

NORTH KOREA AND SEABED PETROLEUM

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North Korea faces a serious shortage of petroleum that has crippled both its industrial and its agricultural development. This has been and remains the driving force that has impelled the Pyongyang authorities to pursue comprehensive exploration of both onshore and offshore areas within North Korean territory.

In this paper, I will focus on the search for offshore, or seabed, petroleum, while putting this search into the perspective of onshore efforts. First, I will briefly review efforts to find and develop oil and gas resources in the Yellow Sea, where the seabed boundary has not been settled among the littoral states. Second, I will touch on the characteristics of seabed geology in the Yellow Sea. Third, I will note the unsettled character of the boundary issues in the Yellow Sea, and finally, I will propose a cooperative approach on the part of the littoral states to resolve these thorny boundary issues.

EXPLORING THE SEABED: A BRIEF REVIEW

For the past five decades, North Korea has made serious efforts, in vain, to find and develop petroleum resources. This effort has been divided into four stages:

1960s: Preparation for Exploration

In 1965, North Korea established the “Administration Bureau of Fuel Resources and Geological Exploration.” The first extensive geophysical exploration was done jointly with China from 1965 to 1980. In 1967, North Korea conducted a joint geological study with the Soviet Union in the Tumen estuary. On top of this, North Korean scientists conducted their own geophysical studies along the coastal seabed of the East and Yellow Seas.

1970s: The First Foreign Contacts

In 1976, North Korea sent a delegation to the Soviet Union to study offshore exploration methods in the Caspian Sea. In 1977, North Korea signed a protocol with Asia Exploration Consultants (AEC) of Singapore regarding oil exploration and development, but this never went beyond the protocol stage. In September, 1979, the first limited seismic work was undertaken in the Yellow Sea with Soviet assistance, and the Yugoslavian national oil company INAP was awarded the right to conduct seismic studies in a 15,000 square kilometer area of the central Yellow Sea.

1980s: Exploration Work Begins

In 1980, a contract was signed with the Norwegian firm GECO Geophysical, a subsidiary of Schlumberger, to survey Blocks, 1, 2 and 3. The exact location of these blocks has not been disclosed.

In 1981, GECO initiated a 2,000 kilometer seismic survey in the central portion of West Korea Bay within the INAP zone.

During this period, China also carried out a seismic survey of the western Korea Bay, including areas near or straddling the boundary. Two western-designed jack-ups

drilled close to the border in 1980. Some minor oil and gas discoveries were apparently made in the same region earlier, and the structures in question continue across the boundary into North Korean jurisdiction. This was why China was interested in assisting North Korea in its exploration efforts. However, both sides left the demarcation issue unsettled, and there have been no reports of Chinese participation in North Korea's offshore exploration and development since the second half of the 1980s.

In October 1983, a "Crude Oil Exploration Bureau" was established under the Cabinet.

North Korea secured an exploration drilling ship (14,000 tonnes level) from Singapore and initiated the exploration work in the seabed adjacent to Nampo on its east coast.

In 1986, North Korea signed an agreement with the Soviet Union on a "North Korea Soviet economic zone and continental shelf boundary" and decided to develop the continental shelf jointly with Moscow. Both the Far Eastern Division of the Soviet Academy of Sciences and the Pyunsung division of North Korea's Academy of Sciences undertook a study on North Korea's coastal geological structure and untapped resources, and found signs of oil from Heungnam offshore. But no further progress was made.

In 1987 Leeward petroleum (UK) signed a contract with North Korea for exploration projects.

Reportedly North Korea discovered 425 barrels a day of crude oil in Zone C in the Yellow Sea at the end of 1988 with the help of an Australian company, Meridian Oil NL, which made a contract with North Korea covering the western Korea Bay on July 31,

1987. It was also reported that North Korea confirmed gas reserves in the Heungnam area.

1990s: Foreign Investment Increases

In 1993, North Korea upgraded its Crude Oil Exploration Bureau to the Ministry of Crude Oil Industry. Then during April, 1994, the Supreme People's Assembly adopted a resolution pledging "to increase the investment in the crude oil industry for upgrading the industry related equipment and concentrating on exploration of the promising areas and finding more crude oil reserves."

Meridian Oil

The first western company that obtained an exploration license in North Korea was Meridian Oil NL of Australia in 1990. Meridian was formerly part of the Independent Resources Ltd (ILR) group, which acquired control of Beach Petroleum NL, Adelaide, and its then parent company, Claremont Petroleum NL. Until the late 1980s, Claremont owned part of the interest in the West Korea Bay acquired by Meridian. Meridian Oil's seismic data was sent to a processing center in London but North Korea failed to pay for the processing. As a result, North Korea failed to get the data back and re-advertised the concession. European and Australian companies were invited to examine prospects after North Korea's Ministry of National Resources Development drafted framework laws governing production sharing contracts.

