Petroleum Company, Cities Service Oil Company, Colorado Oil and Gas Corporation, Mapco Production Company, the Superior Oil Company, J. M. Huber Corporation, Alamo Chemical Company and Colorado Interstate Corporation, as defendants.

The second class action was filed in the District Court of Finney County, Kansas, by Clarence Gigot, and others, on their own behalf and on behalf of all affected royalty owners, as plaintiffs, against Cities Service Oil Company, Amoco Production Company, Mobil Oil Corporation, Skelly Oil Company, Braden Drilling, Inc., Champlin Petroleum Company, Continental Oil Company, Kansas Natural Gas Company, Inc., Kansas-Nebraska Natural Gas Company, Inc., D. R. Lauk Oil Company, Inc., Northern Natural Gas Products Company, Northern Pump Company, Petroleum, Inc., Cities Service Cryogenics, Inc., and Cities Service Helix, Inc., as defendants.

The first case involves helium and hydrocarbons being produced from the Alamo plant near Elkhart. The second case involves helium and hydrocarbons being produced from the Scott City plant. Both cases have been removed to the Federal District Court in Wichita and are in the early stages of litigation.

ELECTION OF DIRECTORS

In a surprise move, Oliver S. Brown, Liberal, announced his retirement as Association President. Oliver had been a director of our Association since its inception in 1948 and had ably served as President for 18 years. Under his leadership, we have grown to an organization of over 2300 members. He has been an outstanding and capable leader, and we will miss him.

Robert Larrabee, President of Star Lumber Company in Liberal, replaces Mr. Brown as Association President. Other officers for the year are: L. F. Stanley, Vice-President; T. A. Dudley, Treasurer; B. E. Nordling, Secretary; Leland E. Nordling, Assistant Secretary; and A. E. Kramer, Assistant Secretary.

The following directors were elected: George Drew, Morton County; L. F. Stanley, Haskell County; Gerald Finley, Finney County; L. C. Waechter, Kearny County; Jno. W. Alford, Grant County; Fred Shore, Stanton County; Ora V. Martin, Hamilton County; Vincent Youngren, Stevens County; and Robert Larrabee, Seward County. Directors at large are: Charles L. Light, Jr., T. A. Dudley, Stanley Julian, Dan C. Sullivan, Ronald Goodnight, Rolland Jacquart, Arthur Brinkmeyer and Wylie Gore.

Charles Light, Jr., replaces Oliver S. Brown, and Rolland Jacquart replaces Lloyd K. Ungles as directors at large.

The royalty group adopted a resolution memorializing the deaths of Harry L. Lightcap of Hugoton and Emil Schnellbacher of Satanta, long-time directors of the Association.

TREASURER'S REPORT

The Treasurer's annual report showed a cash balance on hand as of March 1, 1970, of \$10,383. Membership dues for the year totalled \$32,204, with \$5,299 contributed to the Special Fund. Total receipts for the year were \$47,886.50. Total disbursements for 1970-71 were \$31,254.45, leaving a balance on hand on March 1, 1971, of \$16,632.05.

We are still heavily indebted for out-of-pocket expenses on the helium litigation, FPC jurisdictional cases, and other related Association business.

CONDITIONAL ENDORSEMENTS ON MONTHLY ROYALTY CHECKS

Several companies in the Hugoton Field are making adjustments of royalty prices based on the Hugoton-Anadarko area rate proceedings referred to as "Federal Power Commission Opinion No. 586". Our Association, on behalf of its members, has always taken the position that landowner-lessors are not bound by Federal Power Commission rates. We are entitled to be paid for royalty under our lease contracts. In many instances, this requires a payment of higher royalty prices than those prices being paid by the producers.

We have recommended in previous bulletins that members should endorse your monthly royalty checks with the following endorsement on the back of the check above your signature:

"Payment on royalty account without prejudice to further claims"

This advice should apply particularly to Mobil and Atlantic-Richfield royalty owners, who have recently received letters from their companies, advising of an adjustment in rates under certain conditions. It should also apply to Mesa royalty owners because of pending litigation against Mesa for an accounting on behalf of royalty owners for higher royalty prices.

To facilitate the endorsement of checks, the Secretary's office has available a supply of rubber stamps with the above wording on them.

We have an ample supply. If you desire to secure one of these stamps, mail a check made payable to SWKROA for \$3.00. This price covers the cost of the stamp and postage in mailing the stamp to you.

We highly recommend the use of the endorsement and stamp so long as litigation is pending on the price cases.

NEW MEMBERS

We are pleased to announce that we have added 342 new members since March 1st. We welcome all you new members and feel confident you will find your membership in our organization worthwhile.

Sincerely,

B. E. Nordling

B. E. NORDLING, Secretary
Southwest Kansas Royalty
Owners Association

BEN:yw

RECEIVED

AUG 3 1971

O & G CONS. COMM.



Museum OF NORTHERN ARIZONA

July 30, 1971

Mr. John Bannister
Executive Secretary
Oil and Gas Conservation Commission
4515 North 7th Ave.
Phoenix, Arizona 85013

Dear John:

In regard to your letter of June 14th, would have liked to have answered it before this but we have been rather busy and am just getting around to getting caught up on my correspondence.

In regard to the \$2000 that you tried to get from the legislature I am a little confused. I do not remember asking for reimbursement of this amount although the sample cabinets we sent down to you are valued about \$50 apiece. If you want to keep these cabinets, this amount could be taken out of some sort of an equipment fund rather than taken from the legislature.

We did ask that the legislature make a yearly grant of perhaps \$1000 to support a grant here at the Museum. This would give students a chance to work in stratigraphy in northern Arizona. As I remember right, you were going to apply to the legislature for this. I am wondering if these two amounts didn't get mixed up and perhaps it would be better to apply for this grant for geological work rather than just a reimbursement to the Museum.

Best wishes and I will try to stop down to see you and your new setup one of these days.

Sincerely,

Bill

William J. Breed
Curator of Geology

WJB/dd

June 14, 1971

Mr. William Breed
Curator of Geology
Museum of Northern Arizona
P.O. Box 1389
Flagstaff, Arizona 86001

Dear Mr. Breed:

You will recall that when the geological samples were transferred from the Museum of Northern Arizona to the Commission in Phoenix, we indicated that we would attempt to secure funds from the Legislature to reimburse you for some of the expense incurred by the Museum in building sample cabinets, etc.

The Commission attempted to secure the sum of \$2,000, to be paid to the Museum of Northern Arizona during the period 1971-72. The Legislature failed to appropriate money for this purpose and consequently this Commission cannot contribute money to you. I am extremely sorry that this cannot be accomplished.

I will speak to the Commissioners at the first opportunity and see if it is their desire to attempt to secure funds in our 1972-73 budget.

Sincerely,

John Bannister
Executive Secretary

JB/vb

OIL AND GAS CONSERVATION COMMISSION
4515 N. 7th Avenue
Phoenix, Arizona 85013

Minutes of Meeting
June 18, 1971

Present:

Mr. Ralph W. Bilby, Chairman
Mr. Lucien B. Owens, Member
Mr. Frank E. Moore, Member

Absent:

Mr. W. Roger Hafford, Member
Mr. Robert A. Bledsoe, Member

The regular Commission meeting for the month of June, 1971 was called to order by Chairman Ralph Bilby at 10:00 a.m.

The minutes of the meeting of May 23, 1971 were approved as written.

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

Executive Secretary advised that the Minerals and Fuels Committee of the Four Corners Regional Commission, to which he was assigned, has completed its work. The committee was formed to inventory the Four Corners area for mineral and fuel natural resources possibilities, together with certain projects designed to help stimulate the economy of the area through various means.

Executive Secretary advised that the next step is ready to be taken in surveillance of the salt mining project located west of Phoenix. This will consist of drilling approximately 10 holes 35 to 40 feet deep and inserting plastic pipe through which nuclear moisture probes will be run. This will be paid for by the Governor's Office. The 1971-72 phase will be paid from funds allotted to the Oil and Gas Conservation Commission. Executive Secretary has been informed that the Governor's Office will seek legislation providing that future surveillance costs be paid by the project involved rather than from State funds. It is also proposed that future surveillance of the salt project be assigned to the Arizona Health Department.

After discussion, Executive Secretary was instructed to draft a letter to the Governor, advising of the increased interest being shown both Nation-wide and within the State in geothermal power and suggesting that steps be taken to designate an agency to supervise anticipated activity in this field. It is felt that the Oil and Gas Conservation Commission would be the logical department to handle such regulation. The draft of the letter is to be submitted to Chairman Ralph Bilby for approval.

The Commission voted to increase the Executive Secretary's salary in accordance with the suggested limit of the Joint Budget Committee's recommendation.

Minutes of Meeting
June 18, 1971
Page 2

Motion was made and approved that the regular August meeting of the Commission be held in Show Low, Arizona, on August 20, 1971. As a quorum will not be present, no meeting will be held in July.

J. N. Conley, staff geologist, advised that the index of well samples which he has prepared is now being printed and will be available for distribution by the end of June. Executive Secretary further advised that Mr. Conley has done an excellent job on the index. Dr. H. Wesley Peirce of the Arizona Bureau of Mines also aided in this project. A building has been made available to the Commission by the Arizona Highway Department for the storage of duplicate samples and samples from inactive areas, leaving room at the Commission offices for the more active samples.

Executive Secretary reported there is a possibility that the Arizona State Highway Department will seek to purchase copyrights of certain maps of the State of Arizona from Ammon International Corporation. The Finance Department would not allow the Commission to transfer funds to make the purchase.

Meeting adjourned at 11:30 a.m.

