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# Soviet Oil Prospects

An Intelligence Assessment

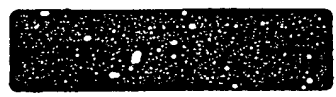
Information available as of 22 May 1981 has been used in the preparation of this report.

CIA HISTORICAL REVIEW PROGRAM  
RELEASE AS SANITIZED  
1999

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EK 81-10200  
May 1981



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### Soviet Oil Prospects -

This report updates the CIA study of April 1977 on the Soviet oil industry.<sup>1</sup> That study concluded that Soviet oil production would peak, possibly as early as 1978, and certainly not later than the early 1980s. We further noted that the maximum output reached would probably be between 11 million and 12 million barrels per day (b/d) and would probably not be maintained for long. Finally, we concluded that by 1985 output would fall to between 8 million and 10 million b/d.

We are in the process of an intensive review and update of the 1977 estimate. All of the problems that we foresaw the Soviets facing are emerging, although output in the near term may be somewhat higher than we anticipated in 1977. This report summarizes the results of our research thus far. It has been prepared because of the critical nature of the Soviet oil problem for energy policy worldwide and because of its potential impact on Soviet policy and East-West relations.

The central finding is that, despite extremely costly efforts, Soviet output, at most, is likely to remain at about the present level of 12 million b/d for one to three years and then begin to decline. We estimate output in 1985 between 10 million and 11 million b/d, with a further decline to perhaps 7-9 million b/d in 1990. Only the rapid discovery of very large amounts of new oil can avert this outcome.

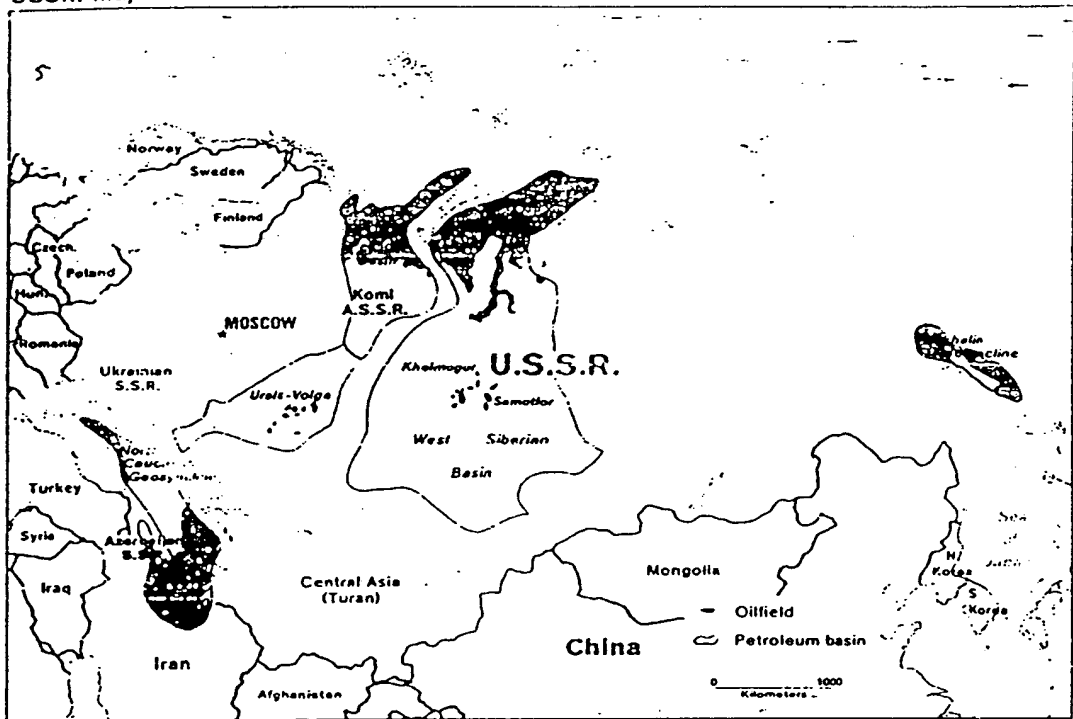
If oil production falls by the mid-1980s to the levels we expect, the Soviet Union will be unable to satisfy its own oil requirements and to maintain exports to its client states and the West. Moscow, therefore, will have to make painful choices in allocating scarce oil supplies between meeting its domestic needs and those of Eastern Europe and in maintaining enough hard currency exports to finance high-priority imports. The Communist countries as a group are already fast losing their net export position and probably will be net importers by 1985.

