Woodrow Wilson International Center for Scholars
Asia Program

Seabed Petroleum in Northeast Asia: Conflict or Cooperation?

Selig S. Harrison

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Contents

1 **Foreword**
Robert M. Hathaway

3 **Seabed Petroleum in Northeast Asia: Conflict or Cooperation?**
Selig S. Harrison

15 **Conference Participants**

Selected Working Papers:
SEABED PETROLEUM IN THE EAST CHINA SEA: GEOLOGICAL PROSPECTS, JURISDICTIONAL CONFLICTS AND PATHS TO COOPERATION
April 12-13, 2004, Beijing, China

18 *Choon-Ho Park*
Seabed Boundary Issues in the East China Sea

23 *Susumu Yarita*
Toward Cooperation in the East China Sea

29 *Zhao Li Guo*
Seabed Petroleum in the East China Sea: Geological Prospects and the Search for Cooperation

32 *Zhiguo Gao and Jilu Wu*
Key Issues in the East China Sea: A Status Report and Recommended Approaches

Selected Working Papers:
SEABED PETROLEUM IN THE YELLOW SEA: GEOLOGICAL PROSPECTS, JURISDICTIONAL CONFLICTS AND PATHS TO COOPERATION

April 15-16, 2004, Beijing, China

39 *Keun Wook Paik*
North Korea and Seabed Petroleum

49 *Zhang Hai Qi*
Oil and Gas Exploration and Development in the Yellow Sea

51 *Kim Myong Gil*
Seabed Petroleum and the Economic Development of the D.P.R.K.

54 *Kook-Sun Shin*
Hydrocarbon Potential of the Yellow Sea Kunsan Basin

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Foreword

Robert M. Hathaway
Director, Asia Program
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With its energy needs steadily multiplying, Northeast Asia will require ever increasing petroleum imports for its economic expansion and survival. Most of these imports will come from the same sources—the Persian Gulf and Southeast Asia—where the United States and Western Europe obtain much of their petroleum. Yet there are enormous untapped oil and gas resources in contested areas of the East China Sea and Yellow Sea seabed that could, if exploited, reduce Northeast Asian dependence on costly imports from politically turbulent faraway sources.

The Project on Oil and Gas Cooperation in Northeast Asia, sponsored by the Woodrow Wilson International Center for Scholars, has focused intensively on promoting cooperation in the development of seabed petroleum as part of a broader study under the direction of Wilson Center Senior Scholar Selig S. Harrison. The project is also exploring the role that gas pipelines from Russia to neighboring countries can play in meeting the energy needs of Northeast Asia and in advancing regional cooperation. Mr. Harrison is the author of *China, Oil and Asia* (Columbia University Press, 1977) and five other books on Asia.

This study draws both on extensive field research in Northeast Asia and on the proceedings of two unprecedented workshops in Beijing co-sponsored by the Wilson Center and the China Institute of International Studies, an arm of the Chinese Foreign Ministry. The initial workshop (April 12-13, 2004) brought together for the first time Chinese, Japanese and independent participants to discuss "Seabed Petroleum in the East China Sea: Geological Prospects, Jurisdictional Conflicts and Paths to Cooperation." In the second workshop (April 15-16, 2004), Chinese, South Korean, North Korean and independent participants discussed "Seabed Petroleum in the Yellow Sea: Geological Prospects, Jurisdictional Conflicts and Paths to Cooperation."

The roster of distinguished participants is listed on page 15.

To encourage frank discussion, it was agreed that Mr. Harrison, who moderated the proceedings, would name no names in his report on the

workshops. As the following account shows, there were contentious exchanges among the participants, and no progress toward agreement on the intractable Law of the Sea disputes that underlie the tensions over seabed petroleum in Northeast Asia. At the same time, his report demonstrates that the workshops reached a significant consensus on how to avoid conflict over petroleum resources and how to move toward cooperative development. His recommendations merit the attention of both governments and public opinion in the countries concerned.

The Wilson Center wishes to express its thanks to the U.S. Department of Energy for its support of the Project on Oil and Gas Cooperation in Northeast Asia.

Selected working papers most relevant to Mr. Harrison's conclusions are presented in this report. All 12 of the working papers prepared for the workshops, edited by Mr. Harrison, may be consulted in their entirety on the Wilson Center website at **www.wilsoncenter.org/asiapubs.**

Seabed Petroleum in Northeast Asia: Conflict or Cooperation?