APPROVED

Ralph W. Bilby, Chairman



OFFICE OF
Oil and Gas Conservation Commission

STATE OF ARIZONA
4515 NORTH 7TH AVE.
PHOENIX, ARIZONA 85013
PHONE: (602) 271-5161

August 11, 1971

Memo: Commissioners
From: John Bannister

Re: Report of Activity

Since our meeting of June 18, 1971, I appeared before the Senate Land Use Study Committee. The purpose of this appearance was to inform the committee of the potential development of geothermals within Arizona. Our presentation received great interest and possibly you have seen some of the publicity that resulted.

Likewise, I appeared before a House committee on environmental future. Again, the subject of geothermals seemed to be of much interest and we are now instructed to prepare a report on what legislation is needed to protect the State's interest in geothermals for this committee. The committee is chaired by Tim Barrow and Burton Barr is vice chairman. This report will be submitted as soon as possible and copies will be furnished you.

Clare Titus, Executive Vice President of Arizona Public Service, and Elton Buell, Manager, met with me recently. They explained that Arizona Public Service is most interested in securing additional sources of fuel for power purposes. They have recently purchased gas from a Texas source and have made arrangements with El Paso Natural Gas to transport same. They said they had never thought of Arizona as a potential source of natural gas or other than coal fuels. They expressed great interest in the information published by the Commission on geothermals. The consensus of opinion was that, being a "conservative utility type" operation, they do not know exactly how they want to support exploration within the State. They do not believe they will actively, and on their own, engage in exploration, but will, perhaps, support the exploration effort of others. Certainly, they did offer all encouragement such as a market to those developing Arizona's resources, however it was stressed that this would be a decision to be made by the Board and that, in all events, they would stay in close touch with the Commission. I believe the support shown

Page 2
Executive Secretary Report
8-11-71

by the Commission in their problem has been most worthwhile and results will be beneficial.

Western Helium Corporation was successful in its bid to purchase the Arizona Helium Corporation's plant at Navajo. The purchase price was somewhere in the neighborhood of \$30 thousand dollars and it is my understanding that the current facilities will be extensively upgraded and total capacity of the plant will be increased, consequently I feel that we will see in the not too distant future increased drilling in the helium area. You will note in Mr. Allen's report that there has been some increased success in locating new gas in the area.

A company called "Geothermal Kinetics Systems Corporation" is opening offices in Phoenix. The purpose of this company is the development of geothermal energies. To date, they have rented office space and are in the process of securing minimum personnel, i.e., a secretary, and will become active as soon as possible. To my knowledge, they are in contact with Arizona Public Service. I have no further information concerning their activities at this time, but will advise.

Since my communication to you on July 7, 1971 concerning Dr. Jerry Wright, it appears now that he will continue with the University for at least another year and I feel will continue to act in his capacity as liaison officer with us.

Jamie Deppey has now officially left the Commission as of August 6, 1971 and will be deeply missed. Jamie has been replaced by Miss Rhema Batarseh who, I feel, will be a most valuable addition to the staff.

The budget is essentially the same as last year, with anticipated increases where indicated. Capital Outlay will be higher in that it will be necessary to replace two cars. As usual, the cost of personal services is determined by the Personnel Commission and is reflected to the best of our knowledge in our proposed budget. This will be subject to discussion at the forthcoming meeting; please be sure to bring your copy with you.

I have authorized William E. Allen to sign drilling permits and approve the bonds required by the Commission, inasmuch as he has shown competency and reliability in this area. I have authorized Mr. Allen to sign pay-in-vouchers in the event of my absence.



OFFICE OF
Oil and Gas Conservation Commission

STATE OF ARIZONA
4515 NORTH 7TH AVE.
PHOENIX, ARIZONA 85013
PHONE: (602) 271-5161

ACTIVITY REPORT

August 11, 1971

Memo from W. E. Allen, Director
Enforcement Section

ON THE LEGISLATIVE FRONT

It has been announced that Senator John Tower (Rep-Texas) is developing legislation which would end pricing regulations on all natural gas by the Federal Power Commission. Tower's advocacy of complete decontrol came in a statement praising the FPC's decision raising ceiling prices for south Louisiana gas. He stressed his belief that "free market mechanisms" are required in the pricing of natural gas to insure adequate exploration and production to meet consumer demands.

Senator Tower also plans to back a 12.5 percent "domestic exploration investment tax credit" to encourage oil and gas exploration. It would reduce a year's income tax by 12.5 percent in exploring for and developing new domestic reserves. It would be a temporary measure to expire automatically 10 years following enactment.

The Federal Power Commission increased ceiling rates for gas produced in the six production areas of the Rockies....Aneth field, Utah, 22.5 cents per MCF; San Juan Basin 24 cents; Unita and Green River basins 23.75 cents; Denver Julesburg Basin 23.5 cents; Montana-Wyoming 22.75 cents; and Montana-North Dakota 23.5 cents....in a move to "create greater incentives for producers to seek new supplies." The new ceilings cover sales contracts dated after June 17, 1970.

Recent information indicates that Aztec Oil and Gas Company was granted authorization by FPC to charge 29.23 cents per MCF and its San Juan Basin gas beginning August 1. This increase is subject to possible later refund.

Page 2
Activity Report - August 11, 1971
Mr. W. E. Allen

It is our belief that any legislation that will allow the price increase on natural gas or oil, or will give the exploration companies additional incentive to develop new reserves will hasten the day that Arizona will become one of the larger oil and gas producing states.

There is some evidence that strat test are to be started shortly. James R. Pickett has just recently picked up a number of applications to drill. He stated that the company or companies that were involved in the large lease play that occurred last year are ready to drill a series of strat tests. The area that will be covered by these tests havn't been determined or so says Mr. Pickett.

Ed Obele has picked up some forms necessary to secure his permit to drill the Wild Cat in Cochise County. As of this date, we havn't received the applications to drill.

The six old Arizona Helium Corporation wells have been plugged, dry oil markers placed, and the locations cleaned up. Mr. C. F. Henderson, who was required by the bonding company to perform this work, did an excellent job. A final inspection was made of the clean up a couple of weeks ago.

Jamie Deppey left on the 6th of August. She has been replaced by Rhema Batarseh. We are currently engaged in assisting her to become familiar with our various tasks. We are sure that she will adapt to the routine in a very satisfactory manner.

Attached to the report is an article taken from the Oil and Gas Journal pertaining to a proposed test by Dowdle Oil Corporation and Sun Oil Company to be made in Cochise County. As of this writing, we have received no recent inquiries from either company.

At a recent meeting of the Arizona Petroleum Development Association, Bud Brown, the inventor and developer of a self-propelled tramway, gave his ideas on how this tramway could be used in the building of the Alaskan pipe line from Prudhoe Bay to Valdez. His approach was so novel and unique that it was thought some of you might have an interest in his ideas. We have attached an article explaining his ideas to this report.

Page 3
Activity Report - August 11, 1971
Mr. W. E. Allen

The Suburban Companies have completed the drilling of their #2 storage well and should very shortly be washing out the storage reservoir.

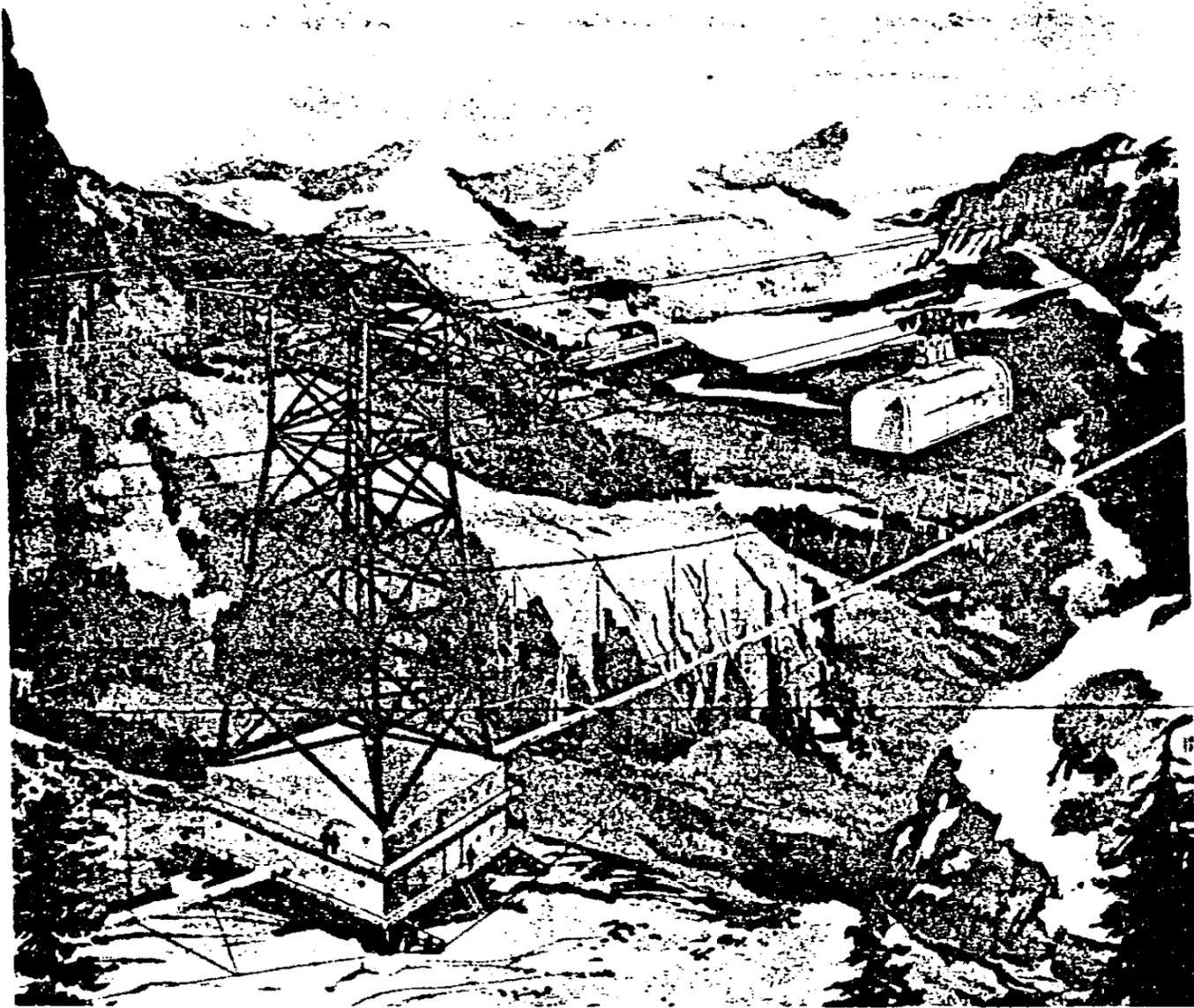
We have no further information on the Airtex Development Corporation's plans for enlarging their LPG storage projects in the Holbrook area.

