U.S. reserves put at 600 billion bbl

Geological Survey concedes its whopping estimate of this nation's petroleum reserves is higher than some, but it offers a stout defense of the figure.

THE United States has a potential source of petroleum amounting to 600 billion bbl, the U.S. Geological Survey says in a report it is preparing as a part of an over-all governmental study of fuel and energy resources.

An interim report on the study is due to be made to the White House soon, with a final report by year end.

The 600-billion-bbl estimate. USGS concedes. is higher than some other published ones and contrasts most sharply with one made by M. King Hubbert as a part of a National Academy of Sciences study.

Hubbert estimated ultimate potential reserves. including past production. to be 175 billion bbl (OGJ. Jan. 21, p. 48).

Said the USGS paper: "Hubbert's estimates are based upon analysis of the rate of discovery. which he believes reached its peak in 1956."

Hubbert's approach. USGS says. "is essentially based on the rate of exploration activity—a phenomenon that bears no relation or yields no clue to how much oil is in the ground."

Then USGS explains why it disagrees:

"The apparent tapering off of the discovery rate around 1956 seems to reflect the tapering off in domestic exploration that has accompanied the surge in foreign exploration and production since the Suez crisis and nothing more.

"The per cent of exploratory wells completed as new producers has remained stable since 1945 and if economic or political conditions should reduce availability of cheap foreign oil and increase interest in domestic exploration, there is no reason to believe that the cumulative discovery curve would not once again resume its upward swing."

The USGS paper also challenges Hubbert's remarks on secondary recovery.

"It is interesting to note," USGS says, "that the sum of past production of petroleum (70 billion bbl). proved reserves (32 billion bbl). reserves in known pools recoverable by established techniques (16 billion bbl), and reserves in known pools recoverable by new methods (40 billion bbl) is 158 billion bbl. If his (Hubbert's) estimate of 175 billion bbl was correct, it would mean that roughly 90% of the potential reserve has already been discovered.

"That this is highly improbable is indicated by the fact that the ground favorable for the occurrence of petroleum is as yet explored to only a minor degree."

Costs. The USGS study also goes into the question of cost and its possible impact on development.

USGS notes that most forecasters call attention to the greater costs that will be involved in tomorrow's search of deeper horizons and in smaller. marginal pools.

But this may not necessarily rule out further development, according to USGS.

"Whether it will actually be more costly when the time comes to use it is another matter, however, for the problem of finding and producing it seems no more difficult compared to present technology than the discovery and deep production of today must have appeared when compared to the technology existing a few decades ago.

"The price of crude petroleum, measured in constant dollars, has remained remarkedly constant over the years, in spite of the fact that the average depth of exploratory and production wells has increased steadily and that secondary-recovery methods too costly to use formerly have been adopted.

"It seems safe to assume that technologic advances over the years to come will prevent costs from rising much above present levels."

How USGS views future-energy picture

THERE are four major conclusions in the draft of a paper prepared by the U.S. Geological Survey for submission to the White House as a part of an over-all fuels and energy resources being made under the direction of the Office of Science and Technology.

The conclusions are:

Known domestic supplies of fossil fuels minable at or below present prices are more than adequate for foreseeable needs through the Twentieth Century. Large additional resources exist and if the research needed to advance fossil-fuel technology is pressed, low-cost supplies should be available for many more decades at prices comparable to those prevailing now.

Minable reserves of uranium are large. and much larger tonnages of deposits of the same quality will be discovered on further exploration. At present low rates of reactor efficiency, the energy available from these sources is small. although ample to support a budding nuclear power industry for a few decades . . ."

If breeder technology is developed for commercial use. enormous supplies of energy will be available "for millenia to come." The bulk of these supplies occurs in low-grade sources—phosphorites, shales, and igneous rocks.

If controlled fusion becomes economical, energy resources of a magnitude that staggers the imagination will be available from lithium in relatively shallow parts of the earth's crust. and especially from lithium and deuterium in the ocean.

USGS estimate. In arriving . a figure of 600 billion bbl, as compared to Hubbert's 175 billion bbl, USGS used this procedure:

- Proved domestic reserves of petroleum and natural-gas liquids were estimated in March 1962 by the American Petroleum Institute to be 32 billion bbl.
- Add to that an additional 16.3 billion bbl which the Interstate Oil Compact Commission has estimated could be recovered by established methods, plus another 40.2 billion bbl which IOCC says could be recovered from known pools by use of new secondary-recovery methods (perhaps at increased cost).
- Add an estimate by A. D. Zapp that undiscovered recoverable resources total 200 billion bbl and undiscovered marginal resources of petroleum total 300 billion bbl.