Taurus Petroleum

Taurus Petroleum AB decided to take the permits in 1992, without knowing of Meridian's earlier activity.

In February 1993 Taurus Petroleum AB signed a PSA with ZosonSulbi (North Korea Equipment), a state trading firm that acts on behalf of the Ministry of Energy. The agreement provides for a 5 year exploration period, extendable by a further 3 years on payment of US \$ 1 million. The agreement provides for North Korea to secure a rising share of production in proportion to the level of output, starting at 55 percent of production. Like Meridian Oil, no taxes or signature bonuses are payable, and Taurus Petroleum has 100 percent ownership rights. Basically Taurus took over the old Meridian blocks.

The exploration phase is divided into four periods. The first period (2 years extendable to December 1998) required reprocessing and interpretation of the earlier seismic shot by GECO, together with acquisition and processing of new seismic carried out in 1997.

Under the PSA, the firm was required to drill one well in the second period of the exploration phase at an approximate cost of US \$7 million and then one more well in each of the two succeeding years.

Beach Petroleum

In 1974, Beach Petroleum's new management accepted an offer to acquire permits to explore the two other concessions (presumably these are just above the Block C in the Taurus concession. These were located above the old Meridian blocks, now let to Taurus Petroleum AB, Stockholm, and the whole East Sea side. Beach Petroleum decided to take the option on the east side, covering approximately 29,000 square kilometers.

Beach Petroleum signed a 25 -year Production Sharing Agreement (PSA) with Zoson Sulbi. This consists of a five-year exploration period and a twenty-year production period. No taxes or signature bonuses are payable, with the exception of a production payment bonus that becomes payable if a certain level of production is reached.

Beach Petroleum's PSA with North Korea was similar to that of Meridian, with the share determined on a sliding scale based on total output from the concession.

In 1997 Beach Petroleum farmed out a 25 percent interest to a Malaysian company, Puspita Emas, in return for financing the costs of shooting 1,000 kilometers of additional seismic in July, 1997. The firm also reprocessed 7,000 line kilometers of seismic shot during the Soviet period and evaluated data from the two wells drilled (the two wells confirmed oil shows).

In total, Beach Petroleum has identified eight prospects and nine leads. These include buried hill structures, with a potential up to 500 million- 1 billion barrels. Beach Petroleum's studies reveal that the onset of oil generation is likely to occur in the Lower and Middle Miocene sediments at subsurface depths of below 2,100 meters.

SOCO International

In May 1998, SOCO International, a London-based exploration and production company spun off from Snyder Oil of Fort Worth, Texas, decided to take the third concession.

The PSA covers an exploration area of 7,000 kilometers, two thirds offshore and one third onshore in the Anju and Onshon basins. The terms of the PSA agreement Soco International has signed required an outlay of US \$350,000 for five years to determine

whether further investigation is warranted. Information concerning the progress made to date is not available.

The First Onshore Concession: Sovereign Ventures

In September, 2001, it was reported that Sovereign Ventures Pte. Ltd. (SVPL), Singapore, was seeking experienced partners to explore and develop the first onshore oil and natural gas concession in DPRK to be granted to a foreign company. The concession was awarded by KOEC and it covers some 6,000 square miles or about 5 miles of North Korea's landmass. Known as PSCA Techon-rajin, it is on the Chinese border across the Tumen River in the northeastern part of the Korean Peninsula and southwest of Vladivostok, Russia.

According to Ben Tan, executive vice president of SVPL, which was formed in 1993 as the upstream subsidiary of the Korasia group, the concession provides for an initial three-year testing period for geophysical exploration, a two-year exploration drilling stage and if successful, 20 years for development and production. No corporate tax will be applicable during the first five years of operations. During the following 2 years, company profits are to be taxed at 5 percent, escalating to 10 percent after that. Extension of the concession agreement can be negotiated on mutually agreeable terms.

SVPL aims at investing at least US \$10 million in the total project, including at least US \$2 million in the seismic testing and exploratory drilling stages. SVPL estimates that the concession area's recoverable reserves are well in excess of 150 million barrels of oil or its equivalent in gas. SVPL anticipates a 30 percent success rate in exploration drilling and up to 70 percent success with development drilling.

In August, 2002, SVPL announced that it had found oil and gas reserves in the contracted area and expects to be able to recover a minimum of one trillion cubic feet of natural gas and 10 million barrels of oil from the concession area.