Eastern Petroleum hasn't as yet started their two wells in Apache County. Their #1 Kiva State Santa Fe in the NE/4 SW/4 Section 13-T20N-R28E Apache County and re-entry in their Santa Fe 6X in the center of Section 25-T20N-R28E.

Cities Service has gone tight on their Monsanto #1-A Navajo located in the SE/4 NE/4 Section 21-T40-N-R29E Apache County. It is known that their total depth is 6111 and that 7" casing has been set at that depth and a 10' section of the Mississippian has been perforated. They had several fair shows of both oil and gas in the Akah, Barker Creek, and Pinkerton Trails formations. The only D.S.T. taken in the Mississippian was a no-show.

The Cecil Cope #1 Bradshaw Fee, NW/4 NE/4 Section 34-T18N R4E Yavapai County was drilling below 1175'. The operators have just cleaned up a fishing job on the hole. They had lost five drilling collars and a drilling bit.

The Ruel W Little #1 State NW/4 NE/4 Section 34 T16N R23E Navajo County is progressing very slowly. At the last report they were slightly below 500'. This report was from the Honorable Fred Struckmeyer. He has an interest in the well.



ELEVATED PIPELINE



SELF-PROPELLED SYSTEM SUGGESTED FOR
ALASKA AND OTHER REMOTE AREAS

How do you move upwards of 40 billion barrels of oil—possibly even 100 billion barrels—from the North Slope area of Alaska to the nearest ice-free port (Valdez) in that state? By pipeline? Right? Wrong? Byron T. Brown, president of Bud Brown Enterprises in Phoenix and developer of the self-propelled aerial gondola (ELEVATOR WORLD March 1970 issue) says "Half Right". Positively not by surface laid or buried pipeline. A pipeline, it has been suggested by numerous and articulate foes of the idea, could lead to the destruction of everything, from the arctic tundra to, and including, the caribou herds, the fisheries industry, and by extension, possibly to the natives, themselves.

The pipeline, it is postulated, could literally melt the

earth upon, or under, which it would be placed. (Oil comes out of the ground at approximately 160 degrees F. and increases in temperature as a result of friction as it passes through the line). Melting of the frozen tundra would, according to some thoughtful opponents, result in the sinking, sagging, twisting and breaking of the pipeline. With the line containing some 100,000 barrels of oil per mile, and with the possibility of an unknown number of miles draining as a result of a break, it is easy to understand the seriousness of this particular problem. A break, if it did occur in such magnitude, would make the all-time-most-disastrous Santa Barbara spill look like a spot left on the driveway by a leaky auto transmission.

With these problems as a point of reference, consider a group of ESCOA (a subsidiary of Bud Brown Enterprises) engineers working on the edge of Phoenix on what might seem to be a totally unrelated project—that of providing efficient, economical, all-weather transportation for those attending the 1976 Winter Olympics to be held near Evergreen, Colorado. One of the ideas being considered, a self-propelled aerial gondola system, seemed to have relevance for the Alaskan venture and a proposal was submitted to Alyeska, a consortium of seven major oil companies, that oil be moved through an elevated pipeline which would be completed in three years (two years less than any other system) and without disturbing the delicate ecological balance about which so many are concerned.

The pipeline would be high enough off the surface so that it could offer no problem of melting the ground under or around it. It would be high enough so that the migrating wildlife of the area would move easily under it. The tramway associated with it would open up immediate transportation routes across vast and otherwise often impassable areas. And it would establish a technological/ecological partnership of a magnitude that could never be ignored in the future. The benefits from that symbiosis alone would provide future benefits of incalculable value, Brown believes.

As Harold D. Lang, ESCOA vice president and project engineer says: "The hardware exists in the working stage now. This is not just an idea we have on paper." Lang expects the tramway at Independence Peak, about five miles from Evergreen to be in operation in late spring or early summer of 1971. It is described as "the third configuration" of self-propelled tramways systems designed and operated by Bud Brown Enterprises.

The first tram put into operation embodying a new principle of propulsion; a two-man unit powered by a five horsepower Briggs and Stratton gasoline engine. The second, a tramway at Custer, South Dakota, is a 26-passenger spherical gondola powered with a Corvair engine. The third configuration, or the one to be operated at Evergreen, will be a 26-passenger car, or cars

powered by a 250 horsepower gasoline engine. From that has evolved the proposed Alaskan tramway, utilizing a dual-cable turbine-powered 2,500 horsepower engine burning natural gas.

Brown's trams differ from conventional units of the past in a particularly significant way. In the past there have been two basic types of cable way systems, he explains. "The kind in which vehicles are firmly fixed to a travelling cable, and the fixed cable carrier type in which a stationary cable is used to support the vehicle and a hauling cable is attached to the vehicle and motivated by a winding machine used for propulsion."

"The self-propelled cable way vehicles employ a totally different concept. The vehicles are self-propelled by means of hydraulic motors that drive rubber-tired wheels over a stationary track, or cable. The 'aerial bus', as I term it, is completely self-contained and controlled by an operator aboard."

"It has been acknowledged that due to the remote location and harsh climate, benefits of the largest oil field discovery in the western hemisphere have not yet been made available to man. Extreme low temperatures combined with terrain varying from the formidable Brooks Range to the unstable tundra of the arctic region have hampered practical access to the North Slope region. It also has been acknowledged that the most practical way to transport the oil from the fields to a suitable transfer point is by pipeline. This line must run as straight as possible to eliminate pressure losses due to excessive bends. Men and materials must be moved along this line constantly during the construction phase, and periodically during its operational life to provide maintenance."

Brown states that the only practical way to accomplish this is to assure that the transportation means parallels the pipeline throughout its entire length and that is where "push really comes to shove". Cost of a highway anywhere near paralleling the pipeline has been estimated to cost at least \$120 million plus astronomical maintenance costs. And no guarantee is available that the highway could, indeed, parallel the pipeline. In fact, road engineers and pipeline engineers generally agree that it probably could not.

Add to this the objections of pushing a road through the virgin Alaskan wilderness, with all the accompanying disruption of the ecology and what do you have? A problem which seems all but insoluble. A railroad, of course, offers the same problems.

Brown's suggestion is: "Forget the highway and the railroad. The tramway would solve all the problems and obviate all the objections."

The proposed aerial tramway system would consist of a dual cable track, operating both ways, a driving unit and a series of gondolas. The system would be able to sustain all-weather, around-the-clock operation. Towers

would be spaced at 1,500 feet intervals on level terrain, and 1,200 to 600 feet intervals over terrain requiring steeper grades. As with a conventional railroad, this system can provide switches at any desired location to provide service at intermediate stations or to permit a fast unit to pass a slower one.

Perhaps most important of all, since only the tower bases contact the terrain, this system would provide an absolute minimum of interference with the natural environment of its location.

The pipeline itself would be incorporated into the system, elevated above the terrain, using each tower as basic support. Midspan support for the pipe would be achieved by a cable suspension system—much like a suspension bridge. Installing the pipeline above ground, thus avoiding contours and obstacles in the terrain, would result in reducing the overall length of the pipeline by as much as 15 percent of the total distance, resulting in the saving of substantial sums of money and, of course, avoiding contact with the various types of contamination of the ground by the pipeline.

Radio, telephone and television communications can be maintained throughout the system. At any desired tower, a turn-around stage can be set up to return a unit if it becomes necessary. Primary power for the drive unit would be provided by a 2,500 horsepower turbine engine driving a bank of hydraulic pumps that would, in turn, drive the wheels over the track. The fuel for the engine would be natural gas, eliminating most engine pollution problems.

The control console is housed in a compartment above the power nacelle. From this position, the operator will have excellent visibility for inspection of the track cables, the towers, the pipeline and the surrounding area. This compartment will be capable of accommodating a few passengers, if desired.

There are three basic types of gondolas: each being approximately 40 feet long by 10 feet wide.

1. Box car
2. Open car
3. Liquid transport car

The box car is a closed unit with access from the sides, as with a conventional freight car, and with swing-away doors at each end for rapid loading and unloading. Due to its closed design, it may also be used as a storage unit or a mobile workshop. A modification will be a hospital car, which is of particular importance to the oil field industry.