The grand total of those figures, then, is around 600 billion bbl.

"This estimate," USGS explains, "is based on the assumption that about 50% of the oil in the ground will be recovered.

Natural gas. The USGS paper puts the estimate of potentially recoverable natural gas at 2,300 trillion cu ft, compared with Hubbert's estimate of an ultimate reserve of 1,000 trillion cu ft.

Natural-gas liquids. USGS tends to side with Zapp again.

Zapp's figure of 60 billion bbl of undiscovered marginal resources, coupled with 7 billion bbl in proved reserves and undiscovered recoverable resources of 30 billion bbl, far exceeds Hubbert's estimate that ultimate reserves, including past production and proved reserves, are about 30 billion bbl of which only about 17 billion are unrecoverable.

Shale oil. USGS finds that oil-shale deposits in the U.S. contain a "tremendous" amount of oil.

It notes an estimate that known recoverable reserves total 50 billion bbl, assuming 50% recovery. Reserves considered are in beds 25 ft thick and less than 1,000 ft under the surface which contain 30 gal of oil per ton.

"Known marginal resources and undiscovered marginal resources are estimated to be 2,000 billion bbl and 4,000 billion bbl, respectively," the report states.

WATCHING WASHINGTON

with Clyde La Motte

New FPC member may cast deciding vote on key gas issues

IT WILL BE interesting—and important—to note the course David S. Black takes as the newest member of the Federal Power Commission because his vote is likely to be the deciding factor in some key decisions.

There is no outright split or definite voting pattern at the commission now, but in an increasing number of cases Commissioners L. J. O'Connor, Jr., and Harold Woodward have dissented from the majority ruling by the three other commissioners. Example: last week's O'Connor-Woodward dissent in the United Gas case involving intrastate and interstate sales (see story on Page 67).

With the departure of Commissioner Howard Morgan, a 2-2 division on such issues was created. That is why Black's vote will become particularly significant.

One can assume from his background and political playmates that Black is likely to side generally with Chairman Joseph Swidler and Commissioner Charles R. Ross. But only time will tell. As those who have slogged around in the Army are aware, you never know how a private is going to react when he's promoted to corporal.

Area hearing nears end, but don't expect decision soon

IT LIKELY WILL BE near the end of the year, at best, before there will be a hearing examiner's opinion in the Permian basin area-pricing area.

The hearing itself is nearing an end, possibly by mid-September or shortly thereafter, but then each side will require time to submit summary briefs and reply briefs. Following that, the examiner will begin drafting his opinion.

So there's a long road ahead.

Long-standing law casts shadow over public-land leases

SOMEONE RECENTLY CALLED Interior's attention to a long-existing law which, if enforced to the hilt, could create endless headaches for many companies with public-land leases.

It is a 1920 statute which states that no alien is permitted to hold any interest in any U.S. public land.

Thus, if an alien owns as much as a share of stock in a U.S. company, that company presumably would not be eligible for a public-lands lease, including federal offshore areas.

Interior's legal experts say there is little room for "interpretation" of the statute, that it says what it says and that's all there is to it.

Obviously, enforcement of the statute would be a tremendous administrative task, both for a company and for the Government.

An Interior spokesman concedes this possibility, saying the only apparent recourse would be to seek nullifying legislation.

There is one other escape valve. The law does not apply if the alien's country has a reciprocal agreement with the U.S. under which a U.S. citizen could obtain similar rights in that country.

Such agreements are in existence with quite a few nations, including England, Netherlands, Israel, Argentina, Greece, France, Japan, Mexico, Canada, and others. But you will note that few of those countries have much oil production.

Nothing may develop from the current flurry, but as long as the law remains, there will be potential problems.

TELEPHONE CALL FROM JOHN S. COLEMAN

SEPTEMBER 25, 1963

In reply to my telephone call to him on September 20, Coleman called me back to give me a progress report about his efforts to obtain a copy of the memorandum mentioned in the Oil and Gas Journal in the issues of September 2, pages 78-79, and September 16, page 63. When Coleman attempted to obtain a copy of this report from Wiesner's office, he learned that all Hell had cut loose over the report in Washington. Bill Thurston of the Geological Survey stated that the report was definitely not an official report of the U.S.G.S., that McKelvey had, in fact, been on loan to Wiesner's office and the Geological Survey did not even have a copy of the report. Furthermore, Wiesner's office stated that somebody had leaked the information to the Oil and Gas Journal. The upshot of it seemed to be that Wiesner's office agreed that I was entitled to have a copy of the report because of the mention that had been made of me and my estimates in the story in the Oil and Gas Journal. It was suggested that if they could not legitimately get a copy of the report to me on any other basis that they might wish to refer it to me as referee.