The Aminex Deal

On September 19, 2004, *The Observer* reported that “Aminex, the British oil company listed on the Dublin stock market, has clinched a deal with the government of North Korea to explore and develop all the country’s potentially oil-bearing territory, with a decisive say in production... The deal – signed secretly in Pyongyang during the summer, gives Aminex 20-year rights over the industry, via a joint venture with the government. It has also negotiated the right to reserve royalties, revenues and the pick of the best acreage should it prove productive.

A more detailed interview story by the *Financial Times* revealed the characteristics of the deal:

The North Koreans proposed to draw the contract up under Swiss commercial law. It was finally signed in Pyongyang in June in the presence of the British ambassador... Under the agreement, Aminex will provide technical assistance such as analyzing seismic data and introducing foreign investment in return for a share of future production and royalties. The company also has the right to cherry-pick and drill wherever it considers promising and is eyeing an area off the western coast.

If these reports are correct, the deal is extremely good for Aminex, which lacks the capacity to make a real investment for exploration, but is terribly bad for North Korea, exemplifying its inability to attract a reliable Western energy firm with adequate capital to conduct its offshore exploration. Unless, as Aminex hopes, it is able to find

bigger companies to join with it, the Aminex deal could prove to be an obstacle rather than a facilitator for offshore exploration.

CHARACTERISTICS OF NORTH KOREA'S OFFSHORE GEOLOGY

North Korean exploration and production activities, both onshore and offshore, have leaked out to the outside world only to bits and pieces. Little is known about the true scale of the offshore potential, but it is apparent that North Korea has high expectations for an eventual offshore breakthrough.

One of the few systematic presentations concerning North Korean offshore geology to surface outside the country came in an October 7th, 1997, seminar titled "Explanatory Meeting For Hydrocarbon Exploration Opportunities Offshore DPR Korea," organized by North Korean and Japanese promoters in Tokyo. Dr. Dong R. Choi, a geologist of Korean ancestry, based in Australia and a technical adviser for Petrex Co. Ltd., Tokyo, presented a summary of the massive survey logs on North Korea's oil formations. In this seminar, the characteristics of North Korea's offshore geology were summarized as follows:

West Korea Bay (exploration area: 18,600 square kilometers)

- The basement made of thick carbonate rocks (5,000 meters) of the Late Preterozoic and Early Paleozoic is overlain by the Mesozoic (6,000 - 10,000 meters) and Cenozoic (4,000 – 5,000 meters) sediments. Source rocks are the Jurassic black shale (3,000 meters or more), Cretaceous black shale (1,000 – 2,000 meters), and pre-Mesozoic – Cenozoic sandstone with high porosity and pre-Mesozoic fractured carbonate rocks. Petroleum traps are anticline, fault-sealed, buried hills and stratigraphic types.

Existing exploration data: 4,500 kilometers of integrated geophysical surveys with grid of 2 x 4 kilometers. Seven wells have been drilled, recovering oil and gas from several wells and hydrocarbon shows from all of the wells.

Korea East Sea (exploration area: 30,000 square kilometers)

- Pre-Mesozoic gneiss and carbonate rocks are overlain by the Mesozoic and Cenozoic sediments, 6,000 – 7,000 meters in thickness. A source rock is the Tertiary thick marine shales (1,500 to 2,000 meters) and underlying Mesozoic Rocks. Reservoir rocks are Tertiary sandstone of a good reservoir physical property and fractured carbonate rocks which constitute the basement. Trap structures – anticline, fault-sealed, buried hill, facies-sealed, stratigraphic types and reefs.
- Existing exploration data – Integrated geophysical surveys with a grid of 10 x 20 kilometers throughout the basin, with a grid of 2 x 2 kilometers over some parts. Two wells drilled, oil and gas shows found from both wells.

Until a comprehensive exploration is made, any suggested figure on the potential hydrocarbon reserves carries no weight at all. According to Shin Dong-A, however, Dr. Bu-Seop Park, MIT educated nuclear physicist and who has been on working on DRPK offshore exploration since mid-1990s, argued that North Korea has five oil deposit zones in the Western Sea, off Nampo, South Pyongnam province.

Dr. Park said the estimated oil reserves of the first zone are 65 million tonnes, those of the second, third and fourth fifth are 50 million tonnes, 30 million tonnes, a small amount of oil, and 10 million tonnes respectively. It is worth noting among these five zones North Korea is giving priority to developing the field in the third zone.

(*Source : “DPRK has 12 Mil. Barrels of Oil Reserves in Western Sea”,
<http://www.hartford-hwp.com/archives/55a/161/html>) As both the China National Offshore Oil Corporation (CNOOC) and Korea National Oil Corporation (KNOC) have the exploration technology and financial capacity to determine the extent and location of these reserves, the exploration of the Yellow Sea, including North Korea’s West Korea Bay, is a matter of time, once the thorny offshore boundary is settled.

