

Regulation of Crude Oil Production in the United States and Lessons for Italy (*)

In the United States, the landowner possesses whatever lies below the land surface as well, and except where there are specific legal limitations, may exploit it as he chooses. Petroleum and natural gas raise unusual problems in applying this common law real property right. They occur naturally in underground pools, whose outlines bear no necessary relationship to the ownership of the land surfaces above. And they are fugacious: whoever drills a well on land over a pool may draw oil or gas from under his neighbor's land as well. Landowners who found themselves despoiled in this manner by more aggressive neighbors, after the discovery of oil in Pennsylvania in 1859, brought suits in the courts to assert their « correlative rights » to the underground reservoir — a property right in the subsoil pool in some way proportionate to the superior land surface they owned. The state courts, faced with such conflicts and lacking any guidance from state legislatures, formulated the common law « rule of capture ». The oil, they decided, belonged to whoever took it out, regardless of where it originally came from. This remained the virtually universal rule of law in the United States until after 1929, when state legislatures finally intervened to place limits upon the unrestricted private right to drill and capture (1).

Because of the law of capture, the vast American petroleum resources were exploited under a regime of virtually uncontrolled pri-

ivate enterprise. An enormous and highly developed industry emerged before serious controls were imposed (2). When finally regulation became inevitable, its task was therefore not to encourage and promote a new industry, but to curtail an excessive rate of private production, in the interest of conservation, economic stabilization, and the protection of correlative property rights. Thus the American regulatory experience in this industry has been unique among all the major producing countries of the world, with the partial exception of Canada.

There are areas in the United States in which the State and Federal governments, by virtue of their ownership of the land surfaces, are in a position more nearly comparable to that of the governments of most other oil producing countries, which control subsurface rights. The Federal Government, whose holdings are most extensive, owns 455,000,000 acres, or 24% of the country's total land area (3). In these regions, exploration and production are possible only upon receipt of government permission.

But it is instructive that there is no significant American literature analyzing the experience in public ownership and regulation. Except for the dispute over state vs. federal ownership of the so-called tidelands (4), the

(2) Between 1857 and 1937, the United States produced 64% of all the world's oil. AMERICAN PETROLEUM INSTITUTE (A.P.I.), *Petroleum Facts and Figures* (1937). As of the end of 1953, in which year the U.S. accounted for 49.7% of the world's production, the cumulative figure from 1857 on was still 60.5%. *Ibid.*, 11th edition (1954).

(3) U.S. Bureau of the Census, Statistical Abstract of the United States. State-owned lands are considerably less extensive. In Texas, both the biggest state and leading oil producer, state school lands (the most important state-owned lands apart from the underwater coastal regions) amount to about 10,000,000 acres (Communication of March 30, 1955 from J. Earl Rudder, Commissioner of the General Land Office), about 6% of the State's total land area.

(4) After long and bitter controversy, the Submerged Lands Act of May 22, 1953 (67 Stat. 29), reversing an earlier Supreme

(*) The Italian version of this study will be published in the September 1955 issue of the « *Rivista Trimestrale di Diritto e Procedura Civile* », to which we are indebted for permission to publish the original text in this Review.

(1) Oklahoma instituted the pioneering production control law in 1914, but effective, general regulation, with its concomitant modification of the law of capture and recognition of correlative rights, did not come until around 1935, after frantic efforts from 1929 on. See MARSHALL and MEYERS, *Legal Planning of petroleum Production*, 41 « *Yale Law J.* », 33 (1941) and WATKINS, *Oil: Stabilization or Conservation?* (1937) *passim*.

issues in this industry that have claimed almost the entire public attention have centered about the law of capture, the consequences of unregulated private exploitation on privately owned lands, and the regulatory legislation imposed since 1929. Production of crude oil on the Federal lands amounts to only about 5% of the national total (5). In some states the relative importance of production on state-owned lands may be somewhat higher; and production from offshore, underwater reserves, though at present a very small proportion of the national totals, will probably eventually make a major contribution to total American output (6). But for the last one hundred years the vital problem has been the regulation of private production on private lands.

Courts decision, vested in all coastal states ownership of the lands beneath navigable waters extending three miles into the Atlantic and Pacific Oceans and three marine leagues (approximately 10.35 miles) in the Gulf of Mexico. The continued ownership by the Federal Government of submerged lands beyond these limits — the outer Continental shelf — was confirmed by the same Congress. 67 Stat. 462 (Aug. 7, 1953).

(5) A.P.I., *Petroleum Facts and Figures*, 11th ed., 1954, pp. 85, 138. Reserves on these lands are believed to be of comparable importance. (Communication of April 15, 1955 from H. J. Duncan, for the Director, Geological Survey, U.S. Dept. of Interior, Washington, D.C.). Oil and gas leases were in effect on 74,000,000 acres of Federally owned land at the end of 1954. (Information from U.S. Geological Survey, Conservation Division, U.S. Dept. of Interior).

(6) Texas, which accounted for no less than 43% of total U.S. crude oil production in 1953 (A.P.I., *op. cit.*, 11th ed., p. 115) credits the major portion of its revenue from leases of State-owned lands to special funds for the public schools and university. Total accumulation in these funds (whose principal cannot be spent) amounted in early 1955 to about \$ 460 millions. [Communication from J. EARL RUDDER, *supra* note (3)]. These sums, accumulated over many years, are probably not much in excess of the total oil royalties paid all lands owners in Texas in 1953 alone. Still they indicate a total production on state-owned lands in Texas comparable to the production on Federal public lands, which have brought in about \$ 400,000,000 in rents and royalties since 1920. (Figures from LEWIS E. HOFFMANN, *Oil and Gas Leasing on the Public Domain*, F. H. Gower, 1st National Bank Building, Denver, Col., 1951, p. v. and A.P.I., *op. cit.*, 11th ed., p. 151).