Selig S. Harrison
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QUIET STRUGGLE IN THE EAST CHINA SEA

Is the vast expanse of the East China Sea between China and Japan "another Persian Gulf," a treasure trove of untapped seabed oil and gas reserves, as a United Nations survey mission reported in 1968?[1]

Until ten years ago, China and Japan did little to find out. A complex legal dispute over their seabed jurisdictional rights has paralyzed petroleum exploration. China asserts that the entire East China Sea continental shelf is a "natural prolongation" of the Chinese mainland that extends eastward all the way to the Japanese island of Okinawa. Japan, rejecting this claim, has drawn a hypothetical median line based on its own unilaterally-defined Law of the Sea criteria. Faced with this impasse, China respected the Japanese line for nearly three decades, restricting its petroleum exploration to waters close to the Chinese coast. But multiplying energy needs, plus the discovery of promising gas deposits in the middle of the East China Sea, has gradually led Beijing to adopt a more assertive posture.

The Chun Xiao Dispute

By 1995, Chinese geologists had focused increasingly high hopes on the potential of a 940-square-mile swath of the seabed straddling the median line northeast of Shanghai in a seabed geological depression known as the Xihu Trough. They gave Chinese names to three promising gas fields that had been discovered in their drilling on the Chinese side: Chun Xiao (Spring Morning), Duanquiao (Broken Ridge) and Tianwaitian (Boundless Skies). All of them overlap the median line. In the case of Chun Xiao, the most hopeful of the three, the overlap extends for some ten miles, though the exact distance has not yet been determined.

At the same time that they were setting the stage for production at Chun Xiao on the Chinese side of the line, Beijing launched survey oper-

ations to assess petroleum prospects on the Japanese side—triggering steadily spiraling tension that still continues.

Initially, China conducted sporadic seismic surveys on the Japanese side of the line from 1995 through 1997. Then, from January, 1998, through August, 2000, 16 ships intruded into areas on the Japanese side on 12 different occasions. In July, 2001, a Chinese-chartered Norwegian seismic survey ship, the "Nordic Explorer," turned up on the Japanese side and stayed for two months.

What Japan wanted to know was how far the geological structures underlying the three gas fields extended onto the Japanese side.

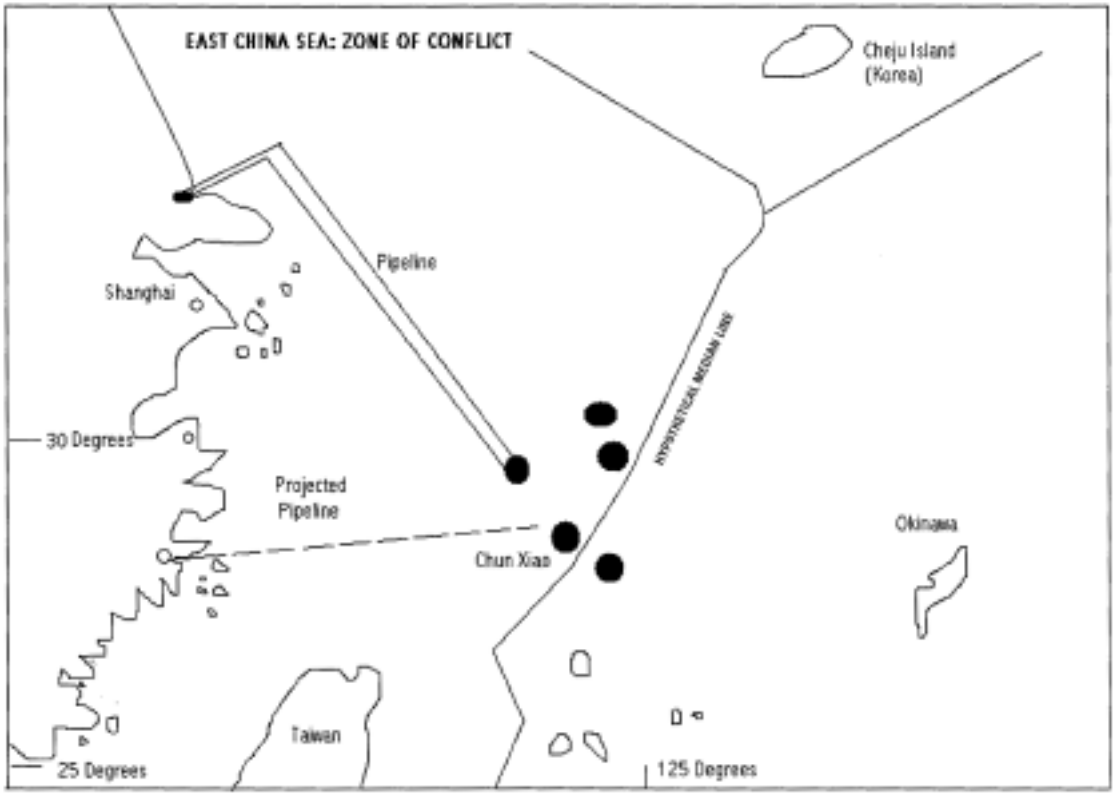
When China set up production platforms in August, 2003, at Chun Xiao, one of them less than a mile from the median line, Japan finally reacted by chartering another Norwegian seismic survey ship, equipped with the latest three-dimensional seismic survey technology. Starting in July, 2004, the "Ramform Victory" intensively surveyed the seabed on the Japanese side of the line opposite Chun Xiao, Tianwaitian and Duanqiao. What Japan wanted to know was how far the geological structures underlying the three gas fields extended onto the Japanese side, and whether these structures were configured in such a way that China could suck up gas from the Japanese side even if its production sites are located on the Chinese side.