THE YELLOW SEA BOUNDARY ISSUE

Petroleum development in the Yellow Sea is currently dormant as the exploration has never reached to the areas of uncertain jurisdiction. Under the current situation, even a preparatory attempt to figure out any existence of hydrocarbon resources could trigger the kind of claims and counterclaims that have been witnessed in other parts of Asia. However, the Yellow Sea coastal states will have no choice but to exploit offshore deposits in disputed areas at some point.

What is needed for the Yellow Sea coastal states is the wisdom of a win-win strategy. To find a solution that can be equally applied to the boundary dispute between North Korea and China, and South Korea and China is very difficult.

If China maintains the silt-line principle based on the concept of the natural prolongation of the continental shelf or alternatively claims an exclusive economic zone (EEZ) extending from Haiyang Island, 69 kilometers off Liaodong Peninsula, problems could arise. A boundary along the silt line would give almost the entire Korea Bay Basin to North Korea, whereas if the equidistant-line boundary were applied, only a small pod of possible oil bearing sediment would lie on the North Korean side of the line.

When it comes to the Yellow Sea boundary issue between South Korea and China, the focus of the argument is different. The silt line boundary in the Yellow Sea would place the entire basin on the Chinese side of the line. If the boundary was the equidistant line, most of the basin would be on the Chinese side but half a pod of potentially oil bearing sediment, including a tip of the area with the best prospects, would be on the South Korean side.

In Autumn 2003, Interfax China reported that China is conducting active surveying and prospecting for marine energy deposits, including those of the highly efficient “combustible ice,” in the northern Yellow Sea and part of the East China Sea. Qingdao Institute of Marine Geology (QIMG), under the auspices of China’s Ministry of Land and Resources (MLR), confirmed that geophysical analysis under the sea had already indicated the presence of hydrocarbon deposits. However, fearing the prospect of a territorial dispute with Japan and the South Korea, especially in the North Yellow Sea, the Chinese government has been carrying out the program discreetly, said the official of the QIMG, who would not discuss the progress made by prospectors in the area.

A rumor in the oil industry in Korea is that the Malaysian state oil company Petronas was planning to undertake an exploration work somewhere in the area initially allocated to Soco International in early 2004 but decided not to pursue the work due to the Chinese-North Korean boundary disputes. This confirms that the boundary issue is a major obstacle to exploration work in the West Korea Bay.

THE CASE FOR COOPERATION

With exploration underway both onshore and offshore, it is clear that North Korea is increasingly serious about oil and gas exploration. The most promising possibilities for

major oil and gas discoveries appear to lie in the seabed, but until comprehensive exploration is carried out, the magnitude of this potential will remain unknown. North Korea faces seemingly intractable political obstacles, facing as it does a continued impasse in relations with the United States that has so far discouraged big-name, reliable Western companies from making exploration commitments to Pyongyang. Until the nuclear crisis is peacefully and completely settled, it will be very difficult to attract Western investment in North Korea's search for petroleum.

Pending a resolution of the impasse with the United States, the most promising course for North Korea lies in cooperation with South Korea and China, specifically cooperation between North Korea's Korean Oil Exploration Corporation (KOEC), South Korea's Korean National Oil Corporation (KNOC) and the China National Offshore Oil Corporation (CNOOC), which are responsible for continental shelf exploration and development and concessions with foreign companies in the three countries.

In May, 2000, SOCO and Taurus, acting for North Korea, invited KNOC and South Korea's giant conglomerate, Hyundai, to form a consortium for oil and gas exploration in the Yellow Sea. Hyundai estimated the Block B and C reserves to be around 100 million – 1 billion barrels, based on exploration to date. The firms saw that the economics of exploration in the West Korean Bay can be justified if a minimum discovery of 40-50 million barrels reserves is made. They wanted to apply for South Korean government funds for exploration and planned to take the next step after the June, 2000, Summit meeting, but received no encouragement from Seoul, and no significant step was taken after the Summit.

Another abortive cooperative effort occurred in May, 2004, when North Korea's KOEC proposed to South Korea's KNOC a group meeting to discuss cooperative exploration in the Yellow Sea. A media leak in South Korea angered North Korea and led to cancellation of the proposed meeting.

To date, KNOC and KOEC have never met to discuss adopting a common approach to resolving the Yellow Sea boundary issue with China and to cooperating in exploration and development. Such contacts and, better still, a tripartite meeting between the two Korean oil enterprises and CNOOC, are increasingly urgent. The North and South should first adopt a common approach to China in resolving the boundary issue. The three should then work together to resolve this issue and proceed to joint exploration and development in one of the least explored offshore areas in the world.

The real question is whether Seoul, Pyongyang and Beijing are ready to take the first step toward cooperation by having a face to face meeting to break the present deadlock.