Extremely rough estimates place potential crude oil reserves in all offshore areas of the United States at fully 50% of current proved national reserves. « The consensus is that this estimate is on the conservative side ». Letter of May 12, 1955, from William B. Harper, Research and Inquiries Section, American Petroleum Institute. But Texas' first commercial offshore production came in only in 1954. (« Oil and Gas J. », Jan. 31, 1955, p. 220). And although offshore production has been going on in California and Louisiana for several years, these wells contributed only about 5% of their total production in 1953. A.P.I., *op. cit.*, pp. 115, 120.

I - Conservation and Market Stabilization.

The primary consequences of the rule of capture were an extraordinarily rapid growth of the American petroleum industry — vast riches lay under the soil to be tapped by whoever could find them first and draw them out most rapidly — and a frightful waste. A concomitant result was extreme market instability.

The Need for Production Control

An underground oil pool is like a great natural engine, an equilibrium of the pressures of encircling rock, dissolved or overlying gas, and underlying water. A well opening releases these underground forces, which propel oil, gas and water upward to the surface. Properly exploited, these pressures can by themselves deliver 90 to 95% of the oil without the application of outside energy: this would be the engineering ideal. The rule of capture imposes instead an engineer's nightmare. With every land owner hastily drilling wells and letting them flow freely (in « flush » production) in order to ensure his maximum participation in the pool, the underground energy is rapidly dissipated. The gas escapes; the oil below becomes more and more viscous, as the dissolved gas departs, and hence more and more difficult to recover; the underlying water forces itself upward and cuts off the possible escape of the oil to the open air. Such oil as can thereafter be recovered at all must be pumped, at far greater expense, and with far less ultimate recovery. The consequence is that the older oil fields, operated without control under flush conditions, have left 75 to 90% of their original oil underground; some of them will never yield more than 10% of what they might have been made to yield (7).

The profligacy with which Americans produced their crude oil in the past was matched by a correspondingly terrible waste above ground. First, it has taken the drilling of about 1,500,000 wells to test the extent of our

(7) Most of the foregoing account is based on NORRHCUTT ELY, *The Conservation of Oil*, 51 « Harvard Law Rev. », 1209 (1938), reproduced in Amer. Eco. Ass'n, *Readings in the Social Control of Industry*, 318, 331-332 (1942).

reserves thus far; in the Middle East about 2,000 wells have already uncovered proved reserves twice as great (8). Second, perhaps billions of dollars worth of natural gas and natural gasoline were burned (« flared ») at the well head, for want of alternative methods of recovering, storing, or disposing of them. Third, freely flowing wells periodically far outran storage and transportation facilities, and vast quantities of oil were permitted either to flow out on the ground or evaporate away in surface storage facilities.

Fourth, there have been corresponding wastes at the refining level. Discoveries of great new oil pools immediately subjected crude oil markets to vast, at least partially unassimilable supplies, depressing prices within short spaces of time to fractions of their previous level. The cheap, abundant crude oil locally available in turn induced numbers of business men to construct cheap, inefficient refineries in the field, often referred to as « teakettles » because all they could do was to distill off the valuable lighter fractions (in « topping » or « skimming » operations) and sell as much of the remainder as they could for whatever it would bring as heating fuel. Crude oil that might have yielded up to 45% gasoline, in more efficient refineries, yielded instead only perhaps 25% of this more valuable product, often of poorer quality; the rest went into economically inferior uses. And once the flush production was over, and newly constructed pipelines could transport the oil cheaply to more efficient refineries, the small field refineries became uneconomical, and disappeared as fast as they had come into existence. In the most dramatic instance of recent times, between 1931 and 1936 over 100 refineries were constructed in or near the great East Texas field, discovered in 1930. By the end of 1939, the Bureau of Mines annual survey (9) listed only 14 refineries in existence in the area, and not all of them were actually operating.

(8) A. J. McINTOSH, *Is U.S. Oil Industry being Drowned by Excessive Imports?*, « Petroleum Refiner », Dec. 1953, p. 77.

(9) U. S. DEPARTMENT OF INTERIOR, BUREAU OF MINES, *Petroleum Refineries, Including Cracking Plants in the United States* (annually).

The history of the American oil industry under the rule of capture was marked by cycles of shortages and gluts. The resultant extreme fluctuations in crude oil and products markets were economically wasteful. Oil that would have been worth \$ 1.00 a barrel, to both producers and consumers, if taken out more gradually (the basic field price today is \$ 2.85 a barrel), reached as low as \$ 0.10 a barrel in East Texas in the 1930's. And, as we have seen, most of it was either poured out on to the ground, evaporated in inadequate storage facilities, or skimmed and sold for virtually nothing for inferior uses. The market instability was also obviously contrary to the interest of established companies in the industry.

So powerful public and private interests alike — in conservation and market stabilization — dictated the introduction of some form of production control. The distaste with which Americans generally regarded government regulation of business, and the independence of the oil wildcatter and producer, for long successfully resisted these pressures. But a series of dramatic discoveries between 1926 and 1931, culminating in the East Texas strike, combined with the depression after 1929, finally brought remedial action.

The body of regulation which has emerged is formidably complex, largely because the primary burden of control is assumed by each of the producing states, under its police power, with the result that the laws differ substantially from one another. The role of the Federal Government is an important one, but it is essentially one of coordination and support of the respective state programs (10). Also much of the real corpus of the law in an area as technical as this must be sought in the orders of the state administrative agencies:

(10) Effective regulation of production for a national market clearly necessitates interstate cooperation, and hence at least the beneficent acquiescence of the Federal government in the resultant restraints on interstate commerce. In fact, with the Connally « Hot Oil » Act (49 Stat. 30, 1935) forbidding the interstate transmission of oil produced in violation of state regulations, with the import limitations of the 1930's, and with the market demand estimates by the Bureau of Mines (see p. 71, below), the Federal government has cooperated actively in making production control effective.

these commissions have of course not been uniformly effective.

