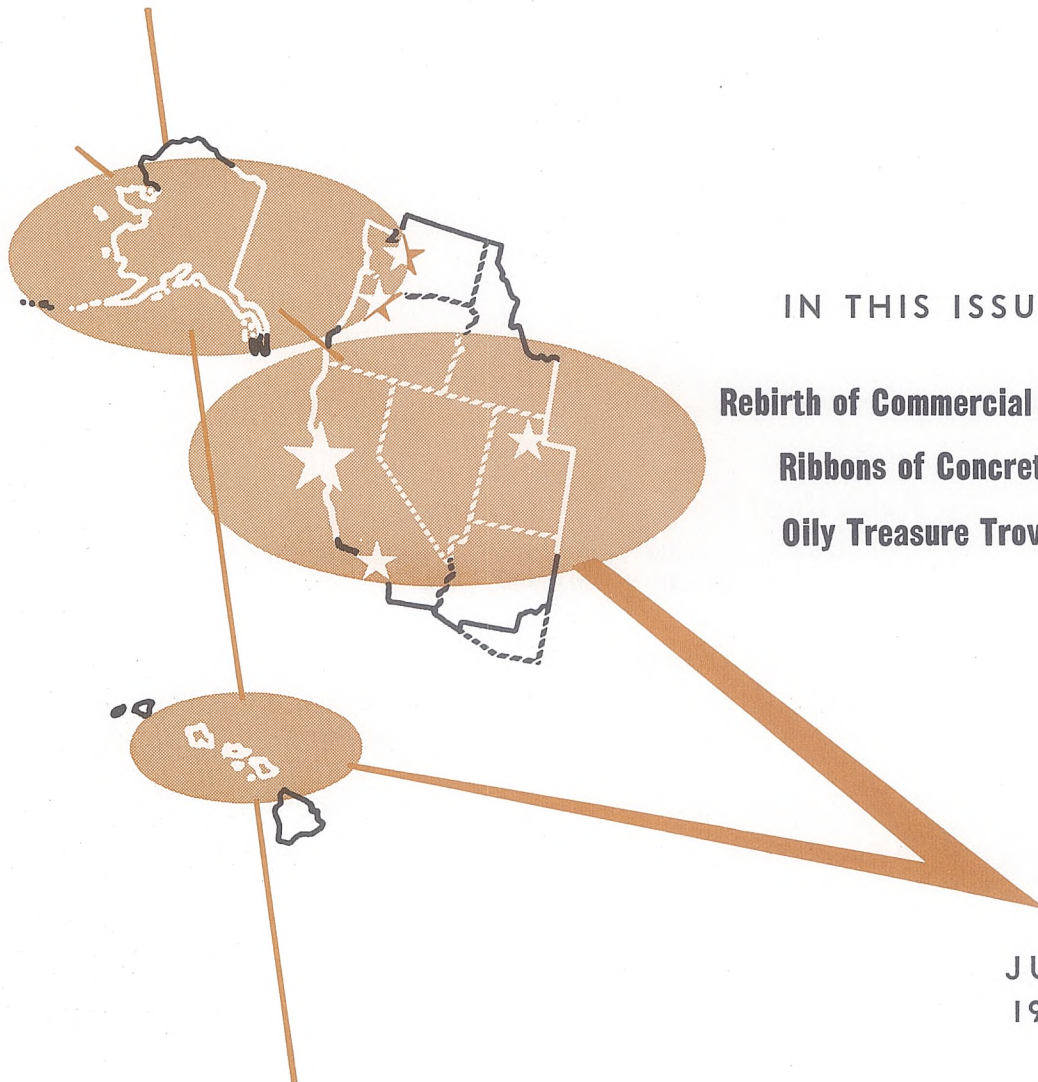


FEDERAL RESERVE BANK OF SAN FRANCISCO

MONTHLY REVIEW



IN THIS ISSUE

Rebirth of Commercial Paper

Ribbons of Concrete

Oily Treasure Trove

JULY
1968

Rebirth of Commercial Paper

... A major money-market instrument of the turbulent 20's scores a remarkable resurgence in the soaring 60's.

Ribbons of Concrete

... Gasoline and auto taxes pay for 41,000 miles of interstate highways, and for 3½ million miles of other roads as well.

Oily Treasure Trove

... Enough petroleum to meet the nation's needs for centuries to come is locked within Green River shale ... How to get it out?

Editor: William Burke

Rebirth of Commercial Paper

The recent commercial-paper boom demonstrates how well the flexible U.S. financial system can respond to new challenges by rehabilitating traditional financial instruments. Commercial paper was a major borrowing instrument immediately following World War I, but its importance then began to decline. Even with its renewed growth after World War II, the 1919 peak in outstandings was not regained until 1951, and at the end of 1960, outstandings totaled only \$4.5 billion.

But commercial paper has scored a sharp resurgence during the present decade. Outstandings at the end of May 1968 reached \$17.8 billion (seasonally adjusted), or about four times the end-1960 figure—and outstandings have doubled within the last 2½ years alone. Commercial paper thus has become a new source of finance to industrial concerns and a renewed source of competition for the commercial banks.

Short-term unsecured debt

Briefly, commercial paper is short-term, unsecured corporate debt. The maturity date is usually under nine months; if it is longer, the issue must be registered with the Securities and Exchange Commission. The commercial-paper market is organized so that once the concern has become a recognized issuer of paper, it can obtain funds with a minimum of formality and delay. Generally high credit standards must be met before a company's paper will be accepted. Commercial paper is relatively riskless, and thus carries interest rates just above those on Treasury bills and bankers' acceptances.

Of the two types of commercial paper—direct (“finance”) paper and dealer (“industrial”) paper—the former is the more important category in terms of dollar volume, accounting for over two-thirds of total outstandings. Direct paper is sold by the larger finance companies through their own sales organizations; hence the name of “finance” paper. Moreover, it is sold directly to purchasers, with banks and securities dealers acting only as agents. These finance companies stand ready to issue paper in the amounts and maturities specified by the purchaser at a posted rate. Maturities can be as short as 3 days.

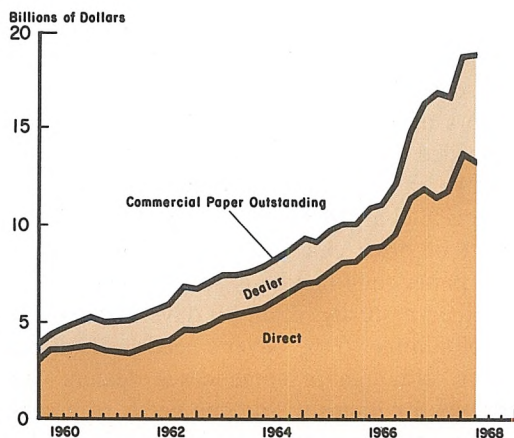
In practice, only the largest finance companies have the financial standing to guarantee a favorable customer reception for such unsecured issues. Furthermore, only they have the ability to utilize such large volumes of funds regularly. For the largest sales-finance companies, commercial paper provides about a quarter of their total financial needs—more, indeed, than they obtain from bank loans.