Japan called on China repeatedly during 2004 to suspend production close to the median line pending a diplomatic resolution of the dispute and to share geological data on the three gas fields with an eye to a possible joint development program. China reacted with menacing military moves. On November 10, 2004, the Japanese Navy spotted three Chinese submarines near Chun Xiao and chased them for two days. In early January, 2005, two Chinese Navy destroyers crisscrossed the Chun Xiao area for a week, provoking a series of patrol missions by Japanese PC3 patrol planes.

The Chun Xiao dispute finally came to a head on February 19, 2005, when the Japanese Agency for Natural Resources and Energy issued a report on the findings of the $75 million "Ramform Victory" survey, announcing a "high probability" that the structures where China is drilling extend onto the Japanese side. While it is "not fully certain" that there is oil and gas on the Japanese side, the report said, "we believe on the basis of the available evidence that such deposits exist." Moreover, it added, "there is reason for concern" that Chinese production operations will extract gas from the Japanese side. The only way to find out how much petroleum exists on the Japanese side and exactly where it is located, the report concluded, would be for Japan to start drilling on the Japanese side of the line.[2]

On April 14, 2005, after China flatly refused to share geological data on the three gas fields, Japan authorized three of its oil companies to proceed

MAP: *East China Sea: Zone of Conflict*



with test drilling on the Japanese side of the line, threatening to set up its own production platforms to compete for Chun Xiao resources if a diplomatic compromise cannot be reached.

Assessing The Reserves

Until much more exploration takes place, the extent of East China Sea petroleum reserves will remain speculative. Based on the known geological facts, Chinese petroleum officials believe that the most promising reserves lie on the eastern side of the continental shelf claimed by Japan. Chinese estimates of potential East China Sea gas reserves on the entire shelf range from 175 trillion to 210 trillion cubic feet in volume. (Saudi Arabia has "proven and probable" gas reserves of 21.8 trillion cubic feet and the United States, 117.4 trillion). Foreign estimates of potential oil reserves on the shelf have gone as high as 100 billion barrels. (Saudi Arabia has "proven and probable" oil reserves of 261.7 billion barrels and the United States 22 billion).

Exploration to date on the Chinese side has indicated "proven and probable" gas reserves of some 17.5 trillion cubic feet, much of it in the Xihu Trough. The Chun Xiao reserves are estimated to be 1.8 trillion cubic feet. Chun Xiao will initially produce 70 billion cubic feet of gas annually, and the volume is projected to reach 350 billion by 2010. A pipeline is under construction to carry the Chun Xiao gas to the Chinese coastal areas near Wenzhou. Gas from a smaller field to the northwest at Pinghu, with estimated reserves of 378 billion cubic feet, is already being supplied to Shanghai through a 250-mile pipeline.

The richest petroleum deposits in the East China Sea are believed to be concentrated in the Okinawa Trough, a geomorphic depression in the seabed at the eastern edge of the continental shelf west of the Ryukyu islands. Where the Trough flattens out at the bottom, there is a "rise" where sedimentary deposits have piled up for centuries. Even though the Trough is 7,000 feet deep, this is no longer beyond the reach of deep-water drilling technology.