State regulatory legislation and practice may be said to have two features, though the two are inevitably related. Both relate to production; exploration (« wild-cattling ») is hardly controlled at all. The one feature is technical: all producing states impose certain restrictions on the methods and most of them on the rate of development and production in order to avoid physical waste and increase ultimate recovery. The other is economic: many states (notably Texas, whose importance has already been indicated) define the « waste » which they prohibit to include production in excess of « reasonable market demand », issue orders proportionately limiting (« prorating ») withdrawals to estimated demand, and thus are in effect involved in cartel restriction of output and price maintenance. The first kind of control as well as the second curtails supply and therefore supports price, at least in the short run: in the long run recovery and supply are of course enhanced. And the second kind as well as the first may be defended as necessary merely to prevent physical waste while protecting correlative rights, as we shall see. But the influence on price in the first case is the indirect consequence of applying engineering standards, designed to maximize net energy recovery. The second, instead, represents a direct and conscious interference with competitive adjustment of supply and price to changing market conditions. Imposed by producing states, without any participation by consumers in the decision-making process, the second kind of regulation, needless to say, is far more controversial than the first.

Physical conservation regulation

The kinds of technical limitations imposed need be only briefly summarized. They include: (1) Prohibitions of the flaring of gas; (2) Limitations on the drilling of wells, notably through the promulgation of spacing regulations, requiring minimum distances between wells. When the minimum area to be served by a single well embraces the property of more than one surface-land owner, the

interested parties may be forced to pool their interests in one optimally-located well, operating it cooperatively; (3) The requirement that producing wells maintain certain efficient ratios between the gas or water and the oil they withdraw, to ensure against too rapid dissipation of the propulsive energy below ground; (4) Prorating of production for each field to maximum efficient rates of recovery (« M.E.R. »), rates of withdrawal in excess of which would jeopardize the ultimate total of oil recovered relative to the energy expended in getting it out (11). These limitations are generally imposed only on the freely flowing fields, whose flush output, produced at almost negligible operating costs, would otherwise force the cessation of the more expensive pumping operations in settled fields (12). Abandonment of these marginal or « stripper » wells might lead to water seepages and so make their oil permanently inaccessible; (5) Permission or state orders requiring that entire fields be operated as a single unit (in « unit operation » or « unitization »). Frequently only through such cooperative operation can a field be most efficiently exploited (13).

The major criticisms of this aspect of state regulation have been that such controls have not been applied with sufficient intensity. It is contended, with much justification, that the industry and the producing states are more interested in market stabilization than in maximizing the efficiency of recovery — or, at least, that the governments can elicit more nearly unanimous support for the former than

(11) In fact, total production has typically been held below the M.E.R. rate, in order to limit it to « reasonable market demand ». See, pp. 71-72, below.

(12) Thus in most states it is in fact only a minority of the oil wells and of total production that is actually subject to prorating. See, ELY, *op. cit.*, pp. 339-341.

(13) For example, efficient well spacing may require fewer wells than there are land owners. Or the underground pool may be dome-shaped, with an overlying gas cap, in which case the owners of the land over the cap must be forbidden to drill, because this would draw forth the gas, sharply reduce field pressures, and jeopardize recovery of the oil. In these cases only through unitization could all land owners participate fairly in production without cutting down ultimate recovery. Also cooperative investment and operation is usually required for recycling, where gas or water are returned underground to sustain field pressure and enhance total recovery, or for construction of central plants to recover natural gas from the oil, or natural gasoline from the gas.

for the latter regulation (14). As a result, proper well-spacing has often not been achieved: before World War II, more wells were drilled under exceptions and exemptions to well-spacing orders than under such rules, because owners of small pieces of land have successfully insisted on the right to drill on their own properties (15). Probably only compulsory unit operations can ever fully meet the requirements of conservation; yet state commissions have typically been unwilling to force resistant producing interests to cooperate in this fashion. Nevertheless, very substantial progress has been made along both these lines (16), and few critics deny that these regulations have been socially desirable.

Prorating to market demand.

Every month the Bureau of Mines, of the U.S. Department of Interior, makes detailed estimates of the prospective market demand for petroleum products. Translated into anticipated requirements for crude oil, these statistics are broken down by the Interstate Oil Compact — an agency for the cooperation of oil producing states — into estimates for the individual states. The latter in turn break down their totals into daily production quotas (« allowables ») for each field and well under their jurisdiction (17). Under this system national production has typically been held

(14) See, for example, EUGENE V. ROSTOW, *A National Policy for the Oil Industry* (1948), and WATKINS, *op. cit.*, *supra* note (1).

(15) In fact prorating actually increased the amount of unnecessary drilling on some fields, since each well must by law be allowed a minimum production quota, and so land owners sought, by drilling extra wells, to increase their total allowable production.

(16) See address by Hines H. Baker, President, Humble Oil and Refining Co., « Achievements and Unsolved Problems in Oil and Gas Conservation », copies obtainable from the Humble Co., also reproduced in U.S. House of Representatives, 83 Cong. 1st Sess., *Petroleum Study, Hearings on Recent Price Increases of Gasoline and Oil*, 1953, pp. 295-306; see also Erich Zimmerman, book on production and conservation of oil, to be published by Yale University Press, late 1955 or 1956.