The second category, dealer paper, is as its name implies sold only through dealers. These dealers buy on their own account from issuers and then sell to customers, and are rewarded for their efforts by the ⅛-¼ percent spread between the purchase price and the price charged buyers—plus or minus the effect of price changes on their inventories. The paper they handle is sold in blocks of a specified maturity, often 30 days. The paper is not tailored to the buyer's needs as is direct paper, although in some cases dealers can arrange for issues to suit the needs of a specific buyer.

For the issuer, the dealer plays a key role by providing advice about maturity dates and appropriate rates, and then by marketing the issue. For the buyer, the dealer helps not only by obtaining securities with proper maturity but, most important, by assessing the credit standing of the issuer. But issuing companies—except the very largest concerns—must establish bank lines of credit equal to their outstanding issues.

These safeguards have helped maintain credit standards, so that there have been no major losses since the 1930's. As a consequence, interest-rate differentials are very narrow between prime dealer paper and other money-market instruments, with rates on such paper typically running $\frac{1}{4}$ to $\frac{3}{4}$ percent above equivalent Treasury-bill rates. As another consequence of these rigid credit requirements, only about 400 firms are recognized as qualified issuers of commercial paper, mostly in manufacturing. For this reason, dealer paper is often called "industrial" paper, although the smaller finance companies also issue through dealers rather than directly.

Both types of commercial paper post sharp gains in recent years



Recent trends

The trend in direct paper has been strongly upwards over the past decade, with outstanding rising on the average by 20 percent annually. This upsurge primarily reflects the growth in consumer credit and the resulting expansion of sales-finance firms' financing requirements. It also reflects the entry into the field of new direct issuers, with their greater emphasis upon commercial paper as a regular source of funds.

The strength of the underlying economic expansion since 1961 has also contributed to this expansion, since the volume of direct paper usually declines only in recession years, when finance companies' own borrowing needs fall off as consumers retrench. Moreover, the severe monetary restraint in the later stages of this expansion has led these companies to rely more heavily on direct issues, even though most firms normally try to maintain their existing borrowing arrangements with commercial banks also.

Nonetheless, the most interesting developments recently have been in the smaller category of dealer paper. Until well into 1966, the volume of dealer paper exhibited no upward movement—if anything, it had been drifting downward during the four preceding years. But the monetary "crunch" of 1966 and the continued monetary restraint since then has turned many non-financial corporations toward the commercial paper market.

Finance companies had always been willing to rely heavily upon commercial paper, so monetary conditions since 1966 have merely reinforced an existing trend for direct paper. But with dealer paper, there was a distinct break with the past. Not only did existing issuers increase their borrowings, but new borrowers appeared and began to issue paper too.

In the second half of 1966, the volume of outstanding dealer paper jumped almost

50 percent, rising to \$3.24 billion by year-end. During 1967, outstandings jumped about 60 percent more, to \$5.14 billion by year-end, and the rise has continued strongly into 1968.

In 1965, there were only 335 issuers—no more than in 1957—but by the end of 1967 there were 391. Significant changes also occurred in the composition of borrowers. Between 1965 and 1967, the number of manufacturing borrowers increased by over a third and, perhaps even more indicative of increased interest by new borrowers, the number of public utilities in the market jumped from 3 to 36.

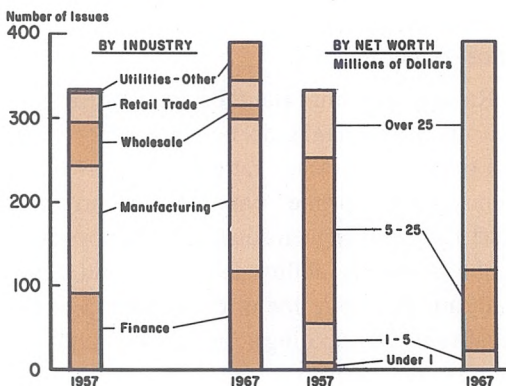
These developments, especially the sudden growth of dealer paper and the entry of new firms into the field, help explain the recent attention given to commercial paper in the financial press. For corporations which are borrowing or lending money, commercial paper is seen to have definite advantages, either as a source of funds or as a liquid asset. In some respects, the market can be considered as the nonbank-corporations' counterpart of the banks' Fed-funds market.

Yet all the comments have not been favorable. Some commercial bankers, for example, have expressed concern as they have seen important customers turn away from bank loans to do their financing directly through commercial paper, and some have worried about the threat to their time deposits because of the existence of commercial paper as an alternative source of funds. But these questions require more detailed analysis before it is possible to assess their overall implications for the market.

Advantages for the lender

Commercial paper, being a money-market instrument, is designed to meet the demands of lenders of short-term funds. Banks, especially smaller country banks, have traditionally been an important source of demand for

Growing number of firms, especially manufacturers, now issue paper



commercial paper, because of the safety and liquidity of this type of asset. But recently corporate buyers have replaced banks as the principal source of demand, and now hold an estimated 60 percent of total outstandings. This demonstrates the increased sophistication of corporate treasurers, with their increased skill in managing cash flows to minimize idle funds.

Corporate treasurers have steadily reduced their cash balances over the years, mostly through their increased efforts to find suitable short-term investments. Commercial paper, both direct and dealer, fits into this scheme as a safe, liquid asset, competing directly with other money-market instruments. Being unsecured, it is not a perfect substitute for Treasury bills, and thus it bears a higher yield in compensation for the greater risk. But the character of commercial paper makes this risk minimal, so that commercial paper ranks close to Treasury paper as a desirable liquid asset.

The low risk attached to commercial paper is related to the high market standards already noted. These standards are maintained by independent rating and by the dealers themselves. The rating agency for commercial paper, the National Credit Office (a division of Dun and Bradstreet), assigns

grades to corporate paper only after thorough analysis of the issuing corporations' financial statements. In addition, dealers themselves watch closely the companies whose paper they sell.

Ratings are important because corporate treasurers and banks do not buy paper with less than a "desirable" rating and many limit themselves to "prime" paper. Each borrower must have sufficient resources to remove any doubt about its ability to repay, and normally must have a line of credit with a bank equal to its outstandings, though this requirement is often waived for blue-chip firms. Because of these financial requirements, then, only the larger companies qualify; over two-thirds of all issuing companies have a net worth of \$25 million or more, and the rest are generally subsidiaries of larger companies.

