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International Oil Developments

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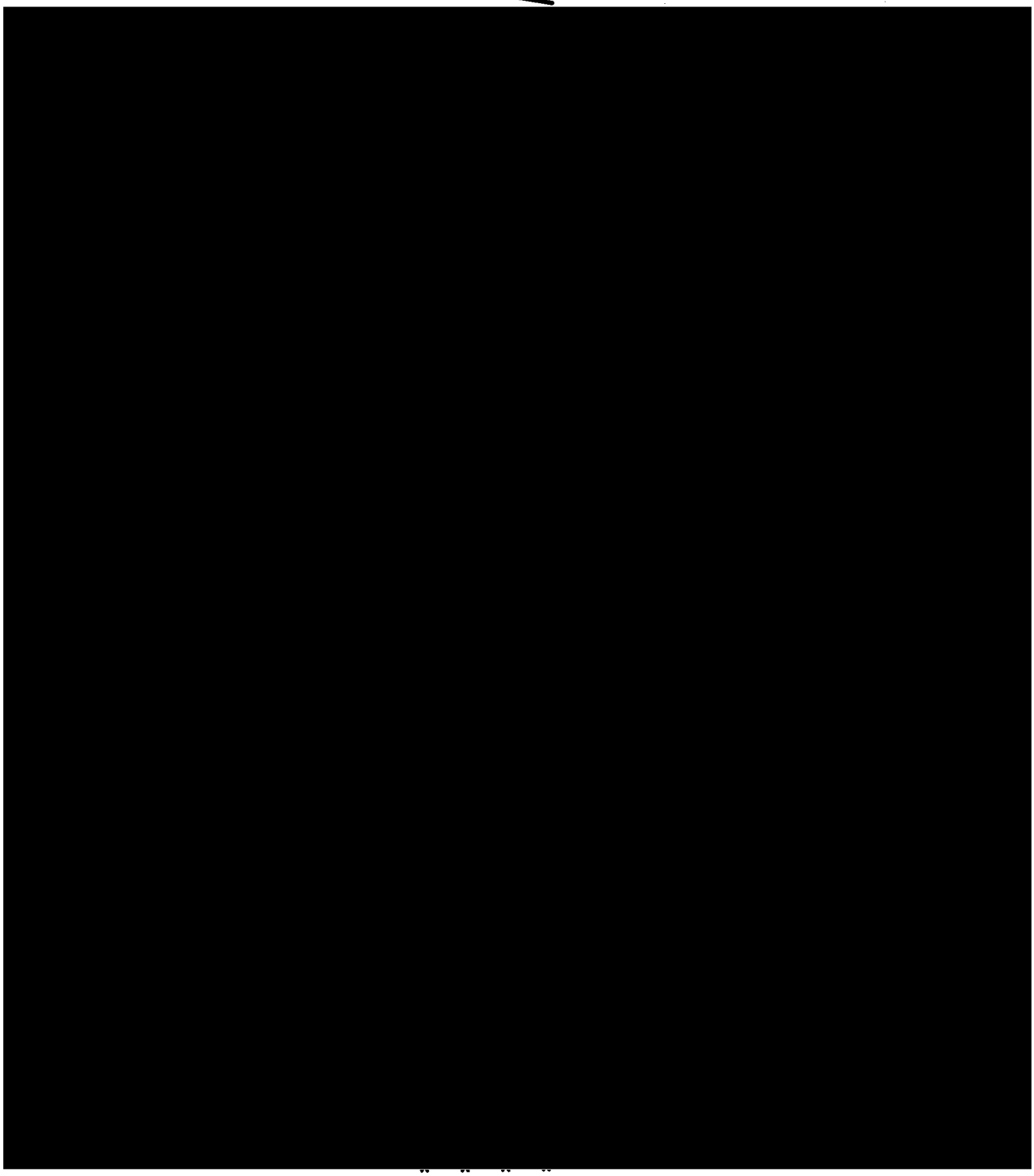

USSR: LASER URANIUM PROCESSING

Several countries, including the Soviet Union, are striving to develop a laser process for producing enriched uranium. The technologies being developed may eventually have significant economic impact in reactor waste processing and general isotope separation, as well as in uranium enrichment. The laser process could possibly produce enriched uranium for one-tenth the cost using other methods.

The process – laser isotope separation – is a new and potentially cheap method of enriching uranium for reactors or nuclear weapons. So far, the Soviet program has not progressed to the point where a pilot plant is feasible. Laser separation of uranium isotopes could be economically attractive because existing methods – gaseous diffusion, gas centrifuge, and Becker nozzle – require large capital investment, are expensive to operate, and are relatively inefficient. A laser method might enable small countries to produce their own fuel for power reactors or nuclear materials for weapons.

The Soviets appear to be emphasizing a uranium laser isotope separation method similar to one being developed at the US Los Alamos Scientific Laboratory. US and Soviet scientists appear to be on a par in their research on this method, which involves the use of cooled uranium hexafluoride gas.

Both the USSR and the United States are doing chemical, physical, and spectroscopic work in support of the process. but actual uranium isotope separation tests await the development of suitably powerful lasers that can be operated at the precise wavelengths of light required. Some US experts predict that such lasers may become available by the early 1980s.

Another method – in which hot uranium metal vapor is irradiated by laser beams to obtain isotope separation – probably has also been considered by the Soviets; [redacted] This process probably has less chance of commercial success because of formidable corrosion problems and the great amount of energy required to vaporize uranium metal at high temperatures. A US commercial firm intends to operate a pilot plant based on this method by 1979.

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Uranium is only one of the many elements whose isotopes can potentially be separated very cheaply using lasers. The Soviets were the first to publish on the successful laser separation of isotopes of nitrogen, osmium, and sulfur. Isotopes of certain other elements can be used as tracers or as radiation sources for medical purposes, and some have special electronics applications. [redacted]

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