(17) This account is necessarily oversimplified. Not all producing states belong to the Interstate Oil Compact; not all of them prorate production to market demand. In California, prorating is accomplished in effect by cooperation among the major integrated producing-refining companies, a practice at present under attack by the Federal government under the antitrust laws. *U.S. v. Standard Oil Co. of Cal. et al*, Civil Action 11584-C, S.D. Cal., Complaint, May 12, 1950. The State of Texas makes elaborate estimates on its own account,

below the M.E.R. since 1935, except during World War II. In 1954, for example, when national production ran at about 6½ million barrels a day (b/d), estimated shut-in capacity (the difference between actual output and M.E.R.) averaged over 1½ million b/d; and the ratio of shut-in capacity was even greater in the late 1930's (18).

Historically prorating to market demand has (or would have) contributed in some ways to conservation of oil, by any reasonable test. Between 1926 and 1931, 14 billion barrels of oil were discovered, increasing estimated national reserves from approximately ten to over twenty billion barrels. The East Texas field alone was capable of producing well over 1,000,000 b/d, when total national production was less than 3,000,000 b/d (19). It would obviously have been desirable to restrict production of these fields to M.E.R. But this would still have resulted in an output far above what the market could absorb. Actual physical waste of oil above ground would still have ensued. It would have been difficult to enforce ratable taking (controlled proportionate withdrawals from all wells in a given field) if production exceeded what purchasers were willing to take. Thus not only would correlative rights of surface owners still not have been preserved (20); disproportionate withdrawals would also have resulted in irregular encroachment of water and gas and hence incomplete recovery of the oil underground. Also the low levels to which oil prices would still have been driven would have forced the closing down of stripper wells, with resultant permanent loss of their production, even though in the longer run the market would have been fully prepared to pay the higher price. The law of capture would still have been an economically illogical influence, forcing each well owner to produce all the government permitted, even though the inte-

and bears the greater burden of adjusting production to market demand because of the only partial cooperation of other states.

(18) Standard Oil Co. (N.J.), « Facts About Oil Imports », April 15, 1953, p. 30.

(19) See ELY, *op. cit.*, pp. 322-324, and McLEAN and HAIGH, *The Growth of Integrated Oil Companies*, 89 (1954).

(20) Unratable, i.e. disproportionate withdrawals would clearly permit certain well operators to drain oil from under their neighbors' land.

rest of the economy would have dictated a slower rate of withdrawal, avoiding sale at \$ 0.10 a barrel in 1933 oil that a few years later was worth \$ 1.00 a barrel.

At the same time, prorationing to market demand is basically objectionable in a free enterprise economy. Enacted under the pressure of producer groups, administered by producing states inevitably most sensitive to the interests of the oil companies, it confronts the buying public with the use of police power to confer monopoly profits upon a private economic group. In fact, within limits, it permits the large oil companies to determine themselves what their profits will be. Thus in June 1953, despite the fact that supplies of crude oil were so ample that production was being cut back substantially below M.E.R., a major oil company raised the price at which it bought (and was also producing) East Texas crude oil, from \$ 2.65 to \$ 2.90 a barrel. Although excess capacity in the industry increased in the following year, and refiners and marketers were unable to pass on the entire cost increase in the prices they charged for their products, successive cut backs of production allowables (21) sustained most crude oil prices at their new high level. The price increase may have been economically justifiable in a certain sense: costs of exploration and production had been increasing steadily. But it was the producing interests themselves, rather than an open competitive market, that decided what the price should be (22).

The compulsory cartelization of American crude oil production achieved by prorationing extends its influence upward through the industry and geographically throughout the world. The refining and marketing of oil products remain substantially competitive in the United States, but the limitation of supply of the basic raw material and the vertical integration of the major producers help hold price competition in check at later stages as well (23).

(21) In the late summer of 1954, shut-in capacity reached 1,800,000 b/d.

(22) See J. B. DIRLAM, *The Petroleum Industry*, in W. ADAMS (ed.), *The Structure of American Industry* (rev., 1954), pp. 248-249; and, for an economic analysis of the conservation problem in oil, *ibid.*, pp. 250, 261-264.

(23) See DIRLAM and KAHN, *Leadership and Conflict in the Pricing of Gasoline*, 61 «Yale Law J.», 818 (1952); also the book

The competitive opportunities of independent refiners and marketers are seriously constricted and their fortunes rendered more hazardous by these same factors: for example, they are periodically subjected to sharp «squeezes» in their margins because of the rigid price they must pay for their raw material (24). And the world price of crude oil remains closely articulated with the U.S. Gulf Coast price, artificially maintained in this manner, even though actual production costs in other areas are evidently only a fraction of the costs in the United States (25).

For these reasons many observers have proposed the abolition of prorationing to market demand. Most of them would substitute either or both of the following systems: (1) Prorationing only to M.E.R. It is possible that the increase of waste that might follow excesses of production over market demand at current prices would be more than compensated for by lower prices, enhanced utilization, and greater competition in oil markets of the world. (2) Compulsory unitization of all oil fields, or at least of all flush fields. In this case, no production control at all might be required. Pool owners, freed at last from the tyranny of the rule of capture, would have every incentive to adopt the most efficient recovery methods, and to draw oil out of the ground only as rapidly as seemed to them economically desirable. In this manner the community as a whole would derive the maximum net economic value over time from its underground oil resources (26) *provided* there

by the present writer and M. G. DE CHAZEAU, *Integration and Competition in the U.S. Oil Industry*, to be published by Yale University Press, 1956.

(24) See *ibid.*; and ROSTOW and SACHS, *Entry into the Oil Refining Business: Vertical Integration Re-Examined*, 61 «Yale Law J.», 856 (1952). It should be added however that the substantial decline in the number of independent refiners in the U.S. since 1935 has also been attributable to technological developments in the art of cracking; and the reader must remember that the limitation of the flush crude oil production, driving many «teakettles» out of business, undoubtedly accorded with the public interest in conservation.