Apart from low risk, the major advantage of commercial paper is its liquidity. This is not achieved through a formal secondary market, but rather through the provision of maturities which closely meet the needs of lenders. In the case of direct paper, the lender can specify the *exact* maturity required, down to three days if desired. While buyers are expected to hold their paper until maturity, the contracts contain "buy-back" provisions whereby the issuer agrees to repurchase the paper without capital loss, except for adjusting the yield to the shorter maturity.

For dealer paper, the practices are somewhat different. This paper is ordinarily sold in blocks to dealers, with the maturities based on the dealer's assessment of market needs. In some cases, a buyer can arrange for a specific issue, although this is not the usual practice. Again the expectation is that the buyer will hold his purchases until maturity. There are no formal "buy-back" commitments, although dealers will on occasion repurchase paper from customers experiencing unex-

pected needs for cash. A high degree of liquidity is normally achieved by the short maturities of the issues, with repurchase available in need. Yet, as a result of these different arrangements—and, in some cases, more risk—prime dealer paper bears a yield of about $\frac{1}{4}$ percent above prime direct paper.

Direct commercial paper has an edge over Treasury bills in that it offers maturities exactly matching the needs of the lender. (Treasury-bill repurchase agreements offer similar results, but these entail some additional costs.) In addition, a buyer who regards prime direct paper as a riskless security would find that its higher yield makes it the preferred short-term investment. For those prepared to accept more risk and less exact scheduling of maturities, the various grades of dealer paper offer even higher yields.

Advantages for the issuer

The issuer of commercial paper has obvious advantages: low relative cost, and ease of selling issues. But these advantages are not open to all prospective borrowers. The first barrier is the amount of financial strength required of paper issuers. High standards are necessary if an issuer wants his paper to be considered practically as riskless as Treasury bills. A low borrowing cost implies low risk, which in turn implies high credit standards. Thus, only large, financially secure companies qualify as issuers.

To obtain the lowest possible interest rate the issuer must sell direct paper, and here the requirements are even higher. Quite apart from unquestioned financial standing, which dealer issuers have, the company must have the ability to handle outstandings of at least \$50 million in order to justify the expense of a separate sales organization and a constant presence in the market. All direct issuers today are large sales-finance companies with outstandings running into several hundred million dollars.

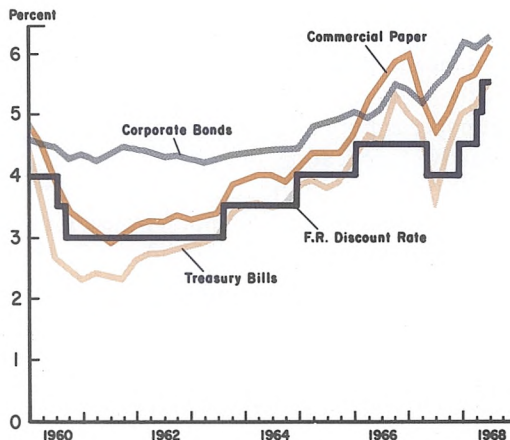
For such firms, the commitment to issue tailored maturities is not a problem since the object is to obtain a regular flow of funds. Minor management problems may occasionally arise, in the sense that inflows of funds may be too heavy at times. While the issuer can always lower its rate slightly to reduce purchases, the need to meet regular customers' demands means that it will generally have to be close to the going market rate and, if necessary, re-invest in other securities any excess funds from the sales of its own issues.

But most corporations are not in a position to issue directly, either lacking the financial size to make their issues acceptable or, more typically, lacking the ability to handle large amounts of funds on a continuing basis. The smaller finance companies face the first limitation, and most industrial issuers come under the second.

The industrial issuer traditionally uses paper to meet temporary seasonal needs; for example, canning companies during the processing season. In this case, commercial paper supplements normal sources of finance, as borrowers continue to rely upon bank loans for their regular needs. Other companies may borrow so as to delay going to the market for long-term financing. Part of the recent increased borrowing by public-utility firms is of this longer-term, but still temporary type. Moreover, normal SEC registration requirements for issues under 270 days can be waived only when funds are raised for temporary additions to working capital. It may sometimes be difficult to determine where "temporary" borrowing shades into "permanent" borrowing, but nonfinancial firms generally still try to limit their borrowing in the commercial-paper market to temporary purposes only.

With dealer paper as with direct paper, the practical advantage to the issuer is the low relative cost. There are further advantages.

Commercial-paper rates move in tandem with Treasury-bill rates



The dealer provides advice about timing and maturities and handles the actual selling of the issue. The dealer buys the issue and thereby supplies the company immediately with its funds and relieves it of the task of finding buyers.

A company issuing dealer paper, unlike a direct borrower, is able to suit the timing and maturity of each issue rather closely to his financing needs, since there is no commitment to issue regularly. Once the borrowing company has become an accepted commercial-paper issuer, it encounters few borrowing formalities and finds a very flexible borrowing instrument ready at hand. Besides, there are some indirect benefits. A small regional company, once its name becomes known and accepted by large investors through this medium, finds it easy to market subsequent long-term issues. Finally, there is the insurance element embodied in being a regular issuer, in that commercial paper is available as an alternative source of funds should monetary restraint once again slow down or dry up the flow of bank loans.

Cause for concern?

The sharp expansion of the commercial-paper market provides a prime example of the process, hastened by rising interest rates, whereby corporate treasurers find more efficient means of managing their cash positions. On the level of the individual firm, commercial paper is both an attractive source and an attractive application of funds. Temporarily excess funds can be readily invested for a specified period, and temporary needs can be readily financed at minimal cost. Therefore, it is not surprising that the market has expanded as its advantages have become known. This rapid growth, however, has created some uneasiness concerning its impact on the commercial banks.

Since commercial paper outstandings have roughly doubled within the past 2½ years, substantial sums obviously must have been diverted from other institutions—primarily the commercial banks, the largest alternative source of short-term finance. The diversion is not so obvious in the case of direct issuers, since bank finance has been a minor source of funds for the large sales-finance companies for some time. Of course, these companies have sharply increased their outstandings, because of their rising need for funds to finance the higher volume of consumer purchases.

Developments in dealer paper, however, suggest a stronger movement away from

commercial-bank financing. More new borrowers have entered the dealer side of the market—public utilities, for example—and these are firms which until now did not issue commercial paper, but instead relied primarily on banks for their short-term financial needs. While examination of any individual company's financial statements may not reveal a clear shift away from bank loans, non-financial corporations as a group have tended recently to rely much more heavily than heretofore upon the commercial-paper market. Thus, dealer paper outstandings have almost tripled since the end of 1965, to about \$5.7 billion today—and this is an increase to warrant some concern by the banks.

In sum, the sudden expansion of the commercial-paper market is consistent with recent developments in financial markets generally. This development, like other recent changes, reflects the emphasis on effective cash management, the rise of new financial instruments, and the diversification of sources of finance. In some cases, these innovations have helped the banks' competitive position—time CD's, for example. Elsewhere, as in the commercial-paper field, the changes have been partially at the banks' expense. But no financial system and no financial institutions can expect to avoid the consequences of change. In most cases, the net result has been to evolve a more complex but more efficient financial system.