<sup>1</sup> The conclusions of that study were highly controversial at the time. Since then, however, more and more specialists on Soviet energy have come to share our view. The views set forth here are still not universally subscribed to either within the government or among outside companies and observers. DIA, for example, takes a more optimistic view of Soviet oil prospects.



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USSR: Major Petroleum Basins and Oilfields



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## Soviet Oil Prospects

### The Soviet Oil Problem

The Soviet oil industry is in serious trouble. There are two principal roots of the problem:

- To minimize investment while maximizing output, the Soviets have overexploited their largest and best deposits. Their production strategy leads to rapid reserve exhaustion and sharp declines in output once production peaks in any individual field.
- The strategy worked well for the Soviets as long as they were finding enough large fields to replace those in decline. No such fields have been found in the past six years.

The problem caught the Soviets off guard. They had anticipated more discoveries and had substantially overestimated the amount of oil they would recover at existing fields.

The Soviets have attempted to compensate for these problems and to keep production rising by greatly increasing investment in recovery and drilling. They are installing pumps and other artificial lift equipment on a vastly increased scale, while at the same time attempting to drill and develop large numbers of smaller, less productive fields. This effort has sharply pushed up the share of the oil industry and supporting infrastructure in total national investment. Moreover, costs will mount rapidly in the next few years because the decline of production in older fields is accelerating and average production from new wells in smaller deposits is low.

In short, the Soviet oil industry is on an accelerating treadmill. Production now totals 12 million barrels per day (b/d), the largest in the world. Simply maintaining this level of production, however, requires development of 2 million b/d in new capacity each year. In the past, large new capacity requirements were relatively easy to meet by drilling a few wells in highly productive fields. Now, drilling requirements are massive because of the deteriorating quality of known reserves. In the mid-1970s, for example, the Soviets added new capac-

ity of 1 million b/d per year in West Siberia (by drilling about 1,000 new production wells that produced 1,000 b/d each) to raise national production 600,000 b/d. In 1981 they plan to add new capacity of 1.5 million b/d per year in West Siberia (by drilling about 3,000 new wells that produce 500 b/d each) to raise national production less than 200,000 b/d.

### Record to Date

From World War II until 1977, the Soviet record in oil production was enviable. Production goals were consistently met or exceeded at small additional cost. Annual production gains have slowed sharply in the last few years, from about 600,000 b/d in 1975 to only about 300,000 b/d in 1979. The original 1976-80 economic plan called for production of 12.4-12.8 million b/d in 1980. Actual output in 1980 was about 12 million b/d, a gain of only 300,000 b/d over the previous year. The plan for 1981 calls for production to increase by only one-half of the 1980 increment.

Production is now stagnating or declining in all major Soviet oil-producing regions except Komi and West Siberia. Urals-Volga production, for example, has declined by 700,000 b/d since output peaked in 1975, dropping to 3.8 million b/d in 1980. The decline reflects the near collapse of output in the region's largest producing field. Production in other traditional producing areas—North Caucasus, the Ukraine, Central Asia, and Azerbaijan—is also declining. Altogether, oil production in these areas, plus the Urals-Volga has slipped by about 1 million b/d since 1975. In 1980 the decline was about 300,000 b/d. Moscow had not anticipated this decline; the initial 1976-80 plan called for output from these areas to remain about constant through 1980.

Almost all of the growth in Soviet oil production during the last decade has come from West Siberia. In 1980, West Siberian production reached about 6.2 million b/d, up from 0.6 million b/d in 1970 and 3 million in 1975. About half of the total comes from the supergiant Samotlor field. Because of its high-quality

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reserves, the USSR was able to achieve large production gains from Samotlor with relatively small numbers of drillers and other oilfield workers. To help compensate for production shortfalls elsewhere, the Soviets have worked Samotlor harder than any major field in the world. As a result, the field is about to decline after only a few years near peak output. Most of the other 17 large West Siberian fields that account for the remainder of the region's output have already peaked or are in decline, according to Soviet industry experts.

#### The 1981-85 Plan

The recently published 1981-85 Five-Year Plan calls for only small increases in total oil production. Output is planned to rise an average of 50,000 b/d to 150,000 b/d annually, reaching 12.4-12.9 million b/d in 1985. Even the low end of the range depends on West Siberia, where output is targeted to increase by almost 1.5 million b/d, reaching nearly 8 million b/d by 1985. The Soviets expect output in traditional producing areas to decline roughly 1 million b/d by 1985.