I told Coleman that I was on a lecture tour before the Society of Petroleum Engineers and that I had just talked on this subject before a quite distinguished petroleum audience in Dallas on Monday night. I, of course, referred to the recent stories in the Oil and Gas Journal and had presented my own analysis of the reserve situation. I added further that there was no disposition whatever in a half hour's discussion on the part of the audience to challenge my analysis. The general reaction to the 600 billion barrel figure attributed to the Survey was that it was completely unrealistic. I mentioned the fact that I had spent the weekend just prior to this reviewing the whole problem with considerable attention given to the possibility that I might be seriously wrong. Nevertheless, every line of evidence that I could find simply failed to substantiate the higher estimate. I told Coleman that I had no interest whatever in proving that my figure was right, but that this question is of paramount importance with respect to government policy, and it is so important that we simply cannot afford to be wrong.

[M.K.H. file memo, Shell Development Company, Houston, Texas. John S. Coleman, National Academy of Sciences, had been staff secretary for the NAS Committee on Natural Resources.

M. King Hubbert
March 24, 1975]

the OIL AND GAS JOURNAL

Vol. 61, No. 43 October 28, 1963

TULSA OFFICE
211 South Cheyenne
Box 1260
Phone LUther 4-4411

George H. Weber . . . . . Editor
Henry D. Ralph . . Chief Editorial Writer
Ted A. Armstrong . . . . . News Editor
Gerald L. Farrar . Engineering Editor
Frank J. Gardner Exploration Editor
W. L. Nelson Technical Editor
Lynn M. Nichols Presentation Editor
John C. Casper Economics Editor
W. B. Bleakley Production Editor
W. A. Bachman . Marketing Editor
John C. McCaslin Geological Editor
John P. O'Donnell Pipeline Editor
C Dudley Johnston Art Director
Norman K. Baxter Asst. News Editor
Robert B. Bizal Editorial Research

Kenneth W. Brooks Gas-Processing Editor
Edward A. Martin . . . . District Editor
Leslie C. Rogers . . District Editor
Robert G. Burke District Editor
Sherry Turner . District Editor
Terry C. Barber District Editor
Earl Seaton . Equipment Editor
Max L. Batchelder Asst. Pres. Editor
Helen Brown Editorial Assistant
Alice Burt . . Editorial Assistant
Ailleen Cantrell . . Editorial Assistant
Margaret Higgs Editorial Assistant
Jane Adams Editorial Assistant
Helen Hudlin Editorial Assistant
Jo Jeanne London Staff Artist

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-1910

D. H. Stormont Refining Editor
Paul Swain International Editor
Gene T. Kinney East Coast Editor
Ray G. Gibson Asst. International Editor

DALLAS OFFICE
1238 Mercantile Bank Building
Phone Riverside 8-5701
Robert J. Enright . . . Southwest Editor

LOS ANGELES OFFICE
650 South Grand Avenue
Phone MAdison 2-0722
Carl J. Lawrence West Coast Editor

HOUSTON OFFICE
802 American Investors Building
Phone CApitol 4-7726

La McGhee . . . . . Drilling Editor
Howard M. Wilson . Gulf Coast Editor
H. C. Bozeman Gulf Coast Eng. Editor
Hugh S. Pylant Petrochemical Editor

WASHINGTON OFFICE
768 National Press Building
Phone District 7-1710
Clyde La Motte Washington Editor

BUSINESS STAFF

P. C. Lauinger . . . President

S. H. Rourke Executive Vice President
Mitchell Tucker Vice Pres. and Adv. Mgr.
Hanson B. Pigman Vice Pres., Circulation
Paul McBride . . Production Manager
William A. Mueller . Mgr. Industry Census

ADVERTISING STAFF

TULSA OFFICE
211 South Cheyenne Avenue
Phone LUther 4-4411
Harry B. Bullen . . . District Manager

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-1910
E. S. Klappenbach Eastern Manager
William DeJernett Representative

PHILADELPHIA OFFICE
1509 Land Title Building
Broad and Chestnut Streets
Phone LOcust 3-0118
John W. Meany, Jr. . . District Manager

DALLAS OFFICE
1238 Mercantile Bank Building
Phone Riverside 8-5701
Fern G. Hollingsworth . District Manager

HOUSTON OFFICE
802 American Investors Building
Phone CApitol 4-7726
John M. Spears Gulf Coast Manager
Eric F. Jeter . . Representative