Robert Johnston

Publication Staff: R. Mansfield, Chartist; Karen Rusk, Editorial Assistant.

Single and group subscriptions to the *Monthly Review* are available on request from the Administrative Service Department, Federal Reserve Bank of San Francisco, 400 Sansome Street, San Francisco, California 94120

Ribbons of Concrete

The 41,000-mile Interstate Highway System — centerpiece of the nation's road network — is the most extensive long-range road-building program ever undertaken. The System, planned for completion in 1972, will link all major metropolitan, industrial and agricultural areas in this country and also connect with the major continental routes of Canada and Mexico. Although this vast network will comprise only about 1 percent of the total U.S. highway mileage, it will carry more than 20 percent of the nation's traffic. Nearly 26,000 miles of the System are now in use.

The nation contains some 3½ million miles of highways, roads, and streets, whose construction and maintenance is supported generally through state-local gasoline taxes and motor-vehicle fees. But Federal support is increasingly important, especially in the Interstate Highway System and the ABC System of other primary, secondary, and urban routes. Over the 1957-67 period, Federal aid in the construction of those two systems amounted to \$34.3 billion, with the West receiving 17 percent of that total.

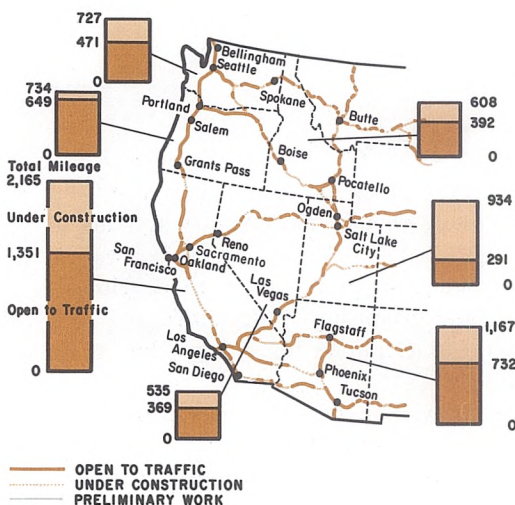
The Federal role

Federal funds have helped support rural and (later) urban road-building for the past half-century. But the present Federal role was delineated only in 1944, when the Federal Aid Highway Act provided for a national system of interstate highways as part of a primary road network connecting the principal metropolitan areas, and industrial centers.

The system was not formally designated until 1947, when it was established with a total of 37,700 miles, 4,400 of them in urban areas. The law set the system's maximum mileage at 40,000 miles, but failed to provide enough funds to complete the system within any predictable time limit. Initially, Federal aid to the Interstate was available on the customary 50-50 basis, but the Federal share was raised to 60 percent in 1954.

Then, the Federal Aid Highway Act of 1956 gave a green light to an expanded high-

Interstate System



way program. The Interstate matching-funds basis was raised to a 90-10 Federal-State split. The System's maximum mileage was increased from 40,000 to 41,000 and the name was officially changed to the National System of Interstate and Defense Highways. The System was designed mostly for 4-to-6-lane traffic, free from railroad crossings and traffic lights. (According to the Bureau of Public Roads, it should help save 8,000 lives every year, along with billions of dollars in operating costs and millions of hours in driving time.) And the Act also provided for increased aid to supporting (ABC) networks.

Million — or more — a mile

Federal-aid funds are the major source of capital outlays for highway construction in each state, including the Interstate and ABC Systems (other primary, secondary, and urban extensions). The Interstate program gets 72 percent, the largest share, of total Federal funds. This amounted to \$24.7 billion out of the total \$34.3 billion spent between 1957 and 1967, the remainder going to the ABC program.

The cost of the complete Interstate System was originally estimated at \$25.8 billion for

the 13 years from mid-1956 through mid-1969. New additions and increased construction costs boosted the estimate for completion in mid-1972 to \$46.8 billion.

The West received 17 percent of Federal Interstate funds, totaling \$4.2 billion, from 1957 to 1967. Several states received disproportionately large Federal aid because of their large areas in public domain, as the Federal share of total interstate funds exceeded 94 percent in Nevada, Utah, and Arizona. Alaska is the only state excluded from the Interstate program, and Hawaii was included under 1960 legislation as an outpost of strategic defense.

Under the 1956 Act, Federal aid to the ABC program rises annually by \$25 million, from \$825 million in 1957 to a \$1-billion ceiling. These funds are split three ways: 45 percent for aid to the primary system, 30 percent for aid to the secondary system, and 25 percent for urban extensions. ABC highway improvement is shared on a 50-50 Federal-State basis. In addition to these regular ABC funds, the Federal government provided in fiscal 1959 for an additional \$400 million to accelerate the ABC program, on a basis of two-thirds Federal, one-third state.

New Possibilities

A report by the Department of Housing and Urban Development, recently submitted to Congress, urges large-scale research-and-development of new systems of public transit.

The department estimates its proposals would cost \$980 million to develop over the next five to fifteen years. Among the "more promising" possibilities:

- "Dial-a-bus" would permit commuters to telephone for a small bus to pick them up at their doors or at a nearby bus stop.
- "Personal rapid transit" would utilize individual four-passenger capsules to speed travelers to a specific destination along a rail network.
- Dual-mode vehicle systems would allow commuters to drive special cars onto automated guideway-tracks, for high-speed trips from suburb to city and back.

The West received 17 percent, or \$1.6 billion, of the total \$9.7 billion of ABC Federal aid between 1957 and 1967. The matching formula for the District as a whole gave it 67.8 percent in matching Federal aid funds. Alaska received the highest matching amount with 93.0 percent.

The chief sources of Federal highway aid are the Federal excise taxes on motor fuel and automotive products, and truck use taxes. In the first decade of the program, revenues accruing to the fund totaled \$27.3 billion. Gasoline contributes more than half the total receipts flowing into the Highway Trust Fund. It is followed by taxes on motor vehicles, which account for one-third of the total.

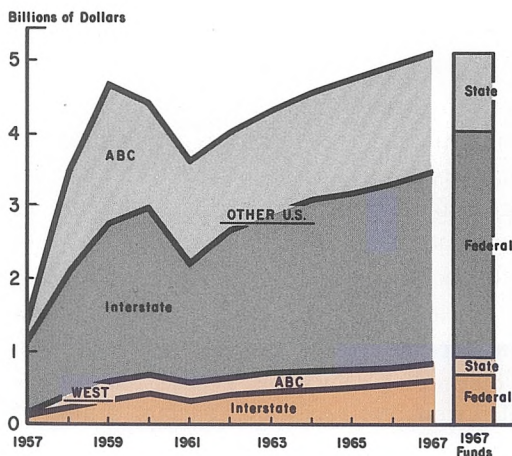
Rocky financial road

Progress has been slow on the construction front during the past several years. For the first time in the 10-year life of the Highway Trust Fund, the Federal government has wielded the highway fund as an anti-inflationary tool. In 1966, for example, the budget was trimmed from \$4.0 to \$3.3 billion, and the West shared fully in this reduction, losing \$137 million. More recently, the fiscal 1969 budget called for a \$600-million cutback in scheduled program spending.