Primary use of the storage configuration is to provide a readily available source of "mud" for drilling operations. Major terminals would be established at each end of the tramway. These would provide all necessary ramps and loading devices to service the tramway and associated systems. A series of switch yards would provide storage and loading areas away from the main

line.

Since the cable is not continuous, but ends at each tower, the tramway can be constructed using the tram itself as the basic means of supply, eliminating the necessity of a paralleling road. Towers would be fabricated in sections at a base station transported by tram to the last complete section on the line. From this point, of course, the sections must be moved by aerial or ground transport to the next erection site. The cables may be used as an overhead crane system during the construction of the pipeline, again minimizing ground contact by heavy equipment. A mobile crane operating on the cables would have a capacity of 40 to 50 tons.

Additional benefits are numerous:

- * The tramway can provide smaller crew gondolas for the rapid transmission of crews for normal or emergency maintenance.

- * A closed car would be modified to act as a hospital, providing complete emergency service. This unit can be parked at any desired location or remain on the system for ready transport to any emergency site.

- * Closed cars can be used as mobile workshops capable of providing close support for any endeavor.

- * Closed cars can be modified to provide modular living, cooking and dining areas. These units can be joined as required, eliminating unnecessary personnel exposure to the winter elements.

- * The tramway towers would be available for mounting telephone cables and electrical transmission lines. This will eliminate need for additional towers and will make service for these lines readily available.

- * Telemetry circuits may be provided in the communication cable which will facilitate remote control and monitoring of isolated pumping stations. The same cable may contain circuits capable of transmitting television signals if visual monitoring should be required, such as an interior view of each pumping station. Other telemetry circuits may be utilized to maintain station security and remote indicator functions necessary to such a pipeline system.

- * The tramway would open a portion of the country that, until now, has had very limited access. A passenger gondola could transfer tourists and sportsmen to any station along the cable system.

- * Unlike a highway, some degree of control can be exerted by this system by allowing passengers to leave the tram only at established stations. This would definitely lower the damage and pollution problems common to many roadsides.

- * To provide previously undreamed of emergency and rescue relief facilities in this barren area, emergency huts can be provided at the base of each tower. Persons marooned in the area—as in a downed aircraft, for example—would never be more than 750 feet from

emergency shelter once they were able to reach the tram line.

In addition to emergency rations, fuel, and other survival equipment, including communications, it is proposed that large supplies of oil-absorbent materials be stockpiled at the towers.

In the event of a disaster such as a breakage of the line from any cause, telemetry immediately would pinpoint the location of the trouble. The tram system then could place men and machinery at the site within minutes, absolutely unaffected by weather or darkness, or snow which would render helicopter or fixed-wing aircraft and other methods of overland transportation such as rail or highway inoperable. In short, the system allows immediate delivery of pollution retardants and repair crews whenever and wherever necessary.

Should the source of oil ever be depleted and the tramway serve no other vital use, the entire system can be removed without leaving noticeable blemish on the environment.

Certain innovations have been proposed for the pipeline, too. It is proposed that the basic pipeline consist of steel pipe (48 inches in diameter) encased within a high density polyethylene cover. Based on an extensive survey of known world-wide, proven materials, Uni-Pipe, made of Hostalen GM 5010 will provide the insulation, corrosion protection and leakage retention needed for such a steel pipe used in the line.

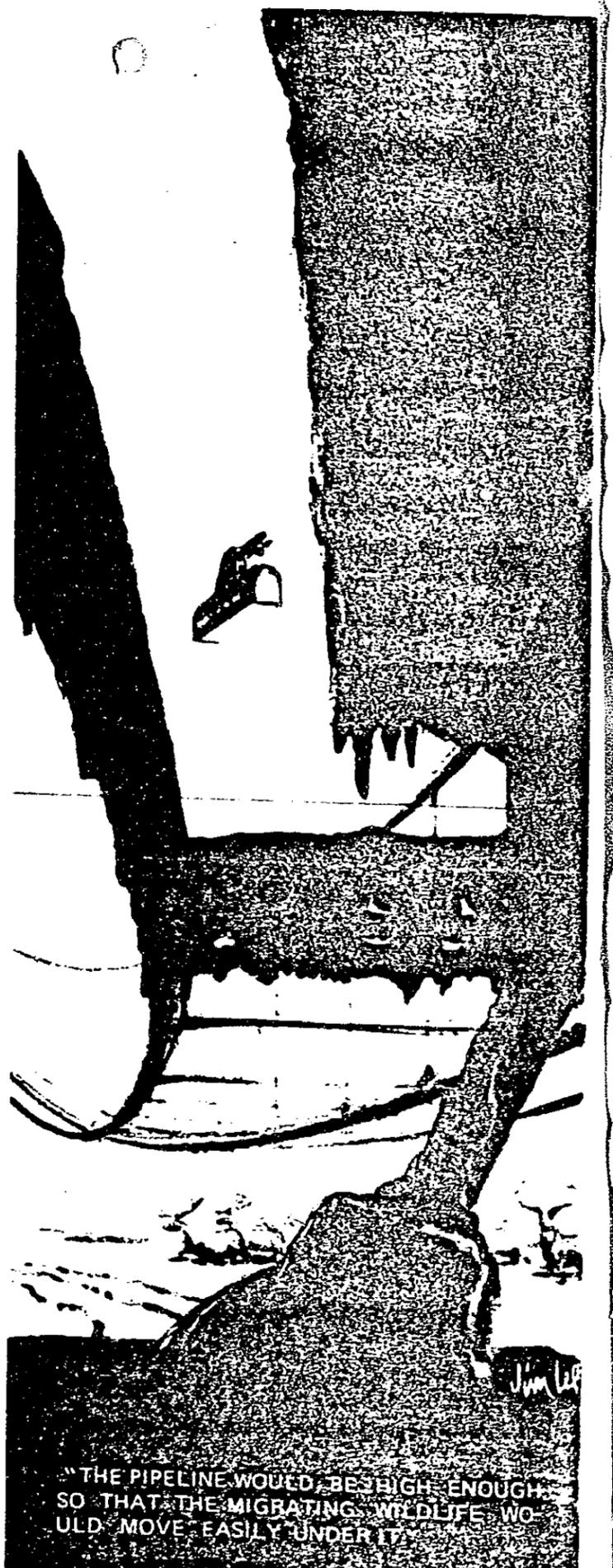
One of the few plastic materials that will not crack at low temperatures, Hostalen GM 5010 has been used for more than a decade in Scandinavian countries with highly successful results.

A portable extrusion plant would be used at one or more sites to extrude, wrap and butt-fuse the pipe. The actual steel oil line sections would act as the mandrel for this operation. The wrapping would extend to within six inches of the end of the steel pipe. This gap would permit welding and pressure testing of the joints. After each steel joint has been approved, plastic caps would be used to close the gap. In the event of need, the liner may be cut open at any location. The opening can then be closed using a hot air, polyethylene rod machine. The extruding process would enable any size steel pipe to be used as a lining, since only plastic pellets need to be transported to the extruder site.

When completed the system would certainly be the largest in the world, though numerous much smaller tramways are operative in Europe.

The engineers who conceived and would execute the design believe it to be the "cleanest" possible method of moving the tremendous reserves of oil from the North Slope area, but, beyond that, a general transportation system that has vast potential in other remote parts of the world.

MAY, 1971



"THE PIPELINE WOULD BE HIGH ENOUGH SO THAT THE MIGRATING WILDLIFE WOULD MOVE EASILY UNDER IT."

Midland firm slates Pedregosa basin test

"IMAGINE 80,000 sq miles of the United States—an area larger than Oklahoma—and only nine oil tests drilled into the Precambrian." This page carried those words back in 1959. The huge area discussed was the southwestern corner of New Mexico and several southeastern Arizona counties.

The statement is almost the same today. Very little drilling has been done since 1959 in this vast area. But several geological papers in the past couple of years have been pointing up the potential of the various basins in the region, particularly the Pedregosa in Cochise country. So any time a wildcatter announces that he will put down a hole in this part of the Southwest, it is news.

A remote wildcat planned. A Midland, Tex., operator, Dowdle Oil Corp. plans to start an 8,000-ft test in 22s-31e, Cochise County, Ariz., about Sept. 1.

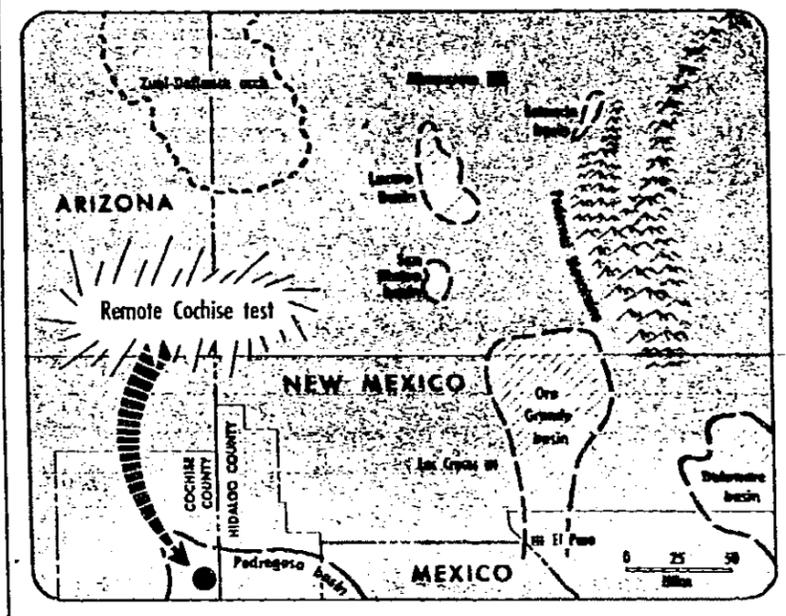
There has been no drilling to this depth in this part of Arizona. Dowdle and Sun Oil Co. have assembled a block of about 50,000 acres in this wild land. Participation by others is expected. Guadalupe Exploration Co. of Albuquerque also has acreage in the vicinity. The proposed test is about 20 miles northeast of Douglas, a town on the Mexican border. It lies south of U.S. Highway 80 in the Pedregosa basin.