#### The Reserve Problem

To achieve even the low end of the planned range for 1985, the Soviets must find new, high-quality reserves soon. Since Moscow keeps reserve data secret, estimates of reserves must be made on the basis of incomplete and indirect evidence. Moreover, the Soviet reserve classification system is completely different from Western concepts, complicating comparisons. Beyond this, differences frequently exist in what is being measured—oil in place versus recoverable reserves, for example. Differences like this help explain why some estimates place reserves at 80 billion barrels or more while others are 30 billion barrels or less.

We estimate that the volume of remaining recoverable reserves—proved, probable, and possible—at discovered fields approximate 50 billion barrels. This is based on an intensive review of Soviet technical literature, which contains large amounts of scattered data on discovery rates, individual field reserves, as well as statements regarding the quality of reserves. We estimate that developed reserves in existing producing areas total about 30 billion barrels. Since this figure includes some viscous oil and reserves with low flow rates, the stock of high-quality reserves that can be

produced at a fairly high rate is substantially below 30 billion barrels.

This reserve base is insufficient to sustain Soviet output at present levels for very long. With annual production approximating 4.4 billion barrels the reserve-to-production ratio is already declining sharply. The ratio of total discovered reserves to production has dropped to about 11:1. In the case of drilled reserves in existing producing areas, the ratio is now around 7:1, not much better than in the United States, excluding Alaska. Moreover, the ratio is declining in West Siberia, as well as in traditional producing areas, because of a sharp decline in discovery rates.

#### Falling Discovery Rates

The odds on finding major new deposits that could be brought into production quickly appear to be shrinking. In the USSR, as elsewhere in the world, giant fields account for most of reserves and output. In the older producing areas of the Soviet Union, however, only five giant fields have been found in the last 20 years. And in the newer region, West Siberia, no giant field has been located since the Kholmogor field was found in 1973. A key indication of the erosion in the quality of West Siberian reserves is the projected decline in well productivity—the volume of oil that each new well can produce—over the next five years. According to Soviet specialists, well productivity will decline by 60 percent during 1981-85 compared with the previous five-year period.

The failure to discover any giant fields in West Siberia since 1973 has substantially lowered the rate of finding reserves. This rate fell from about 8,000 barrels per exploratory foot drilled in the early 1960s to about 1,000 in the period 1966-75 and about 200 in the last five years. As a result, Soviet specialists are increasingly concerned about the lack of good discoveries and falling reserves in West Siberia. Because of the sharp increase in production in recent years and the fall in discovery rates, the reserve-to-production ratio in West Siberia may be declining faster than in any other producing area.

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We cannot rule out the possibility of finding large new fields in West Siberia. Otherwise, particularly promising locations are offshore extensions of onshore producing areas in the Caspian, Barents, and Kara Seas. Of these, only discoveries in the deep waters of the Caspian are likely to be brought on stream before 1990. Offshore exploration is under way at Sakhalin, but significant production is not likely. Development in other areas will entail long leadtimes. The Arctic, for example, is only lightly explored. Although Arctic onshore and offshore potential is considerable, exploration and development will require technology that is not now available either in the USSR or in the West. As things now stand, seismic limitations hinder Soviet exploration in permafrost regions, below salt layers, and generally at depths below 3,000 meters.

#### Drilling Requirements

To meet 1985 oil production targets, the Soviet oil industry will have to add more than 10 million b/d of productive capacity to offset the depletion of fields in older producing areas as well as West Siberia. With no stock of high-quality reserves awaiting development, drilling will have to increase much faster than in the past just to maintain output. Soviet planners recognize the problem, and current plans call for total drilling to more than double in five years, reaching 35 million meters in 1985. Most of the increase is planned for West Siberia, where development drilling is scheduled to about triple the present effort, to 20 million meters annually. Plans call for this drilling during 1981-85 to be 75 million meters, versus only 28 million meters in the previous five-year period. These drilling targets probably will not be achieved.

In addition to vastly increasing the drilling effort, the Soviets simultaneously will have to put large numbers of personnel in place to service old wells, pumps, and other artificial lift equipment. Siberian working conditions are difficult, mainly because of the climate but also because shipping requirements for equipment, well casing, personnel, housing, and food overload the transportation system. Poorly sorted and loosely consolidated sediments add to the problems; drilling is more difficult, and submersible pumps wear out in a few months.

The Soviets are now in the process of shifting drilling resources from traditional producing areas to West Siberia because new well productivity—although falling sharply—is still higher than in the older producing areas. The shift probably will result in steeper production declines in the Urals-Volga area and elsewhere than the Soviets now expect unless they are able to train new crews and build rigs rapidly enough to maintain drilling in the old areas. In 1979, they were unable to replace shifted rigs and crews, and we doubt they will be able to do so in the future because of the concentration of their efforts on West Siberia.