Construction is also beset by continuing squabbles in urban areas, generally related to the criticism that the System, by building highways in cities, is destroying or burying neighborhoods and scenic areas. As an example, San Francisco rejected plans for a \$267-million, 12-mile Interstate freeway project within the city in 1965.

Because of constantly rising costs and difficulties in acquiring land in urban areas, the Department of Transportation now estimates that the System will miss its completion deadline of September 1972, and will be lucky to make it by June 1974. It also estimates that the cost will jump to about \$56.5

Spending continues to rise for interstate and ABC systems



billion, up nearly \$10 billion from the 1965 figure and twice the original 1956 estimate. The Federal share of this cost would be \$50.6 billion instead of \$42 billion.

At the end of 1967, a total of 25,642 miles of the Interstate System was open to traffic. In the West 4,267 miles were open, making the regional system 62 percent complete. Oregon led the West with 88.4 percent completed, while Utah, with 31.2 percent, showed the smallest completion rate.

Why the need?

Motor vehicles have increasingly dominated the transportation scene since the first mass-produced Model-T Ford rolled off the assembly line in 1909. By 1966, U.S. auto registrations totaled 78 million, a substantial increase over the 1950 total of 40 million. Trucks and buses likewise increased during that time from 9 million to 16 million. Total motor vehicles thus numbered more than 94 million in 1966 — almost double that of 15 years ago. And total motor travel more than doubled between 1950 and 1966, jumping from 458 to 932 billion vehicle miles.

The growing crisis in transportation is largely the result of the growth of population and economic activity—and the near-explosion of vehicular activity. Now more than 90 percent of intercity travel is made by motor vehicles, either for passenger travel or for freight movement. For every one person using public transportation to commute to and from work, six use autos. Private cars are also preferred for virtually all urban non-commuter trips as well as for social and recreational travel.

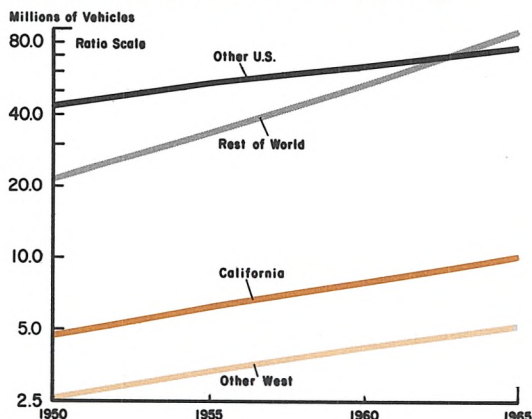
In this highly automotive age, the West has experienced the largest post-war growth. Total motor vehicles in District states doubled from 1950 to 1966, reaching a total of 16 million. California leads the West, having 67 percent of the 1966 total for a ratio of roughly one car for every two persons (including non-driving infants). In many California cities the proportion of car owners is much higher — and in the state as a whole, about 9 out of 10 families own one car, and 1 out of 3 own two or more cars. Nationwide, 8 out of 10 families own a car.

Automobiles continue to function more or less as they did several decades ago — although at greater speeds—but modern highways are built stronger, wider, straighter and

safer in response to increased traffic requirements. Of the 3.7 million miles of the nation's roads and streets in use in 1966, 76 percent were hard-surfaced. In 1950 only 58 percent were surfaced.

The West — with ribbons of highway stretching half a million miles—accounts for 14 percent of the nation's total mileage. California, the Pacific Northwest, and the Mountain states each account for about one-third of the regional total. Of the District's total road mileage, 62 percent is surfaced and 80 percent is in rural areas.

Sharp gains in auto population create demands for more highways



Good Idea

In a recent poll of some 700 Los Angeles families, the question was asked, "If by some miracle, a rapid transit system were in effect tomorrow morning, would you ride to work on it?" In response, 50 percent said they "Wouldn't, definitely, flatly." Another 10.8 percent said they probably would not, while only 7.2 percent said they would definitely or probably ride the new system. On the other hand, an overwhelming number—86.8 percent—said they believed Los Angeles needed a new rapid transit system.

Apparently the respondents did not want a new system for themselves, but they thought it was a good idea for everybody else.

Future approach

Because vehicular traffic is notoriously slow and frustrating in many of the nation's leading cities, the future approach to road building may be somewhat different than it has been in the past. It is more likely to stress road construction in and near urban areas than it has heretofore. The Department of Transportation (DOT) now claims that in the future it will emphasize an enlarged Federal role in the solution of urban transportation problems. This year DOT requested an appropriation of \$250 million from general funds, starting in fiscal 1970, for urban extensions of primary and secondary highway systems.

Future projections of highway construction are tied into projections of population, travel, and motor-vehicle growth. There were 94 million motor vehicles on the highways in 1966 — but the total may reach 118 million by 1976 and 144 million by 1985. The West will claim a major share of the future growth. If the region grows only at the national pace,

there will be 24½ million vehicles in the West by 1985, 18 million of them in California.

Highways for these vehicles will cost an average of \$30 billion a year between 1973 and 1985, according to DOT estimates. DOT now has on the drawing boards an "intermediate" system of about 66,000 miles of highway, ready to go upon completion of the Interstate System.

Highway safety and beautification have commanded a great deal of attention in recent years. Cities are spreading and scattering and "supercities" are emerging—dependent upon the automobile. Research and development are proceeding on such picturesque solutions to the transportation problem as monorail trains, hydrofoil boats and automated highways. Whatever the solution, it is certain that highways will have a major impact on people—on their environment, housing, recreation, and cultural interests—during the final third of the 20th century and the opening stages of the 21st.

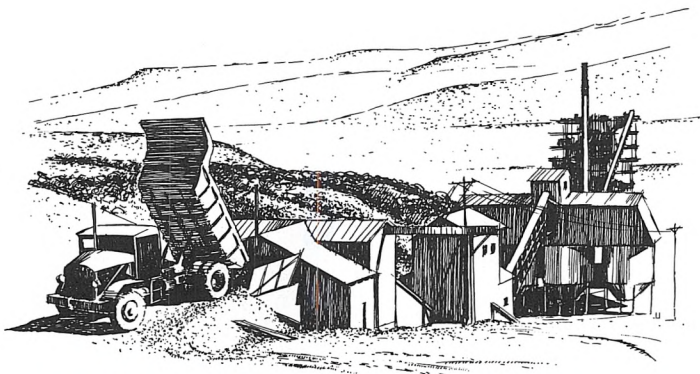
Paul Ma

New Federal Reserve Film

A new motion picture, "Monetary Policy and Economic Activity: A Postwar Review," produced by the Board of Governors of the Federal Reserve System, is now available without charge (except for return postage) to university and college classes in economics, to business and other professional groups, and to other interested groups.