There was a sizable lease play reported in this Arizona area in 1969 and 1970.

For the Basin and Range. This section of the Southwest is mostly in the Basin and Range physiographic province.

Isolated fault-block mountain ranges separated by alluvium-filled graben valleys characterize the landscape. The most favorable rocks for the occurrence of hydrocarbons here are the Devonian, Mississippian, Pennsyl-

Pedregosa basin test due



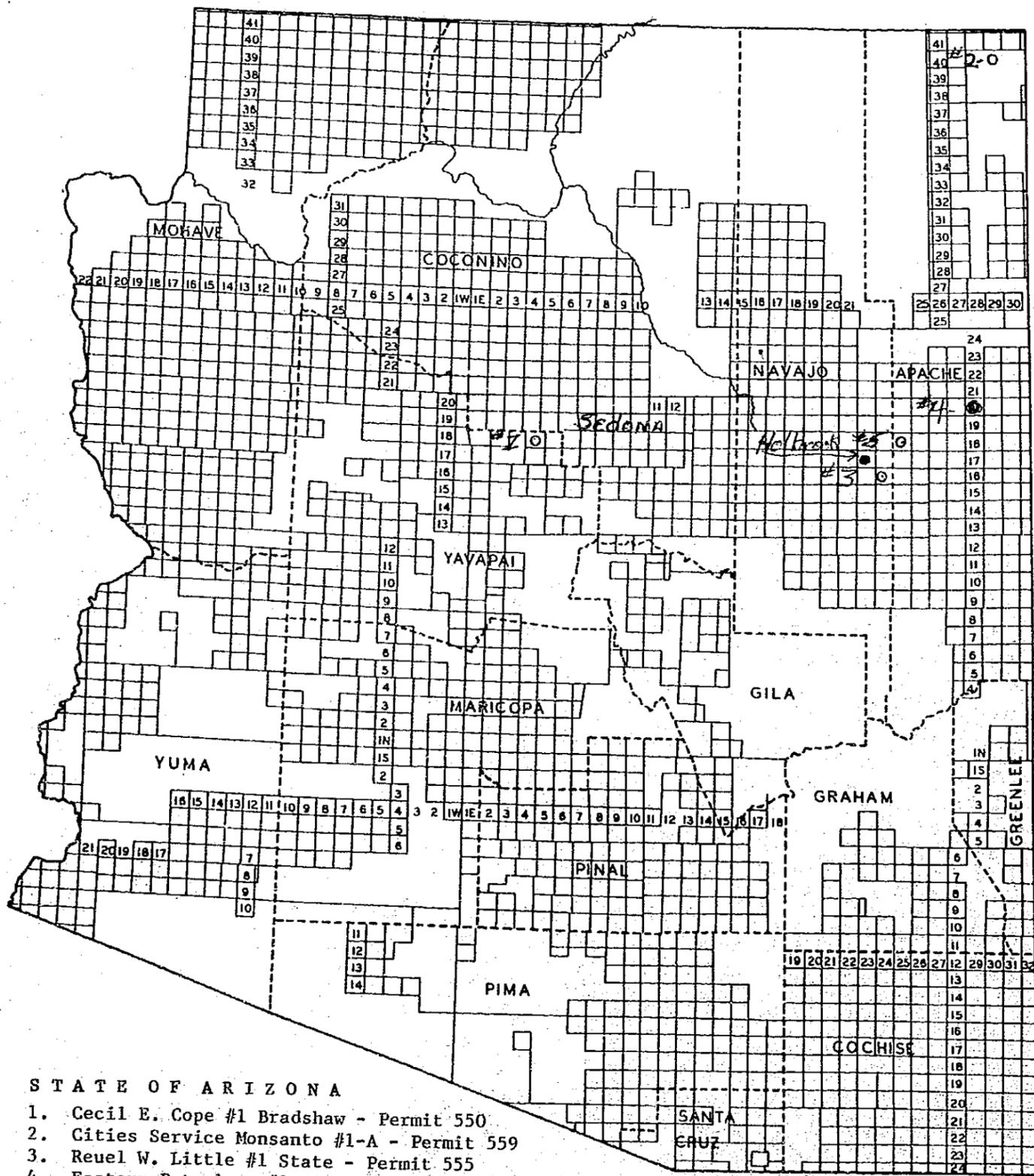
vanian, and Permian marine beds. These are mostly limestone with some sandstone units thrown in. Reefs are probably present in these formations around some of the Paleozoic high areas.

The depth of basin fill may be substantial since a well near San Simon penetrated more than 7,500 ft of alluvium without passing into the bedrock. Southeastern Arizona has an excellent stratigraphic section of marine beds over 10,000 ft thick. This section contains source beds, reservoir beds, and facies changes which may hold stratigraphic traps. But structural complexities and concealed subsurface relationships make it hard to evaluate and pinpoint traps. However, a few shows have been reported from

wells drilled in southeastern Arizona.

Volcanics have always been a no-no to most geologists looking for oil. There are many such areas masked by lava flows in this area, but to the south in Mexico igneous rocks form part of the oil traps. Structure in this region of Arizona is somewhat discouraging, but so it is in other areas of the world. Much of the Pennsylvanian section, considered a good prospect by most, is dense cherty limestone—but so is much of the Pennsylvanian section in other producing areas.

This is real wildcat country. Each new test will give us more clues to one of the most highly complex and remote exploration theaters on the map.



STATE OF ARIZONA

1. Cecil E. Cope #1 Bradshaw - Permit 550
2. Cities Service Monsanto #1-A - Permit 559
3. Reuel W. Little #1 State - Permit 555
4. Eastern Petroleum #1 Kiva Santa Fe - Permit 560
Eastern Petroleum Santa Fe #6-X - Permit 561
5. Suburban Companies #1 Fee Strat - Permit 556
Suburban Companies #2 Fee Strat - Permit 557

Courtesy of
ARIZONA OIL REPORT



OFFICE OF
Oil and Gas Conservation Commission
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August 11, 1971

ACTIVITY REPORT

TO: COMMISSIONERS

FROM: GEOLOGICAL STAFF

James Scurlock

At last, after a long delay, our structure map of northern Arizona has gone to press and I have turned my attention once again to editing Dr. Peirce's compilation of our scout data. According to schedule, this compilation is to be finished this fall, but we seem to be running behind with this project. I am inclined to agree with Mr. Bannister's observation that we will be lucky to have this thing in print by the end of the year.

Edward Koester

A good part of the month has been spent on a study of the salt deposits in the state. Additional information has been secured in a visit to the local office of the U.S. Bureau of Reclamation which has drilled several wells in central Arizona, one of which, near Picacho Reservoir in Pinal County, has cored salt. The Bureau has confidential information on four wells drilled for water by land owners in the vicinity. These wells also reached salt and the land owners are reluctant to release information on them because they think that the presence of salt in the wells would give the impression that the water supply was not good on their land and that this would make it difficult to sell their land later. Of course, these fears are unwarranted inasmuch as it is not difficult to properly plug off the formations below the fresh water horizons. Although we lack the data from these wells, it is apparent that there is a salt structure covering many square miles west of the Picacho Reservoir. This feature is probably not as sharp as the Luke Salt Dome which is in harmony with the gravimetric work of the U.S. Geological Survey here. A gravity minimum has been found and the highest wells on the top of the salt are near the center of this minimum, however, no wells have been drilled in the lowest part of the minimum, which suggests that the top of the salt dome has not yet been drilled.

Page 2
Activity Report
Geological Staff
August 11, 1971

Edward Koester (Cont.)

Just west of the town of Picacho is another and sharper gravity minimum which might be expected to be the site of another salt dome. However, wells drilled near the center of this gravity minimum do not report any salt. It is unlikely that the drillers of these wells would fail to mention salt if it had been penetrated. This situation points up the various possibilities of a geophysical interpretation of the area. It suggests that this gravity minimum represents a deep basin in which potential petroleum producing formations may be found instead of a salt dome. It also opens up the possibilities that other gravity minima in the geophysical survey of parts of Maricopa, Pima, Pinal and Yuma Counties may be indicative of thicker sedimentary basins than have been found in some of the intermontane valleys of central Arizona. Most of these anomalies have not been satisfactorily drilled.

Sufficient information has been obtained to give us an idea of the size and shape of the Luke Salt Dome. The drilling of wells for water and for salt in the area of the Luke gravity minimum show that the geophysical work has been a good guide to the delineation of the Luke Salt Dome. The very top of the dome may not yet have been found, but we do know from the data supplied by wells that this feature fits the requirements of a salt dome. At least six wells are known to have reached the salt beds. The highest well has penetrated over 3600' of salt and is bottomed in salt. Wells located on the flanks or outside the limits of the gravity minimum, which have not reached salt, have given us data useful in determining the configuration of the structure. Several tests within a few miles of the highest salt well have shown sharp dips in all directions on the top of the salt.