Another area regarded as rich in petroleum deposits by both China and Japan is the seabed surrounding the Senkaku (Tiao Yu Tai) islands northwest of Taiwan, which are occupied by Japan but claimed by China.

A Japanese government survey immediately following the 1968 UN report estimated that there were "well over 94.5 billion barrels of quality oil" trapped in the shallow waters to the northwest and south of the island. But the Japanese Foreign Ministry is reluctant to suspend Japanese territorial claims to the Senkakus (Tiao Yu Tai) for the sake of joint exploration and development with China, lest this set a precedent that would jeopardize Japan's position in its dispute with Russia over the Kurile Islands north of Japan. Moreover, possession of the Senkakus (Tiao Yu Tai) would be crucial to Japan in bargaining over the location of an agreed median line. The Senkakus (Tiao Yu Tai) are located further west than Japan itself. Thus, using the Senkakus (Tiao Yu Tai) to demarcate the outermost extension of Japanese territory would push part of the median line westward, maximizing the Japanese share of the seabed.

The Legal Issues

Under the UN continental shelf convention adopted at Geneva in 1958, coastal states have the exclusive right to exploit seabed resources up to a depth of 660 feet "or beyond that limit where the depth of the waters admits of the exploitation of the natural resources of the said areas." Where two states lie on opposite sides of a continental shelf, the Geneva Convention states, or where they lie adjacent to each other on the same

coast, the shelf boundary is to be determined by mutual agreement. If such agreement cannot be reached, the boundary is to be a median line determined by the same base points (i.e., islands near the coast, or the coast itself) used by each state in defining its territorial sea, unless another boundary line is justified by "special circumstances."

The caveat permitting states to claim "special circumstances" led to an arcane legal controversy, still unresolved, over precisely what makes this or that island valid or invalid as a base point. Among the many resulting disputes that arose in the East China Sea, the Yellow Sea and the South China Sea, the most troublesome has proved to be the case of the Senkakus (Tiao Yu Tai). To becloud matters further, the International Court of Justice, interpreting the 1958 Geneva Convention in the North Sea Cases, held in 1969 that seabed boundaries should be drawn so as to "leave as much as possible to each party all those parts of the continental shelf that constitute a natural prolongation of its land territory into and under the sea, without encroachment on the natural prolongation of the land territory of the other."

By emphasizing the natural prolongation principle, the Court left it unclear whether the median line approach should be applied at all in cases where a subsea trough divides what would otherwise be a continuous continental shelf between two states. As it happens, there is just such a subsea divide in the Okinawa Trough, which provides China with a legal rationale for seeking jurisdiction over the continental shelf as far as the Trough.

China has carefully avoided a precise definition of its sea boundary claims and has left the door wide open, accordingly, for negotiated settlements with its maritime neighbors.

Chinese statements during UN discussions on the Law of the Sea treaty echoed the "natural prolongation" concept set forth by the World Court in the North Sea Cases, which gives China a legal rationale for claiming the entire continental shelf. This rationale was implicitly invoked in a basic policy statement on June 13, 1977, describing the shelf as "an integral part" of the mainland. In other statements China has accepted the principle of median lines and "equitable" adjustments between neighbors, but it is far from clear that Beijing would accept a median line agreement in the East China Sea.

Chinese international law specialists argue that provisions of the Law of the Sea treaty relating to the median line concept are open-ended and ambiguous. In the Chinese view, the median line approach is not necessarily applicable under the treaty to a case such as the East China Sea, in which a coastal state faces an island state. By contrast, Beijing acknowledges that the median line might apply under the treaty to cases such as the

The richest petroleum deposits in the East China Sea are believed to be concentrated in the Okinawa Trough... Where the Trough flattens out at the bottom, there is a "rise" where sedimentary deposits have piled up for centuries.

Tonkin Gulf and Yellow Sea, where states contiguous on the same land mass can invoke the "natural prolongation" doctrine.