(25) See U.S. Federal Trade Commission, Report on *The International Petroleum Cartel*, 1952, and U.N., Economic Commission for Europe, *The Price of Oil in Western Europe*, Geneva, 1955.

(26) For a strong argument in advocacy of compulsory unitization as an alternative to prorationing, see ROSTOW, *op. cit.*, supra note (14).

remained enough competition between unitized pools to prevent curtailment of output for monopolistic reasons (27).

II. - Tax Preferences.

Production control has imposed substantial burdens upon the small crude oil producer by making it more difficult for him to recover his investment quickly, when he finds oil. But by supporting crude oil prices, it has on balance undoubtedly further encouraged private exploration and exploitation of the national oil resources.

Another form of «regulation» that has had the same effect deserves brief mention — the extraordinarily favorable treatment which the American tax laws accord this industry. The central tax clause is the so-called 27½ percent depletion allowance (28). In computing net income, upon which it must pay income tax, a company in any industry may of course deduct from gross income not only operating expenses but also the estimated annual depreciation of its capital equipment, until it has written off the entire original investment therein. Similarly, oil (and gas) producing companies may write off their investments in seeking and producing oil, charging actual expenditures against income as the oil or gas are used up. But the depletion allowance offers an alternative that is often far more attractive: regardless of what they may have actually invested in finding their oil or gas, these companies may instead deduct as expenses up to 27½ percent of the gross income from the sale thereof (up to 50% of their net income), indefinitely. In this way they are supposed to be compensated for using

(27) In 1954 there were operating in the United States 171 oil fields with estimated ultimately recoverable reserves of 100 milliard barrels or more; they accounted for only 47.1% of total output in that year and had 55.5% of total estimated U.S. reserves as of January 1, 1955. In view of the excellent facilities for low-cost transportation of crude oil all over the United States, the inevitable long-run increase of imports, and the pressure of small land-owners on unit field operators to produce at maximum efficient rates, the dangers of monopolistic restrictionism would not appear as great as it is under the present system of prorationing, even though the same large companies would undoubtedly operate several unitized pools.

(28) Internal Revenue Code, Par. 114 (b) (3).

up their capital assets (the underground oil or gas) as they sell them. In consequence, these companies often can deduct as expenses many times the actual original investment.

Nor is this all. In addition, these companies may, if they choose, charge as current expenses a variety of exploratory costs — so-called «intangible» drilling expenditures and the costs of drilling «dry holes» (29). Thus, in effect, they may before paying taxes recover these capital investments involved in searching for oil twice — once by deducting them as expenses in the year in which they are incurred, and again in the depletion allowance, which is likewise supposed to compensate producers for the costs of finding oil.

A single example will suffice to demonstrate the order of magnitude of these tax benefits. In 1948 the U.S. Steel Corp. showed a net income before Federal income taxes of \$ 239 million; its taxes came to \$ 109 million. In the same year the Humble Oil and Refining Co. earned \$ 240 million, and paid taxes of \$ 54 million (30). Even more striking examples could readily be found.

It is clear that these tax provisions bestow special favors upon the American oil industry (31). The essential justification is that

(29) Costs of drilling and equipping *productive* wells must be capitalized and depreciated annually, like any other investments in equipment. See U.S. Treasury Reg. 111, Par. 29.23 (m)-16 (b) (1943).

(30) BAKER and GRISWOLD, *Percentage Depletion. A Correspondence*, 64 «Harvard Law Review», 361, 374 (1951).

(31) Industry spokesmen do sometimes deny this fact, contending that the special tax treatment is merely a reflection of the special circumstance that when a producer sells his oil he is selling part of his capital, and his revenues are therefore not properly taxable as income. This is perfectly true: the sale of a wasting asset justifies some method of charging off the capital consumed, before computation of tax liability. But this fact does not justify the present tax law, for two reasons: (1) The oil company is in the business of exploring for oil and selling off what it finds. Its capital investment is the cost of finding the oil and the equipment required to take it from the ground. It might equitably claim the right to recover this investment before paying taxes. But the depletion allowance, as we have seen, often permits it to recover much more. (2) Even if the entire underground oil pool were to be regarded as capital, and the proceeds from its sale as capital gains rather than income, the present arrangement would not be justified. For gains from the sale of capital goods are likewise subject to tax in the United States, though at a lower rate than income. In computing the taxable gain, the original cost of acquisition is deducted from the sale proceeds. But, as we have seen, the depletion allowance and permission to charge intangible drilling costs often permit the deduction of far more than the original cost, in computing the tax liability. So the revenue from oil

the search for oil is expensive and risky. The great majority of wells drilled prove to be dry holes. So, it is maintained, the prospect of high rewards — and the actual receipt of very high returns by the fortunate few — is necessary to induce capital to enter the field.

But it must be remembered that the free market will ordinarily offer higher profits to the successful venture the more risky the field in which it operates. Even without favorable tax treatment, the oil industry offers huge prospective returns to the wildcatter. It is not clear why the tax laws should cumulative these rewards for risk-taking in this industry, and not in others.

Moreover, in the absolute volume of tax savings, the major beneficiaries of the depletion allowance are of course the larger producing companies. It may well be argued that for these companies, although each individual exploratory venture is undoubtedly very risky, their exploratory programs considered as a whole bring in returns with a reliability and regularity not appreciably different from investments in other industries. Even without tax preference, thus, these companies need have no difficulty writing the costs of unsuccessful ventures off against the successful ones, if not in each year, then over a period of years.