Palynologists date a core of gypsum overlying the salt in the Picacho area as Pleistocene-Pliocene. It is quite likely that the Luke salt and that found in the Red Lake area of Mohave County, north of Kingman, is of the same age. To the north, in adjacent parts of Nevada, salt outcrops in valleys which now are buried by Lake Mead and this salt is of Pliocene age. The significance of this data is that it suggests the occurrence in several valleys of southern and western Arizona of Pliocene sedimentary rocks which hitherto had not been suspected. It also suggests that these rocks were deposited in seas which may be related to the occurrence of the Bouse Formation of western Yuma County, which is believed to be the northern extension of the Gulf of California in middle and late Tertiary time. The occurrence of marine sediments, which are preferred potential source rocks and reservoirs of petroleum, in this part of Arizona may lead to additional exploration for oil and gas when their presence is known by oil finders.

Page 3
Activity Report
Geological Staff
August 11, 1971

Edward Koester (Cont.)

However, the impact of this information may be greater from a psychological standpoint than it is scientifically. Since oil men know that salt domes are frequently associated with large oil fields, they may be attracted to Arizona on this basis alone. For this reason, we have submitted data concerning the salt domes to the Exploration Editor of the Oil & Gas Journal. We may expect publication of this information within the next few weeks.

Jack Conley

SAMPLE CATALOG PROJECT - ARIZONA

As of August 11th, 190 announcements (copy attached) of the availability of the catalog had been sent to oil companies, independent operators, schools, libraries, geologists, hydrologists, geological societies, governmental agencies and trade journals. As of the same date, 190 catalogs had been distributed.

PETROLEUM INFORMATION printed an announcement about the catalog, and The OIL & GAS JOURNAL has promised to do so. It is hoped that some of the geological societies will print announcements in their newsletters, or make announcements orally at meetings. An announcement also appeared in SOUTHWEST OIL & GAS NEWS.

In an effort to stimulate some exploratory interest in the State, a brief mimeographed message (copy attached) about the catalog has been enclosed with each one distributed. This message also has a "plug" for The Arizona Bureau of Mines Bulletin 182, which pertains to coal, oil, natural gas, helium and uranium in Arizona.

Please note that the announcement of the availability of the catalog or index of well samples mentions that many of the water wells penetrated or reached geological formations that can be utilized in subsurface mapping in areas lacking oil and gas test wells. Ed Koester has also noted that our list of water wells for which we have samples contains many wells not on lists of water wells published by the U.S. Geological Survey and the Arizona State Land Department.

OUT-OF-STATE SAMPLES

As mentioned in the July 7, 1971 Activity Report, we have in our sample library more than 740 sets of samples of wells drilled in Colorado, New Mexico and Utah. These sets, with a few exceptions, have been inventoried. The compilation into catalog form is almost complete for Utah.

Page 4
Activity Report
Geological Staff
August 11, 1971

Jack Conley (Cont.)

SAMPLE LIBRARY - COMMISSIONS' OFFICE

Re-arrangement of the samples in the library room has been completed.

RECENT ACQUISITIONS - GEOLOGICAL/GEOPHYSICAL MATERIAL

Structure contour map, Northeast Arizona. Complimentary copy from James Barlow, geologist associated with POMCO MAP CO. This map will be useful in future structure investigations.

Paleontological reports. Thirteen reports obtained from a paleontological laboratory; complimentary. These reports are of value in determining the correct geologic age of Paleozoic rocks penetrated in wildcat wells.

Photogeological brochures. A small supply of brochures was given the Commission by Geophoto Services, Inc. These brochures describe the various kinds of geological and geophysical services offered by this world-wide firm, plus a map showing photogeological coverage in Arizona available currently by purchase. This information may be of value to non-major companies and individuals interested in exploration for oil or other resources in this state.

Geothermal springs and wells. Dr. Jerome Wright gave us a map and tabulation of hot water springs and water wells in Arizona.

Geothermic references. Dr. W. K. Summers, ground-water geologist, New Mexico Bureau of Mines, furnished us at no cost an extract of all references to geothermics in Arizona from his North American bibliography, which is now available at \$52.50 per copy.

Aeromagnetic maps, Arizona. We now have copies of both the total intensity and residual maps at a scale of 1:1,000,000. This project was completed recently. It was under the supervision of Dr. John Sumner, Geoscience Department, University of Arizona.

Base maps, Navajo-Hopi Indian Reservations. The Conservation Branch, U.S. Geological Survey, has given us three maps showing wells drilled for oil or gas on the reservations.

Doctor's dissertation. Joan Baldwin, University of Arizona, has kindly lent us a copy of her dissertation for a doctorate of philosophy degree, geology, pertaining to the Triassic Moenkopi Formation in northern and central Arizona and southeastern Utah. Critical portions of the lengthy dissertation will be reproduced for the Commission's files.

Page 5
Activity Report
Geological Staff
August 11, 1971

Jack Conley (Cont.)

GEOLOGICAL - GEOPHYSICAL COMMENTS

Aeromagnetic maps. Only a limited amount of time has been available for analysis of the aeromagnetic maps. A comparison of the Arizona Geologic map and the aeromagnetic maps, however, quickly established the fact that most of the dominant maxima are reflecting areas of highly magnetic intrusive and extrusive volcanic igneous rocks. And many of the strong minima occur in mountainous areas with no sedimentary or very thin cover of sedimentary rocks. Most of these minima are the result of differences in the magnetic susceptibilities of the Precambrian and igneous rocks involved.

Of exploratory significance, these relationships have been noted in the overall Black Mesa basin in northeast Arizona:

- 1) the overall sedimentary basin is reflected on the magnetic maps as a minimum;
- 2) as magnetic maps in basins normally reflect the basement surface, these maps will be useful in preparing more accurate sedimentary column thickness maps;
- 3) most of the few wildcat wells drilled by major oil companies in the deeper part of the basin are on or close to local maximum anomalies; it is reasonable to assume that most of these wells were located on seismic subsurface structural anticlines; it therefore appears that local magnetic maximum anomalies in the basin may be reflecting structural features warranting exploration;
- 4) the magnetic control will be of value in semi-isolating areas offering stratigraphically controlled accumulations of oil or gas on the east and south flanks of the basin.

By analogy with the Black Mesa basin, there are numerous other strong magnetic minima of considerable areal extent in the Pedregosa basin in Cochise and adjacent counties and in those counties in the Basin and Range Province where appreciable thicknesses of sedimentary rocks possibly offering oil or gas accumulations may be present.

Widespread lava flows in parts of the State have masked effectively the geology of the underlying sedimentary rocks. These flows also cause high magnetic readings, even though the area might be within a basin with a thick sedimentary column. Used in conjunction with gravity meter and geological information, however, some of these masked areas could offer oil and gas potentialities.

Page 6
Activity Report
Geological Staff
August 11, 1971

Jack Conley (Cont.)

Baldwin's Moenkopi dissertation. A preliminary examination of the maps in this dissertation suggested that the sands in this formation might offer stratigraphic traps for oil and gas accumulations in portions of Navajo County. A quick look at the logs of several wells revealed that sand bodies do disappear eastward onto the Defiance uplift. The search for oil accumulations in Arizona to date has been restricted to those controlled by structure. In the future, more emphasis may be placed on the search for stratigraphically controlled accumulations. Some oil has been produced from the Moenkopi in the Virgin field in southern Utah, northwest of Colorado City in Mohave County. Shows of oil and gas have been reported in the overlying Shinarump conglomerate in the Black Mesa basin. The potentialities of these Triassic rocks warrant some investigation at some future date.



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ANNOUNCEMENT

The Commission has available for free distribution to earth scientists and other interested persons an index of samples of drill-bit cuttings and/or cores of 448 wells drilled for oil, flammable gas, helium or stratigraphic information and 1,523 wells drilled for water in the State of Arizona.

Many of the water wells listed fully penetrated or reached geological formations that could be used in the construction of subsurface structure and other types of maps. Most of them are located in areas lacking any control by test wells drilled for oil or gas.

The drill-bit cuttings and/or cores of the wells listed in the index are available for examination in the Commission's library in Phoenix or in The Arizona Bureau of Mines' library in Tucson.



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This complimentary index of samples of drill-bit cuttings and/or cores lists 448 wells drilled for oil, flammable gas, helium or stratigraphic information and 1,523 wells drilled for water in the State of Arizona that are available for examination by earth scientists and other interested persons.

Of exploratory significance to the petroleum industry, many of the water wells listed fully penetrated or reached geological formations that could be used in the construction of subsurface structure and other types of maps. Most of these wells are located in areas lacking any control by test wells drilled for oil or gas.

Relative exploration for oil or gas in Arizona, attention is directed to a 1970 publication by the Arizona Bureau of Mines, Bulletin 182, entitled "Coal, Oil, Natural Gas, Helium and Uranium in Arizona", by H. Wesley Peirce, Stanton B. Keith and Jan Carol Wilt. This publication presents a comprehensive treatment of past exploration, proved accumulations of oil, gas and helium, and the geology of almost wholly unexplored basins offering hydrocarbon-productive potentialities. This bulletin is available from The Arizona Bureau of Mines, Tucson, Arizona 85721, at a cost of \$3.00.