The 16 mm color film is 37 minutes in length and is based on a chart show presented to the Symposium on Money, Interest Rates, and Economic Activity which was held in Washington, D.C., in April, 1967. Through the use of charts and comments by members of the Board's staff, the film discusses some of the problems dealt with in the formulation of monetary and fiscal policies over the postwar years, and highlights significant changes in financial markets during that period.

The film is available on request from the Administrative Service Department, Federal Reserve Bank of San Francisco, 400 Sansome Street, San Francisco, California 94120, or from any of the Bank's four branches. The branch addresses are: P.O. Box 2077, Los Angeles 90054; P.O. Box 3436, Portland 97208; P.O. Box 780, Salt Lake City 84110, and P.O. Box 3567, Seattle 98124.



Oily Treasure Trove

The lonely canyon-slashed Green River country, located near the headwaters of the Colorado, 50 million years ago was a luxuriant land dotted with a number of fresh-water lakes. But with the passage of thousands and then millions of years, the land turned into semi-desert, and the silt and organic material in the drying lakebeds gradually turned into shale. Today that shale is an oily treasure trove valued at as much as \$2½ trillion, because it contains, locked within the rock, enough petroleum to meet the nation's needs for centuries to come.

The steward of this treasure trove is Interior Secretary Udall, since the Federal Government owns most of the shale-rich land in this area. In recent public proposals, Secretary Udall has attempted to develop means of exploiting this resource, in such a way as to balance the conflicting demands of the petroleum industry, consumers, conservationists, and the Federal Government itself. But in so doing, he is dealing with a vast amount of uncertainty—not uncertainty regarding the location and size of the oil deposits, since these are accurately known, but rather uncertainty regarding the future technology, economics, and politics of shale-oil production and marketing.

Some of the oil-bearing lands contain dawsonite, an important source of aluminum, as well as valuable sodium materials. Thus, a

number of interests besides the petroleum industry might eventually become interested in the mineral exploitation of this area. Moreover, Secretary Udall's task is complicated by the fact that the exploitation of shale oil involves the multiple use of resources. Parts of these mineral-bearing lands have non-mineral values, such as scenic and recreational resources, that mining can easily damage. Almost by definition, multiple uses imply multiple constituencies, so that the solution of the shale-oil question must take into account conservationist and consumer—as well as commercial—interests.

Why shale is needed

Shale oil has broken into the headlines because it is an obvious means of supplementing conventional sources of oil. Energy specialists expect the U.S. to consume over 80 billion barrels of liquid fuel in the 1966-80 period, considerably more petroleum than the U.S. industry produced in its first century of operation. To meet this increased demand, domestic and foreign crude-oil production will be expanded, but a number of other resources besides liquid-fuel reserves may also have to be called into play. The possibilities include coal liquefaction, tar sands, nuclear energy—and the nation's vast shale-oil resources.

Major interest is centered on 11 million

acres of land in the Green River Basin, where the three states of Utah, Colorado, and Wyoming come together. The ancient lake beds in this now semi-arid region contain the world's largest concentration of hydrocarbons. The known reserves of 1.7 trillion barrels of oil amount to over half of the world's total shale resources and roughly 60 times the nation's crude oil reserves.

Crude undoubtedly will continue to supply most liquid-fuel requirements over the near-term future. (The 80-billion barrel estimate for total needs in the 1966-80 period assumes a 3.3-percent annual increase in total energy needs and a fairly constant liquid-fuel share of the overall market.) Proved reserves of crude amounted to 31.5 billion barrels at the end of 1966. A like amount is probably recoverable with today's technology from the nation's crude reserves, and perhaps 40 billion barrels more can be obtained through improvements in technology and higher price levels. Thus the physical exhaustion of the nation's petroleum is still far in the distance.

Looking further into the future, however, shale oil assumes an increasingly important prospective role. The growing size of the world market for oil suggests the need to develop other resources besides crude, and

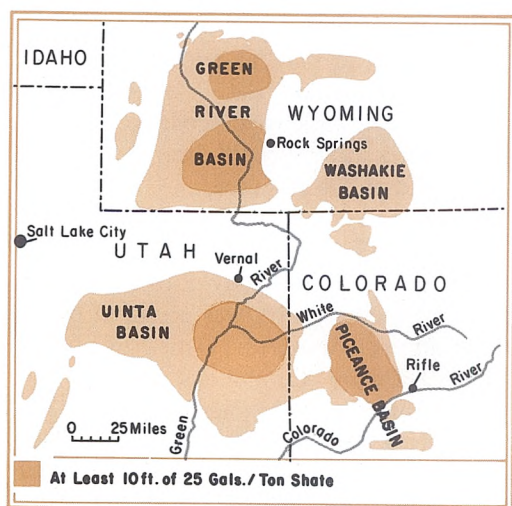
the vast size and relatively high quality of the Green River shale resources make these beds attractive for eventual commercial exploitation.

Yet the large-scale development of shale will depend on its ability to compete economically with other fuels—that is, the future of the Green River deposits will depend on the technology and economics of the energy industry itself. Developments in the means of extracting oil from shale, in the demand for energy and for petroleum chemicals, and in the competing means of satisfying these requirements, all deserve close attention at a time when long-term decisions are being made by public and private interests concerned with these problems.

Where it is

The most extensive of the shale deposits are in the Uinta Basin of northeastern Utah, with almost 5 million of the total 11 million acres of shale. The richest deposits, however, are found in the adjacent Piceance Basin of northwestern Colorado, with about two-thirds of the known reserves of 1.7 trillion barrels. The Green River formation as a whole contains about 590 billion barrels in higher-grade shale, yielding over 25 gallons a ton in deposits at least ten feet thick, plus 1,150 billion barrels in lower-grade shale, yielding 15 to 25 gallons a ton. Indeed, a single Federally owned parcel, a standard 5,120-acre tract in the center of the Piceance Basin, contains oil equivalent to 40 percent of the nation's total known crude-oil reserves.

Oil shale is sedimentary rock containing large quantities of organic material, the remains of the plant life which flourished in the lake beds when the deposits were laid down 50 million years ago. The potential energy of the shale is locked within a finely divided wax-like hydrocarbon, kerogen, which is distributed in uneven concentrations throughout the rock. (Conventional petroleum, in contrast, consists of deposits of



liquid hydrocarbon.) The process of extracting usable petroleum from shale consists of crushing the rock, applying at least 800° F. heat to transform the kerogen into liquid, removing impurities from the liquid, and then disposing of the waste rock which amounts to 90 percent of the initial weight of the shale.