The American Mid-Continent Oil and Gas Association has estimated that over the period 1925-48 the oil industry's expenditure for finding oil were approximately the same as the depletion allowed by the tax laws. A defender of these laws cites this fact to support his conclusion « that the amount (of depletion allowed) is not excessive in relation to the capital risked in the search for oil » (32). But in this same period the country's ultimately recoverable reserves increased from ten to almost thirty milliard barrels, and their money value twice as much again (33). What these facts mean is that the oil industry has been able thus to increase the value of its capital assets almost six-fold, by exploration, with funds obtained from the consumer and spared by the tax collector.

sales is not even taxed as a capital gain. On this subject, see *ibid.*, *passim*.

(32) *Ibid.*, p. 366.

(33) McLEAN and HAIGH, *op. cit.*, pp. 86-88.

III. - Publicly-owned lands.

Federal.

Under the law, exploration and production of oil and gas on the « public domain » may be conducted only under leases granted by the Bureau of Land Management of the U.S. Department of the Interior (34). Leases may be granted only to U.S. citizens or corporations; foreigners may participate in the latter however without limit, so long as their own governments do not deny similar privileges to Americans.

No lessee might before 1954 hold such rights (35) for more than 15,360 acres in any single state; the act of Aug. 2, 1954 (36) increased these limits to 46,080 acres for the United States and 100,000 for Alaska. However, producing companies customarily conduct much of their exploration not as lessees, but under options obtained from land owners and lessees. Option agreements give them permission to explore, sink test wells, and the privilege of either taking over the lease at a fixed price or merely operating the well, if they succeed in finding oil. In this way the prospector may be able to afford extensive exploratory operations, and have a more extensive territory to explore, without becoming a lessee himself. The law governing the public domain permits a company to hold such options, of no more than three years duration, covering no more than 200,000 acres in each state (before the 1954 amendment the limits were two years and 100,000 acres). It is only a company's actual leases that may not exceed

(34) The following summary of the law is based on HOFFMAN, *op. cit.*, *supra* note (6), and Code of Federal Regulations, Title 43, Chap. I, Par. 192. The basic statutes are 41 Stat. 437 (1920), 49 Stat. 674 (1935), and 60 Stat. 950 (1946). On the 1954 amendment, see below. There are other lands owned by the Federal government than the so-called public domain, but the latter is by far the most important. In addition, there is the Outer Continental Shelf Act of 1953, regulating the procedures in the underwater areas beyond the « tidelands », ceded to the coastal states. See p. 75, below.

(35) The reader should be reminded that the rights in question are leases on the public domain. Companies may acquire rights up to the same limits also on the Federal government's much less extensive « acquired lands ». 43 Code of Federal Regulations, Par. 200.6.

(36) 68 Stat. 648-649, Public Law 561, 83 Cong. 2d Sess., S. 2381.

the 46,080 (formerly 15,360) acres in each state.

The foregoing maximum acreages apply to all leases or options held by the individual or corporation, both directly and indirectly through participation in associations or corporations (except interests in unit operations approved or prescribed by the Secretary of the Interior). Each individual participant or owner in such associations or corporations holding leases or options is considered to hold acreage proportionate to his participation in the joint venture. The law attempts to see that these limitations are respected. Individual applicants for leases must attest that their interests, direct or indirect, in leases, permits or applications do not exceed the maximum. Corporate applicants must list names and addresses of all holders of 20% or more of their stock. And every option holder must, twice each year, file statements listing and identifying all his option interests.

Five year leases for prospecting on lands not known to overlie oil or gas deposits may be issued non-competitively, merely to the first applicant. The maximum area permitted in each such lease is 2,560 acres, and the plot must be reasonably compact. The lessee pays an annual rental of \$ 0.50 an acre (\$ 0.25 in Alaska) for the first, and \$ 0.25 for the fourth and fifth years, so long as no paying quantities of oil or gas are discovered. Leases may be renewed for five additional years, at an annual rental of \$ 0.50 an acre, so long as the land is still not known to be within the geologic structure of a producing field. Thereafter they lapse. However, as soon as oil or gas are discovered and as long as they are produced in paying quantities, the Government receives a royalty of 12½% of the gross value of production, in addition to the rent (37), and the leases continue automatically. Thus a lease to explore unproved land, upon discovery, automatically becomes a lease of unlimited duration to produce, at a predetermined royalty.

Lands known to overlie producing fields may be leased only by competitive bidding,

(37) As in the case of other provisions, the law is more generous to companies in Alaska: there the royalty for the first discovery of a new pool is only 5%, for the first ten years.

in units not exceeding 640 acres each. The royalty may not be less than 12½%, the annual rental no less than \$ 1 an acre (\$ 0.25 where only gas has been discovered), and the lease is issued to whoever offers the highest bonus. In addition, the law provides for detailed supervision of operations of lessees, notably the application of the same kinds of rules for the prevention of waste, as are provided in the various state laws, including the power of the Secretary of the Interior to require unit operations (38). The regulations formulated thereunder permit production on Federal lands also to be prorated to « reasonable market demand » (39).

The major difference between the foregoing procedures and those prescribed by specific statute in 1953 for exploitation of the submerged lands of the outer Continental Shelf (40) is that the latter requires competitive bidding on all leases, whether or not in areas with known deposits. The Act prescribes a limit of 5,760 acres for each lease, but sets no limit to the total area that any one company may control in this fashion. The minimum royalty is fixed at 12½% of the gross value of production. The leases are for five years and as long thereafter as oil or gas may be produced in paying quantities or drilling operations continue. Lessees are obligated to operate their leases diligently, under the supervision of the Secretary of the Interior.

State lands.