RECEIPTS MONTH OF	RECEIPTS CLASSIFICATION	APPROPRIATED RECEIPTS	UNAPPROPRIATED RECEIPTS	TOTAL ALL RECEIPTS YEAR TO DATE
July 1971 50 00	1 Permits to Drill			50 00
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
50 00	TOTAL CURRENT MONTH RECEIPTS		50 00	XXXXXX
	TRANSFERS IN		-0-	
XXXXXX	BALANCES BROUGHT FORWARD		1,701 83	XXXXXX
50 00	TOTALS - MONTH AND YEAR TO DATE		1,751 83	50 00

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 1971 7,333 16	1 Personal Services	22,593 00	7,333 16		12,259 84
503 01	2 Emp. Related Exp.	2,190 00	503 01		1,686 99
4,360 69	3 Other Operating Exp.	9,350 00	4,360 69	4,391 35	597 96
	4 Prof. & Outside Serv.	425 00			425 00
46 21	5 Travel - State	2,100 00	46 21	1,900 00	153 79
	6 Travel - Out of State	3,500 00			3,500 00
907 92	7 Cap. Outlay - Equip.	2,100 00	907 92		1,192 08
	8 Conserv. Fund - Other				
	9 Operating Exp.				
	10				
	11				
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				
	21				
	22				
	23				
	24				
	25				
	26				
	27				
	28				
	29				
	30				
13,150 99	TOTALS	42,258 00	13,150 99	6,291 35	22,815 66

AGENCY Oil & Gas Conservation Comm. IDENTIFICATION CODE NO.

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 1971</i>
	7111	1 Per Diem: Board Members	1
7,121 00	7112	2 Salaries: Employees	2 7,121 00
212 16	7113	3 Wages: Summer Aides	3 212 16
	7151	4 Industrial Insurance	4
146 93	7153	5 F.I.C.A.	5 146 93
356 08	7155	6 Retirement	6 356 08
	7159	7 Personnel Commission	7
	7215	8 Professional Services: Engineer	8
	7219	9 Other	9
	7221	10 Travel-State: Mileage	10
	7222	11 Subsistence	11
	7223	12 Public Transp.	12
46 21	7224	13 Vehicle Exp.	13 46 21
	7225	14 Reg. Fees, Parking, etc.	14
	7232	15 Travel-Out of State: Subsistence	15
	7233	16 Public Transp., Taxi	16
	7234	17 Airport Parking	17
	7235	18 Reg. Fees, Tel., etc.	18
3,698 92	7251	19 Occupancy: Office Rent	19 3,698 92
	7261	20 Warehouse Rent	20
	7263	21 Warehouse Mtn. & Repair	21
120 00	7272	22 Mtn. & Repairs: Furn. & Equip.	22 120 00
22 18	7280	23 Office Supplies	23 22 18
	7300	24 Field Supplies, Film, Am. Strat, P.I., etc.	24
	7331	25 Printing: Reports, Large Maps, etc.	25
	7332	26 Legal Advertisement	26
	7333	27 Court Reporter	27
	7334	28 Postage	28
193 57	7335	29 Telephone	29 193 57
8 75	7337	30 Drayage, express, etc.	30 8 75
67 27	7349	31 Rental, Misc.	31 67 27
	7360	32 Dues and Subscriptions	32
	7431:	33 Capital Outlay: Office Equipment, Tpr, etc.	33
9 07 92	7433	34 Reproduction Equip.	34 9 07 92
	7434	35 Spec. Equip.	35
250 00	7913	36 Revolving Fund	36 250 00
		37	37
		38	38
		39	39
		40	40
		41	41
		42	42
		43	43
		44	44
		45	45
		46	46
		47	47
		48	48
		49	49
		50	50
		51	51
		52	52
		53	53
		54	54
		55	55
13,150 99		TOTAL	13,150 99

From the Desk of

JOHN BANNISTER

7-7-71

CONFIDENTIAL

To: Commissioners

I am exceedingly sorry to report that Dr. Jerry Wright of the Department of Geosciences, University of Arizona, will probably not continue acting as liaison between the University and the Commission.

Dr. Wright has advised us that for some reason he has been passed over in the normal line of promotion and he has tendered his resignation to the University. However, his resignation was not accepted, but apparently a situation, at best untenable, is the result.

I have not had a chance to discuss Dr. Wright's position with Dr. McCullough, but will do so at the first opportunity.

As you are aware, in the short time he has been with us, Dr. Wright has made some very valuable suggestions and we will deeply feel his loss.

I am sure Dr. McCullough will appoint someone else to fill Jerry's position.



OFFICE OF
Oil and Gas Conservation Commission
STATE OF ARIZONA
4515 NORTH 7TH AVE.
PHOENIX, ARIZONA 85013
PHONE: (602) 271-5161

July 7, 1971

Memo: Commissioners
From: John Bannister

Re: Report of Activity

As of now, the 1970-71 year has officially closed. Our last claims have been signed, however, as you are aware, it will be some time in July before the final payments have been made for certain services. In this respect, we have exercised our option to continue renting these premises. According to our contract of rental, we will pay the first and last months' rent for the year 1971-72 in July.

I am pleased to report that we have completed the index of well samples. This primarily has been the work of Jack Conley and he is to be congratulated upon the contents of this index. We are distributing copies as rapidly as possible. For your convenience, we are enclosing a copy of the catalog for you.

Jim Scurlock has also been updating his map of northeastern Arizona and has been expanding it to the west and somewhat to the east, based upon information generated since our last revision. The new map will not undergo a general mailing, but it will be used in answer to future inquiries of the area covered.

As you have previously been advised, the State Highway Department has made available to the Commission a quonset hut located in the 2200 block of East Van Buren for excess storage of samples. We have transferred many of our cores, duplicate samples and out-of-state samples into this facility. Our remaining samples will be located within the sample room and much critical space therein has been saved by moving all possible into the quonset hut. Consequently, we are in excellent shape as to storage space at this time.

Pursuant to instructions from the Commission, I have contacted Maxwell House Motel in Show Low and made arrangements for the Commission meeting there in August. The necessary rooms have

Page 2
Executive Secretary Report
7-7-71

been reserved for the evening of August 19th and a meeting room made available beginning at 9:30 a.m. the morning of August 20th. Arrangements will be made for our usual get-together for dinner at the Maxwell House the evening of the 19th. Inasmuch as this will be at the height of the Show Low tourist season, we must vacate our rooms by 12 noon or pay an additional fee. The motel was most emphatic as to this point.

Again, pursuant to direction of the Commission, I wrote to the Governor, outlining our concern as to leasing, regulation, exploration for and production of geothermal energy within our State. On June 30th I received a letter from Governor Williams, indicating he had somewhat discussed this problem with Andrew Bettwy, State Land Commissioner, and he has requested that Mr. Bettwy and I get together and discuss the problems involved with geothermal energy. The Governor has requested that I furnish him a memorandum after this meeting has been concluded. I will further advise you as to these results.

Elton Buell and Clare Titus of Arizona Public Service have requested an appointment with us on July 22nd at 9 a.m. in our office here. This appointment is a result of a previous discussion with Arizona Public Service as to oil and gas potential in our State. They were invited to visit our office so that we could show them the help we could give them.

As you are aware, Jamie Deppey will probably leave the Commission early in August. It is her announced intention to permanently retire from work. Needless to say, the loss of this valuable employee will be felt very deeply. We are in the process of seeking a replacement for Jamie at this time.



OFFICE OF
Oil and Gas Conservation Commission

STATE OF ARIZONA
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ACTIVITY REPORT

July 15, 1971

Memo from W. E. Allen, Director
Enforcement Section

The week of July 4 an inspection trip was made covering all drilling and the majority of producing operations within the State. All operations were being conducted in a very satisfactory manner. With the exception of Eastern Petroleum, all operators have installed the required well signs. These signs are very helpful to a newcomer in a particular area. Without the signs it is sometimes difficult to definitely identify a particular well.

The Suburban Companies are progressing very rapidly on their storage project at Adamana. The drilling of one storage well is completed as is their water supply well. They were to spud the second storage well on July 14, 1971. The floor to the brine pit is in the compaction stage. A six-inch line has been installed from the well sites to the brine pits; and, other auxiliary lines are presently being installed.

While on the subject of LPG storage, Aritex Development Corporation is planning to rework one of their storage wells. Also, additional land has been purchased by Aritex in order that they can expand their facilities. The ground has been leveled and prepared for a railroad spur to their loading area.

It is understood that the study of the projected Cal-Gas storage facility west of Phoenix is progressing nicely. Indications are that Arizona may someday be a major area for storing both LPG and natural gas for the west coast market.

Rumor has it around the Holbrook area that Duval Corporation is planning a series of tests in an effort to discover natural gas in that area.

Page 2

Activity Report - July 15, 1971
Mr. W. E. Allen

The writer received a very pleasant surprise a couple of days ago. Ed Obele assured me that he was starting his long awaited test in the Pedregosa Basin of Cochise County. His estimate of starting date is the middle to latter part of August. It was evidenced from Mr. Obele's conversation that he had acquired the necessary funds. This will be a test of great interest to a number of operators. Ed will drill this hole tight, tight, tight! He has assured me that the Commission will be furnished the required information. Everyone with any knowledge of his operations should be very careful not to divulge any information that they might possess.

The test holes for monitoring the seepage of brine at the Southwest Salt Company's installation have been completed. Samples from these holes were sent to the University of Arizona for analysis; and, in the near future a nuclear probe will be run to establish a base for further monitoring.

As mentioned in a previous memorandum, this office had contacted the U. S. Fidelity and Guaranty Company regarding the plugging of six wells belonging to Arizona Helium Corporation. Mr. C. T. Henderson, the original owner of these wells, has assumed the responsibility of plugging these wells; and, the writer witnessed the plugging of four of these holes this past weekend. The remaining two will be plugged by the time you receive this report.

The Cities Service Monsanto #1-A Navajo well in the SE/4 NE/4 Section 21-T40N-R29E Apache County is drilling a 8-1/4" hole below 4700'. I will stretch my neck out by predicting a well of some kind resulting from this operation.