While the Soviets recognize the need for massive drilling, the scope of the problem has caught them by surprise. For one thing, they did not expect the finding rate for giant fields to drop as suddenly as it did. In addition, during the 1970s, Soviet oil experts had to revise downward their estimates of the percentage of the original oil in the ground that could be extracted with current techniques by about 1 percent per year since 1970. These unforeseen revisions equate to a write-off of estimates of high-quality reserves on the order of 25-35 billion barrels—the equivalent of six to eight years of output at current rates. Before these downward revisions began in the late 1960s, the Soviets were counting on a recovery rate of more than 50 percent nationwide, compared with only 32 percent for the United States.

#### Production Outlook

We doubt that the Soviets can meet their production goals because of the lack of high-quality reserves and the difficulty they will have in achieving their drilling targets. To meet these goals would require more reserves than we think they have, or more discoveries than we think they will make. We expect Soviet oil output to remain at about present levels for one to three years and then begin to decline. By 1985, output will probably be between 10 million and 11 million b/d, declining to 7-9 million b/d in 1990. Oil output could remain at about 12 million b/d through 1985 only if the Soviets quickly find large, easily producible deposits in accessible areas. The odds on this happening are poor.



The projected ranges for Soviet oil production are based on optimistic and pessimistic assumptions on the size of the reserve base, the rate of discovery of new reserves, the decline in the productive capacity of existing fields, and the rate of growth of development drilling. The principal uncertainties involve factors affecting production in West Siberia. With respect to the rest of the country, we are only slightly more pessimistic than the Soviets themselves.

Although the Soviets are planning output levels 1-2 million b/d above those we believe likely in 1985, there is little doubt that the Soviet Government understands it has a serious oil problem. There are many indications that senior planners and party officials are alarmed about the shrinking reserve base, the growing production problems, and the massive increase in the cost of developing oil and gas, which is already cutting severely into other investment programs. The Soviet Government is making a big effort to develop and find oil, is hoping for the best, and is trusting to luck. This strategy makes good political sense, given the likely brief remaining duration of the Brezhnev leadership. Unless the Soviets are very lucky indeed, their strategy will sooner or later make the oil problem worse. As they produce their reserves faster in the next few years, the subsequent decline in output will be greater.

#### Policy Implications

If Soviet oil production soon begins to decline as we expect, Moscow will have to make difficult decisions on how to meet its domestic needs and those of Eastern Europe without turning from a net exporter to the West to a net oil importer. We do not expect the USSR to be a net oil importer by 1985 in part because its economic growth will be slow. The Communist countries as a group, however, are already losing their net export position and probably will be net importers by 1985.

The Soviets will attempt to deal with slower growth in total energy production by substituting other energy sources for oil and by cutting energy use through conservation. With coal production stagnating and nu-

clear power still a small but growing energy source, Moscow must depend on increased natural gas production to substitute for oil and to cover increases in energy consumption. Most of the increase in gas output through the mid-1980s will slow—but not halt—growth in domestic oil needs because gas will be used in new plants and equipment that otherwise would have consumed oil. Achieving a large absolute reduction in oil requirements through conversion of existing capital stock to gas will not occur until an extensive, costly network of gas distribution pipelines is constructed.

Energy conservation, moreover, will be very difficult. Most energy is consumed in heavy industry; households use little energy, and energy use in transportation is already quite efficient. The USSR has had a high-priority energy conservation policy for the last three years that relies mainly on central directives and exhortations, but energy consumption has continued to increase more rapidly than economic activity. Unless substantial reforms are made in management systems and overall basic priorities, energy supply will probably constrain Soviet economic growth during the 1980s.

During the next few years, Moscow can cushion the effect by cutting its oil exports to the West. Eventually, the Soviets will have to maintain a balance between the need to export energy to pay for high-priority imports and the direct requirements for energy in their domestic economy. Alternatively, Moscow could cut exports to Eastern Europe, but only at the risk of worsening a highly unstable situation.

The West can probably do little to prevent a substantial decline in Soviet oil production in the 1980s. Use of such Western equipment as pumps, drill bits, and gas lift equipment could help to moderate the decline somewhat. In the longer term, large-scale access to the best Western technology and advice could be of great help to the Soviets in exploring for and developing offshore fields, deep deposits, and fields in remote areas.