Space is lacking for an adequate survey of the methods pursued by the several states in granting exploratory and production concessions on publicly-owned lands. The following brief account, based on responses to written inquiries by the four leading producing states (Texas, California, Louisiana, and Oklahoma), accounting for over 75 percent of U.S. output, is intended to be suggestive only.

All four states typically require competitive bidding for leases permitting either explora-

(38) « Oil and Gas Operating Regulations », Code of Federal Regulations, Title 30, Chap. II, Pt. 221.

(39) *Ibid.*, Par. 221.10.

(40) 67 Stat. 462, Aug. 7, 1953; see also Code of Federal Regulations, Title 43, Chap. I, Pt. 201.

tion or production of crude oil and natural gas (41). Bidding is usually in the offer of cash bonuses, in which case the typical royalty is 12½% of the value of crude oil produced. Sometimes, instead, bonuses and rentals are predetermined, and bidding is on the royalties. The terms of the leases vary — three years in inland Louisiana, five years in the Louisiana submerged lands, five years in Texas; twenty years in California — with varying possibilities of extension if exploratory drilling continues in good faith. In all cases, as on Federal lands, the leases continue as long as oil or gas are produced « in paying quantities ». The States did not inform the writer of any limitations on the total acreage in the State any one person or company might lease.

Most states require diligent prosecution of exploration or production on leased lands — in Texas the drilling of as many wells « as the facts justify »; California leases may carry very specific requirements about the maximum time that may elapse between the abandonment of one well and the commencement of another, and the depth to which wells shall be drilled. In contrast with conservation legislation, the stipulations here seek to assure *sufficient* exploration and production: California leases prescribe *minimum* numbers of wells to be drilled, and require production continuously at M.E.R. At the same time, the States generally impose the same sort of conservation controls on public as they do on private land (42).

Unfortunately there is no literature analyzing and evaluating the application of the above-described statutes, and the writer lacks sufficient first-hand experience to do so. In any event, we find ourselves perhaps in an area in which economic logic cannot supply decisive guidance for public policy. The problem clearly posed on state-owned land — though it exists also on privately-owned land, and in formulating tax legislation governing

(41) Louisiana law permits the State Mineral Board to explore and develop state lands on its own account, if it chooses, or to grant exploratory permits to others without competitive bidding. California regulations specifically prohibit the issuance of prospecting permits: exploration on public lands is permissible only upon successful competitive bidding for a lease.

(42) California goes even farther, reserving the right to limit output of its lessees to M.E.R., something it does not do on private lands. See note (10), supra.

depreciation and depletion as well — is one of providing adequate incentives to produce a desired rate of development of a natural resource, on the one hand, while preventing spoliation of the social patrimony for the exclusive benefit of the few. It is clear that the regulations just outlined attempt to strike some sort of balance between these two conflicting considerations, with their opening of public lands to private production, yet adding acreage limitations, and requirements of competitive bidding, conservation practices, and diligent working. Economics alone cannot determine the amount and kind of incentives required, on the one hand, or the desired rate of uncovering and using up natural resources, on the other; and hence is of limited usefulness in determining the appropriate terms and conditions of regulation.

The 1954 amendment to the Federal law, relaxing some of the restrictions on private enterprise, illustrates the kind of problem involved. The bill's supporters argued that the increasing costs of exploration in the United States, with the average depth of wells increasing yearly, required such a liberalization: private capital could not be expected to take yearly larger risks without the possibility of exploiting more than the 15,360 acres of public domain theretofore permissible in each state (43). No voice was raised in Congress in opposition either to this contention or to the bill itself. The even greater relaxation in the case of Alaska undoubtedly reflected the feeling that both the risks in that far more distant and less well prospected region, and perhaps the desirability of attracting private capital to its economic development were proportionately greater. Yet at the time the bill was passed, to offer greater incentives for exploration on the public lands, some 1,800,000 b/d, or over 20 percent of the nation's total M.E.R. capacity was already shut in to keep production from exceeding « reasonable market demand », and oil producers were putting heavy pressure on Congress (and, perhaps more effectively, on the importing companies themselves) to curtail imports. On the other hand, it must be remembered that natural resources are not

(43) *Congressional Record*, July 8, 1954, p. 9598.

really economic resources until they are found. It may be entirely consistent with the national interest to pay a high price to elicit exploration today while yet holding some of the productive capacity thus discovered in reserve for tomorrow.

IV. - Lessons of the American Experience.

The years since World War II have witnessed an ever-increasing interest in the possibilities of finding crude oil in Italy. Several successful wells have already been drilled, and numerous companies have made application for permission to join the search. Can the Italian government draw any lessons from the American regulatory experience?

The basic difference between the controlling legal institutions in the two countries clearly renders any attempt to do so highly precarious. Italy is faced with the question of granting exploratory and production concessions to its subsoil, subject to limitations designed to protect the public interest therein, while assuring rapid, efficient development. The major question facing it is how severe these limitations may safely be — stated alternatively, how limited concessions it can offer private enterprise — and still get its oil found and produced at an acceptable rate. In the United States, instead, maximum incentives were offered by the rule of capture, and for 75 years minimum safeguards imposed. The result was an extraordinarily rapid industrial growth, but the wastes were stupendous.

Even if we confine our attention to that portion of the American industry in which the legal situation is basically similar — the government lands — comparisons are dangerous. For there was already in existence in the United States a thriving industry before the basic code of 1920 was written. The pre-existence on private lands of a going industry — with all this implies in the way of skilled labor, availability of venture capital, a huge market, an accumulation of geophysical information built up over 50 years of wild-cattling, a pool of administrative-technical talent on which to draw for staffing regulatory government agencies — would have justified

statutory provisions that would be entirely inappropriate in a different economic environment. We have already noted, for example, that the different situations of Alaska and continental United States appear to explain the variations in the law applied to each.