Much of the necessary technology has been developed at a demonstration plant at Rifle, Colorado, which was operated first by the Bureau of Mines during the 1944-56 period and then by the Colorado School of Mines Research Foundation in the 1964-68 period. (Over the years, too, at least one major oil firm has done some R & D work on its own holdings.) This demonstration plant was returned to Federal control several months ago and has recently been offered for sale or lease by the Bureau of Mines.

How to get it out

The basic procedure for obtaining shale oil — mining, crushing, liquefaction, refining — can be carried out either above-ground or under-ground. The ideal mining system would work nearly 100 percent of each shale deposit, extract the maximum economic amount of energy from the shale, and at the same time prevent land-surface damage. The key elements in an efficient above-ground system would be continuous shale-breaking and inexpensive loading and hauling—essentially problems in the use of large mechanized equipment—along with optimum waste disposal by filling the underground voids with spent shale. But to reduce the expenses of mining, crushing, and waste disposal, which account for the major part of total production costs, shale could better be retorted underground.

Underground (in situ) processing would not only avoid heavy production costs; it would also permit the exploitation of deep faulted beds which are not presently amenable to conventional mining, and it would

strictly limit the problems of air, land, and water pollution. The technology of underground processing is still very complicated, especially in regard to creating adequate permeability of the shale bed for oil recovery. The basic technique looks promising, however, and a number of alternatives exist for penetrating the strata—high-voltage electricity, liquid nitroglycerin, hydraulic fracturing, or underground nuclear explosions.

Nevertheless, other factors might hamper the near-term development of a shale-oil industry in this isolated semi-arid land—problems of water and labor supply, for example. Industrial and municipal requirements for water under current conditions of water supply could perhaps limit ultimate oil production to 2 million barrels a day, or substantially below the 3 million b/d production rate envisioned for the year 2000. This limitation thus suggests that the producing area will have to pay some attention to the community's water needs, as well as to the industry's technology, over coming decades.

The development of a 1 million b/d producing unit, the type of unit envisioned for the year 1980, would involve about 16,000 construction and operating employees plus perhaps 27,000 workers in supporting activities. Such an operation would probably double the area's present population of 72,000 and generate an annual payroll of close to \$300 million, but, at the same time, it would create expensive needs for community services which could bear heavily on private and public resources.

Economics of shale . . .

The most extensive study of the economics of the shale-oil industry was prepared by the University of Houston's Henry Steele for Senate Judiciary Committee hearings last year. In his study, Dr. Steele estimated the total costs of producing shale oil at a 25,000 b/d plant, shipping by small pipeline to the Four Corners area, and thence delivering by

large pipeline to the Los Angeles market. On the basis of late-1965 price and cost data, he estimated that oil could be delivered in Los Angeles at a cost of \$1.96 a barrel—yielding an \$0.89 margin when compared with the \$2.85 cost of crude oil of comparable quality.

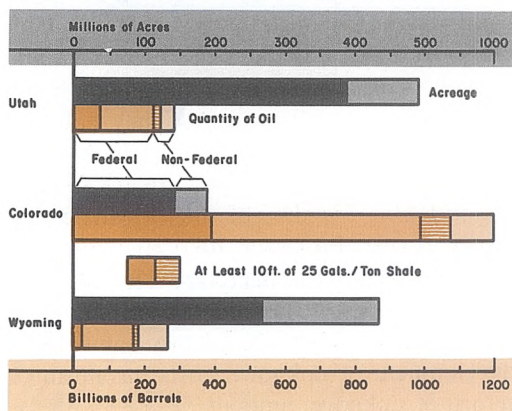
This margin would yield a return of 15 percent after taxes on average invested capital in shale-oil production. Yet, in view of the high initial risks involved, at least this much return is needed to elicit the required capital investment in the creation of a shale-oil industry.

These estimates may be conservative, since no allowance is made for the exploitation of profitable byproducts, such as aluminum-yielding material, or for the tax benefits available through the percentage-depletion allowance. On the other hand, some cost elements may be understated, since the calculations assume that the company mining the shale encounters only negligible land costs, despite the possibility that high lease or royalty payments may eventually be required for the exploitation of shale land.

... and economics of crude

Yet to the investor contemplating an investment in shale, Dr. Steele suggests that the most relevant comparison may be between

Utah has bulk of acreage, but Colorado has richest shale deposits



the relative profit positions of shale and crude oil, rather than between shale's expected rate of return and shale's probable risk. But cost and revenue estimates for crude oil may be even more difficult than for shale, especially in view of the uncertainty surrounding the returns to petroleum exploration. Moreover, an important distinction arises in the comparison of the two competing fuels because of the difference in their ratios of current operating costs to total costs.

To a major petroleum producer, out-of-pocket costs are much lower than current prices, while total costs per barrel are increased by heavy fixed exploration costs. But to the producer of shale oil, out-of-pocket costs may amount to 80 percent of total costs because of the expense of mining and retorting, while exploration risks are largely absent because the extent and quality of existing reserves are generally known.

In crude-oil production, the major risk of an insufficient discovery rate is now increasing, as is evident in the long-term downtrend in the petroleum discovery rate. On the other hand, the risk of price fluctuations has been greatly diminished through price-stabilization policies, such as conservation regulations and import controls.

In Dr. Steele's view, the long-run costs of crude production, especially exploration costs, are likely to increase, barring major technological breakthroughs in oil-finding procedures. But shale costs in the long run are apt to decline, especially after commercial plants get into operation and stimulate technological improvements.

Even so, large-scale development of shale will not automatically occur simply because of its cost advantage. In crude-oil production, there are large existing reserves and producing capacity which can be exploited at low operating costs at acceptable production levels. In shale-oil production, there are major technological advances on the horizon which could discourage investors from mak-

ing any commitments in the near-term future. Moreover, potential investors may be held back by the uncertainty which surrounds public decisions over such major questions as land-leasing policies.

Crucial Federal role

Perhaps the most essential difference between shale oil and other forms of energy is the Federal dominance of this industry through its ownership of shale deposits. Federal acreage contains almost 80 percent of the known oil resources of the Green River Basin. The Federal title to about 4 million acres is clouded by the existence of some 2,500 private claims, yet private interests hold full title to only 350,000 acres, of which some 200,00 acres are in the hands of major oil companies. Moreover, the private and state shale lands are generally lower-grade than the Federal holdings.

Federal lands were first exploited during the 1920's in the wake of World War I concern over the inadequacy of U. S. petroleum resources. But following the Teapot Dome scandal, President Hoover closed these lands to private development (1930), and the Interior Department ever since has been faced with the thorny task of creating a policy which would best serve the diverse needs of producers, consumers, and taxpayers. The pressures for a clear-cut Federal policy have become especially strong in the last several years, largely because of the developments already cited—the dwindling of the nation's reserves of conventional petroleum, the increasing costs of drilling for crude, and the approaching reality of economic methods of extracting oil from shale.