DETROIT OFFICE
302 Northland Towers Office Building
15562 Northland Drive
Southfield, Mich. (Detroit Suburb)
Phone 356-3503 (Area Code 313)
John D. Yoder District Manager

CHICAGO OFFICE
105 West Madison Street
Phone CEntral 6-2537
Philip S. Griffin . . . District Manager
Karel Wegkamp . . . District Manager

LOS ANGELES OFFICE
650 South Grand Avenue
Phone MAdison 2-0722
George O. Ruppert . . . . District Manager

PITTSBURGH OFFICE
Law & Finance Building, 429 Fourth Avenue
Room 1505
Phone GRant 1-5847
Ernest S. Holzworth . . District Manager

ENGLAND
67/68 Jermyn Street, St. James's,
London S.W. 1. Phone TRAfalgar 6318
Max Holsinger . . . Director International
Sales Operations
A. T. Chapman-Purchas, Ian Goulden,
and John Thornton
11 Tewit Well Road, Harrogate, Yorkshire
P. W. B. King
Phone Harrogate 69212

WEST GERMANY
Huttenstrasse 17, Am Ernst-Reuter-Platz,
Düsseldorf. Phone Düsseldorf 10493
Max F. Holsinger, Director International
Sales Operations
Dr. Diethart Helmann, E. Hillerbrand,
and Herbert Haibt

Subscription rates to the petroleum industry United States and foreign, 1 year, $6.00; 2 years, $10.00; 3 years, $12.00. Single copies $1.00. Back copies when over a year old, $2.00.

Member
Audit Bureau of Circulations
Associated Business Publications

THE DAY

USGS estimates not official

Dear Sir:

I have had several inquiries concerning the article on "U.S. Reserves Put at 600 Billion Bbl" (OGJ, Sept. 2. p. 78).

The nature of the inquiries suggests that some clarification is needed in regard to the circumstances surrounding the preparation and distribution of the report mentioned in the article.

First of all, the "report" was one of a considerable number of individual papers prepared at the request of the Office of Science and Technology by specialists in their respective fields serving as individual consultants.

These were designed to assist the staff and advisers of that office in the preparation of an interdepartmental energy study. A major objective of the study was the definition of the size and scope of a national research effort in this field.

The papers were prepared, under rather rigid time limitations, as working papers that would not necessarily be used in the final report.

The one on which the article was based represented an effort to extend estimates of national productive capacity made by A. D. Zapp several years ago to the more comprehensive subject of ultimate resources.

I have recently learned that these papers were sent by Dr. Jerome B. Wiesner's office to a number of individuals and organizations both in and out of Government for review and comment. This was done in the expectation that the responses obtained would assist in preparation of the final report.

Under these circumstances, I think it's fair to say that the document should not be characterized as an "official Geological Survey report." It and the several other papers which survey members were requested to prepare were certainly not so regarded by me.

And I particularly would like to dispel the impression that some may obtain that the paper was a planned rejoinder to King Hubbert, who is a friend of long standing.

I suppose in one sense that the survey might feel complimented by the implication that working papers

and interim studies of this sort are of sufficient import to be regarded as "official."

But it is probably confusing to much of the public that within the past few months there have appeared published references to two such disparate "official" reserve estimates as the David White estimate made many years ago on the one hand, and the present one on the other.

Perhaps the best conclusion that can be drawn from this current interest in, concern over, the magnitude of our resources of the fossil fuels is that there is a very real need for additional research designed to make it possible to improve our estimates through better knowledge of the origin, nature, and localization of these substances.

So far as an "official" Geological Survey position in regard to resources is concerned, there is "a demonstrable relationship between the level of research efforts in geology and the raw material productivity of the country."

I suspect that at present this only warrants estimates that encompass a range of figures, rather than a single arbitrary one.

Thomas B. Nolan
Director
U.S. Geological Survey

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

OCTOBER

27-30 National Lubricating Grease Institute, annual meeting, Pittsburgh-Hilton Hotel, Pittsburgh.

29-31 Corrosion and Pipeline Institute, Southwest Kansas Center, Agricultural building, Seward County Fairgrounds, Liberal, Kan.

29-31 National Petroleum Refiners Association, refining-technology question and answer session, Continental Hotel, Kansas City.

30 Athabasca Oil Sands Conference sponsored by Edmonton Geological Society, Research Council of Alberta and Alberta Society of Petroleum Geologists, Northern Alberta Jubilee Auditorium, Edmonton, Alta.

30-31 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

30-Nov. 1 Gulf Coast Association of Geological Societies, thirteenth annual meeting, Captain Shreve Hotel, Shreveport, La.

NOVEMBER

1 Natural Gas Processors Association.