In terms of geographic propinquity of potential supplies to sources of capital and markets, Italy is apparently not so poorly situated as Alaska. But in terms of the preconditions listed above, neither is it so well endowed as the continental United States. On the other hand, Italy has the probable advantage over the United States that its surface has, so to speak, hardly been scratched. It probably need not anticipate the need in the immediate future for 15,000 to 20,000 foot wells, costing hundreds of millions of lire each, such as are being drilled in the United States.

Because of these important differences between the two countries, it would probably be most useful to confine ourselves to certain general observations and suggestions based on American experience, leaving it to the reader to decide to what extent the conclusions are applicable to the Italian situation.

(1) American oil history seems to demonstrate the effectiveness of the lure of immense riches in getting oil discovered. With all its insufferable waste, the anarchic system of capture, in the American environment, developed the world's greatest oil industry. Continuous new discoveries have kept the ratio of reserves to an ever-increasing annual consumption extremely steady, thirty five years after imminent exhaustion of the nation's oil resources was widely predicted. A country would be well advised, it would appear, to offer adequate incentives to the private wild-catter.

(2) Competitive withdrawals from individual pools makes for intolerable waste, and must not be permitted. But the spur of competitive exploration, with substantial rewards going to the successful discoverer, would seem still an excellent way of getting oil found.

(3) One possible way of determining in an objective fashion what price society has to pay for assiduous private exploration — or, conversely, how much of what they find wild-catters may be willing to return to society

while still being willing to search — would be to issue exploration and production leases by competitive bidding. It will be noted that this is the frequent procedure on publicly-owned lands in the United States. Such a system presupposes the existence of a sufficient number of bidders to make the competition effective.

(4) At the same time, competitive bidding may result in too much of a small country's oil resources falling into the hands of a few powerful international oil companies, who can offer the highest bonuses and have the greatest incentive to retain control in their own hands. Thus the attempt to secure the highest possible money return from leases may defeat the public interest in competitive development of its oil. This danger suggests the desirability of limiting the acreage any one company may control — with a higher limit for exploration than for production of known fields — and assiduous efforts to prevent evasion of these limitations by the proliferation of de jure independent but de facto subsidiary lease-holding companies. It suggests also that permits for exploration should be made available on relatively easy terms, so as to attract numerous, independent wild-catters.

(5) When the government owns the sub-soil rights, it is in an ideal position to insist on intelligent well-spacing and unit operation. There then emerges the opposite threat: that concessionaires may not develop and produce from known reserves with sufficient rapidity, for monopolistic reasons. How can this danger be minimized?

(a) The maximum efficient recovery rate might be designated the *minimum* rate of withdrawal instead; California leases, it will be recalled, require production up to M.E.R. on state-owned lands. This provision might not assure sufficient development, however. It is doubtful, for example, that the rate of production in Middle Eastern oil fields is below the M.E.R. Supply is held down to what the major integrated companies believe markets will absorb without price weakness by controlling the drilling programs in areas where oil is known to exist, in accordance with the estimates of requirements provided by the

owners of the cooperative concessionaire companies.

(b) It might be possible to prescribe minimum programs of development, such as various American state laws do, to assure assiduous prosecution of leases. Enforcement of such rules might require the exercise of substantial administrative discretion, which presupposes the presence of an efficient bureaucracy.

(c) Another spur to development would be a rule limiting the duration of exploratory permits where no production is forthcoming, as is done in U.S. federal government leases. Thus the prospector would have an incentive to search diligently. Once oil was found and produced, he could be required to produce up to M.E.R.

(d) Competition would be the most effective spur to economically optimum development — not competition in withdrawal from each pool, which would be the intolerable rule of capture, but competition between unitized fields for the maximum share of the Italian market. The refiners in Italy could easily be required to give preference to Italian-produced crude oil, where practical, thus assuring an adequate market to the most aggressive producers. Here again we return to the efficacy of offering maximum opportunities to the independent wildcatter-producer.

(e) It is in this connection — providing competition with private enterprise — that a public corporation like E.N.I. might make its most positive contribution. By the same token, it would seem safest to have such a corporation itself subject to the spur of rivalry: it too might be reluctant to take unusual risks with taxpayers' money in seeking for oil, or to spoil the market.

(6) The foregoing emphasis on the desirability of offering adequate incentives to independent exploration, and competitive pressure to assure maximum efficient production may seem to run counter to the public interest in conservation and in avoiding the earning of high profits, especially by foreign companies, from exploitation of the public's resources. To these considerations there are two answers. First, competitive bidding and development

would help hold profits in check. Second, neither conservation nor the public interest (so far, at least, as the economist can define them) consist in simple failure to discover and use natural resources. Waiting involves a real economic cost, and therefore risk capital is worth paying for, because £1,000 prudently invested today is worth more than £1,000 hidden somewhere underground and discovered a year from today. Conversely, a barrel of oil discovered and produced tomorrow is worth less to the Italian economy than a barrel extracted today, and the difference is worth paying for — to Italian capitalists, if they are available, to foreign capitalists, to the extent they can speed the process — provided, of course, the price paid is not excessive.

Ultimately of course the basis for these decisions of economic policy must be political

rather than purely economic. The value which a country places on a given rate of economic development, the price it is willing to pay therefor by permitting small groups to profit by contributing to it, are not economic but political data. An economist can not as such appraise the possibilities of loss of political independence, or menace to democratic institutions posed by the creation of fortunes from oil exploration; nor can he appraise the danger that a governmental bureaucracy may be incapable of regulating the granting of concessions in the public interest. Here again he may only point out that delay, too, is economically costly, and probably politically costly as well; and that a competitive, decentralized economy is probably best adapted to minimize the political as well as the economic dangers.

ALFRED E. KAHN