The Cecil E. Cope #1 Bradshaw Fee in the NW/4 NE/4 Section 34-T18N-R4E Yavapai County is drilling a 6-3/4" hole below 992'. The projected depth of this well is currently 1400'. This operator is to commended on his operations. In spite of limited funds and difficulties of about every imaginable kind, he has installed first-rate well control equipment. Should he get a well he has made preparations to control it. This type of precaution is very unusual with a small promotional operator.

The Reuel W. Little #1 State in the NW/4 NE/4 Sec. 34-T16N-R23E Navajo County is drilling at 445'. The rotary rig has given way to a small spudder so progress will be slower than ever.

Two applications have been received from Eastern Petroleum. One application is to drill a well designated as the #1 Kiva Santa Fe in

Page 3
Activity Report - July 15, 1971
Mr. W. E. Allen

the NE/4 SW/4 Section 20N-R28E Apache County. The other application is to re-enter their Santa Fe #6-X in the center of Section 25-T20N-R28E Apache County.

We are in the process of interviewing candidates to replace Jamie Deppey. Jamie is leaving the Commission to raise a family. She will be greatly missed.



OFFICE OF
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July 7, 1971

ACTIVITY REPORT

TO: COMMISSIONERS

FROM: GEOLOGICAL STAFF

James Scurlock

This last month was spent in the revision of our structure map of northern Arizona.

I am continuing to assist Dr. Peirce in editing our forthcoming publication of the geologic well data in our files. This should come to press this fall.

Jack Conley

SAMPLE CATALOG PROJECT

This project has been completed for wells (oil, flammable gas, helium gas, stratigraphic information and water) drilled in the State of Arizona. The catalogs (indexes) of samples of drill-bit cuttings and/or cores have been received, and a preliminary distribution list is being prepared.

Statistically, the index lists 448 oil, flammable gas, helium gas and stratigraphic information wells for which there are samples of drill-bit cuttings available for examination by interested persons in our library or the one maintained by the Arizona Bureau of Mines in Tucson. The water well section contains 1,523 listings for which samples are available in the two libraries. Attention is directed to the fact that many of the water wells are sufficiently deep to have penetrated or reached geological formations or distinctive markers for use in the preparation of subsurface structure and other types of maps incident to a search for oil and gas accumulations. The listing of water well samples will be of interest to hydrologists, and, possibly at some future date, to other earth scientists.

Page 2
Activity Report
Geological Staff
July 7, 1971

Jack Conley (Cont.)

OUT-OF-STATE SAMPLES

We have in this library a total of 740 plus sets of samples of oil and gas wells drilled in Colorado, New Mexico and Utah. Most of these wells are in the Four Corners region. Those affecting directly Arizona geology have been retained in the Commission's library, the others have been stored in our warehouse facility.

We are currently indexing these out-of-state sets of samples. Tabulated lists, by states, will be compiled and distributed to the geological departments of universities and various governmental agencies that might be interested in acquiring some of them for their sample collections.

LIBRARY-COMMISSION'S OFFICE

Re-arrangements of the sets of samples in the library, to permit easier and faster access, will be completed this week.

MAP PROJECT

Relative the base maps of Arizona available from Ammann International Corp., the photogrametry section of the Arizona Highway Department has informed me that: 1) The maps are accurately constructed; and 2) That they are not interested in acquiring them. They anticipate that the future coverage to be obtained through NASA, at a scale of 1"=10,000', with the State Grid System, will be more useful to them.

Such coverage will not be available for several years, and when available, will not show the wells drilled for oil or gas in the State. Serious consideration should be given soon as to what route to pursue to obtain adequate base map coverage for anticipated geological investigations.

GEOHERMAL PROJECT

Dr. W. K. Summers, ground-water geologist, New Mexico State Bureau of Mines and Mineral Resources, one of the authors of a recent paper entitled "Geothermics in North America: Present and Future", has kindly consented to furnish us his bibliography pertaining to geothermics in Arizona. He expects to complete it in a few weeks.

Page 3
Activity Report
Geological Staff
July 7, 1971

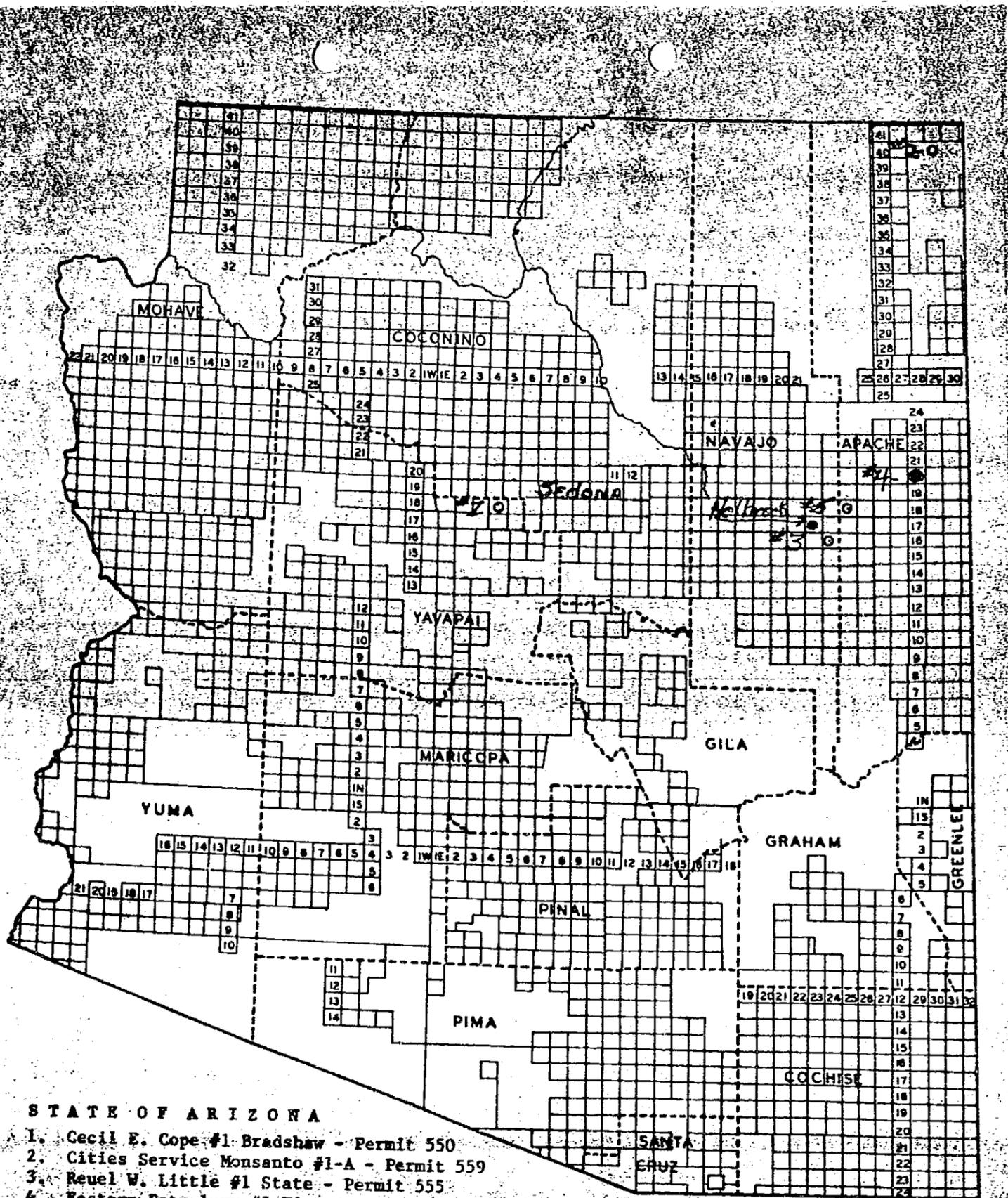
Edward Koester

Work has continued on isopach of the units of Paleozoic rocks, both on the outcrop and in the subsurface. The end result will be a series of maps of the Basin and Range Province and adjacent parts of the plateau area showing the estimated thickness of Cambrian, Devonian, Mississippian, Pennsylvanian and Permian rocks that may be found in the valleys of southern and northwestern Arizona. In other words, when this project is completed, we will be able to give anyone interested in drilling a test well for oil, gas, helium, salt or steam our best estimate of the character and thickness of the rock units to be expected. While we know that our estimates in many cases will prove to be inaccurate, we will be able to help the seekers of these natural resources plan a sound drilling program.

Millions of dollars have been wasted in this state by uninformed "wildcatters" who have started test wells with little or no idea of how deep they should drill, or whether or not they would encounter strata which might be even remotely, potentially productive. In other cases, test wells have been started with equipment which was too small to reach the expected objectives and inadequate to properly test any potentially productive horizons.

If the outlay of funds for 50 or 60 of such ventures had been spent on a half dozen strategically located deep tests in some of our valleys, the determination of the oil and gas potential of Arizona would have been better served. In so far as the Basin and Range Province is concerned, it should be our prime objective to encourage the drilling of such strategically located test wells.

A natural follow-up of the isopach studies is a more detailed report on the petroleum possibilities of each of the counties in the Basin and Range Province. I would suggest that "The Oil and Gas Potential of Cochise County" be the first in this series.



STATE OF ARIZONA

1. Cecil E. Cope #1 Bradshaw - Permit 550
2. Cities Service Monsanto #1-A - Permit 559
3. Reuel W. Little #1 State - Permit 555
4. Eastern Petroleum #1 Kiya Santa Fe - Permit 560
Eastern Petroleum Santa Fe #6-X - Permit 561
5. Suburban Companies #1 Fee Strat - Permit 556
Suburban Companies #2 Fee Strat - Permit 557

Courtesy of
ARIZONA OIL REPORT