The Oil Shale Advisory Board, reporting to Secretary Udall in 1965, could not agree on the key question of commercial exploitation of Federal shale lands. Some committee members proposed immediate private development of oil-bearing lands, but others preferred the creation of a TVA-style public

agency or a Comsat-style quasi-public agency to develop the resources. Faced with this impasse, Secretary Udall came up with a compromise plan in early 1967 and, after lengthy Senate hearings, a second compromise plan this spring. In his recent report, he set forth the guideline: "A Federal shale program must assure wide utilization and adequate controls to protect the environment, as well as resource payments that return a fair market value to the public."

Last year's plan . . .

The Secretary's 1967 plan called for leasing relatively small acreages to private firms for specific R&D projects. The plan stipulated that larger acreages, up to 5,120 acres per lessee, could be made available for commercial production after the completion of each research project. Royalty payments would be placed on a graduated schedule, ranging from 3 percent of the gross value of oil products to 50 percent of the net income from oil production, with renegotiation possible after 20 years.

This leasing policy, however, encountered stiff opposition in Congressional hearings. Oilmen pointed out that those who entered upon research contracts would not be guaranteed that reserves would be made available for commercial production, and so they contended that the leasing plan offered them nothing but further uncertainty. On the other hand, conservationists argued that the Federal government should do its own R&D and should then license the resultant technological processes to all comers. (They noted in passing that the major oil producers had failed to develop the lands already in their hands.) One member of the Oil Shale Advisory Board, Professor John Kenneth Galbraith, opposed the Secretary's leasing plan with the words, "The government would be offering a subsidy of unknown value for a development of unknown costs, promising a return of unknown amount."

The Congressional hearings also unveiled disagreements over the tax treatment of depleted natural resources. The depletion allowance, which is designed to compensate producers for the gradual exhaustion of their capital assets, is presently fixed at 15 percent (the mineral rate) for oil shale, and is based on the value of mined shale *before* retorting instead of on the value of the product after liquefaction. But oil producers at the hearings insisted that oil shale should be treated the same as crude oil, receiving the typical 27½-percent deduction *after* retorting. On the other side, former Senator Paul Douglas contended that the allowance actually should be zero, since the asset being depleted differs from petroleum in that it is neither owned by oil producers nor requires any high-risk discovery costs.

The hearings also uncovered problems with the handling of royalty payments. Under terms of the 1920 Mineral Leasing Act, 10 percent of the royalties go to the Federal government, 37½ percent are earmarked for educational expenses in the three shale-containing states, and 52½ percent are distributed to all "reclamation" states in the West. Local authorities of course would like to see a continuation of the present royalty system, but Senator Douglas, again in opposition, claimed that royalty payments should benefit all taxpayers instead of only those residing in the Mountain West.

... and this year's plan

Late last year, Wisconsin Senator Proxmire introduced a bill which would delay the leasing of shale land until the Federal government completes a resources survey, title clearance, R&D work on the underground-recovery problem, and full-scale pilot-plant operation. This May, however, Secretary Udall unveiled new leasing proposals designed to meet some of the industry's criticisms of his 1967 plan.

The new plan reduces restrictions on patents which firms might develop while conducting research under leasing agreements. In contrast, last year's plan stipulated that any technical discoveries made while conducting pilot operations would become Federal property.

The latest proposal is an effort to encourage further R&D before committing the Government to large-scale leasing of its shale-oil holdings. The plan suggests a delay — perhaps five years — before land is made available for commercial production, to permit enough time to clear up questions of conflicting land ownership and to demonstrate the economics of existing technology. Meanwhile, it proposes competitive bidding for two 20-to-30-year test leases, with each requiring an investment of \$140-200 million for a plant producing 35-to-50,000 barrels a day.

The Udall proposal, which asked for comments by this September, thereafter envisages the submission of bids for test leases on shale land. If there are no takers on this proposal, the Government might perhaps undertake joint ventures with private industry, encourage development work by private consortiums, or even operate once again its own demonstration plant.

The report repeatedly emphasized that shale-oil development has been held back by economic and technological factors rather than by the availability of land for exploitation. Eventually those economic and technological problems will be overcome. But the exploitation of this vast treasure trove will eventually require the resolution of a number of conflicting claims, including (in the words of the Proxmire bill) the needs to "insure competition, protect the environment, provide the consumer with low-cost petroleum products, and provide the Federal Government with an adequate return."

William Burke

Western Digest

Large Gain in Bank Loans

Large Twelfth District banks reported an increase of \$332 million in bank credit in June. To support a heavy \$727-million loan expansion, banks reduced their holdings of U.S. Government securities and municipals by almost \$400 million. . . . In the District, as in the nation, business loans accounted for about one-half of the loan increase, as corporations borrowed even more heavily than in June 1967 to meet their mid-month tax payments. Increases in real-estate and consumer installment loans, although relatively large, were somewhat smaller than the gains made during the preceding month.

Mixed Trends in Deposits

Large District banks reported a \$316-million increase in demand deposits adjusted in June. This increase reflected substantial gains in the deposits of individuals and corporations, and of states and political subdivisions. . . . Total time-and-savings deposits declined by \$90 million in June, in contrast to a \$299-million gain in June 1967. The decrease in the District, as in the nation, was mainly due to large withdrawals of time deposits by states and political subdivisions. The attrition in large negotiable time CD's was somewhat greater than in May but well under the large run-off which occurred in April.

Strength in Farm Receipts

District farmers reported a 4-percent year-to-year gain in cash receipts during the first four months of 1968. Farmers elsewhere posted only a 2-percent gain in this period, although they had a larger increase in April than did their Western counterparts. . . . In April alone, District receipts were up only modestly, despite higher prices for both crops and livestock and products. Prices continued strong in May. . . . Production estimates available to date suggest some rise in Western crop output in 1968. Deciduous-fruit production, for example, is expected to be 14 percent higher than last year.

Grand Coulee's Mammoth Turbines

The Interior Department this month selected a Portland firm to build three huge hydro-turbines for the planned third powerplant at Grand Coulee Dam on the Columbia River. The turbines will cost \$19.5 million and will be the world's largest, being designed to spin generators having a capacity of 600,000 kilowatts each. . . . The latest Grand Coulee installation would be seven times heavier than the largest installation now operating in the U.S., at the Bureau of Reclamation's Davis Dam on the Colorado River between Arizona and Nevada. It would also take the world leadership in hydro-generation away from the Soviet Union, which now operates three 500,000-kw turbines at the Krasnoyarsk Dam on the Yenesei River in Siberia.