Japan has attempted to push its base points for a median line as far to the west as possible on the shelf by claiming the status of "special circumstances" for the Senkaku islands (Tiao Yu Tai), in the southern part of the East China Sea, and for two other uninhabited islets, Danjo Gunto and Tori Shima, in the northern part. Both of these are on the western side of the Okinawa Trough, however, and in order to win recognition of these claims, Japan would have to prove that it is entitled to "jump" the Trough. The argument advanced by Japan is that the seabed between the Ryukyus and the mainland is a common prolongation of both Japanese territory, i.e., the Ryukyus, and of the Chinese mainland. Thus, it is argued, Japan's jurisdiction extends past the Trough to the median line.

China's formal position has long been that the Ryukus themselves are part of the prolongation of the mainland, and that the shelf ends, and the ocean floor begins, on the eastward side of the Ryukyus. Both sides treat the Trough as a geomorphic depression in the shelf, not a geological breach. As a practical matter, however, given Japanese sovereignty over the Ryukyus, Beijing has not pressed this claim recently. Instead, Beijing focuses on where the eastern edge of the shelf should be demarcated if it acknowledges that the shelf does end to the west of the Ryukyus. On this key point, Beijing argues that the shelf embraces not only the western downward slope of the Trough but also the "rise" where the slope flattens out at the bottom.

Paths To Cooperation

China has carefully kept its options open in the East China Sea. Repeatedly, Beijing has offered to negotiate joint development arrangements in contested areas. At the same time, however, it has continued to assert the "natural prolongation" principle, which makes it difficult, if not impossible, to reach agreement with Japan on the location and demarcation of joint development zones.

The papers prepared for the Beijing workshop on Seabed Petroleum in the East China Sea, some of which are presented in this report, underline the wide gap in the Chinese and Japanese approaches to the goal of joint development zones and suggest possible ways of narrowing this gap. The workshop discussions did not attempt to adjudicate the complex and intractable legal issues that underlie this divergence. The participants focused instead on proposals for practical immediate measures that would forestall conflict and move the two sides step by step toward cooperative

petroleum development. There was a broad consensus that the economic needs of the two countries should be given priority and that the resolution of Law of the Sea issues and of the territorial conflict over the Senkakus (Tiao Yu Tai) should be deferred in order to make joint development possible. As Masahiro Miyoshi and Keun-Gwan Lee pointed out in their papers, China and Japan did give priority to their immediate economic needs when they concluded the Sino-Japanese Fisheries Agreement of November 11, 1997. The fishing accord established agreed fishing zones in limited but substantial areas of the East China Sea, sidestepping the still-unresolved Sino-Japanese conflict over the boundaries of the "exclusive economic zones" envisaged in the 1982 Law of the Sea Treaty.

The Japanese government has already demarcated petroleum development concessions in seabed areas on its side of the hypothetical median line and has authorized designated Japanese companies to operate in these areas when and if a seabed agreement is reached with China—or when Tokyo decides to start exploring without an agreement, as it has done in the waters opposite Chun Xiao.

In his revealing paper, Susumu Yarita, managing director of one of these companies, Uruma Resources, which has a concession area embracing the Senkakus and adjacent areas immediately to the north of the disputed islands, provides a hitherto-unpublished account of Uruma's secret negotiations over the past two decades on possible cooperation with the China National Offshore Petroleum Corporation (CNOOC).

As Yarita explains in his paper and as Chinese participants in the workshop agreed, the two sides are not far apart on the modalities for setting up cooperative arrangements for exploration and for an equitable division of the spoils of development. What has impeded agreement is the conflict between Japan's desire for a joint zone that straddles the hypothetical median line, embracing areas on the Chinese as well as Japanese side of the line, and China's position that the zone should be limited to areas on the Japanese side of the line.

China bases its position on the argument that only the area on the Japanese side is "disputed," since under the median line concept, Japan does not dispute China's authority on its side of the line, while China does lay claim to the seabed on the Japanese side under the "natural prolongation" principle.

Chinese participants emphasized this argument during the workshop discussions on how to demarcate a joint development zone that would embrace Chun Xiao. Japanese and other non-Chinese participants proposed a zone that would straddle the median line, covering the entire area

on both sides of the line encompassed by the geological structures that China has started exploring at Chun Xiao, Tianwaitian and Duanqiao. But Chinese participants heatedly rejected this approach, calling for a zone restricted to the Japanese side of the line that would extend to the mid-channel line in the Okinawa Trough. As a compromise, some non-Chinese participants suggested an alternative: The zone would extend to the middle of the Trough, on the east, but it would straddle the median line on the west. This, too, was rejected by the Chinese, but with less vehemence.

Lurking behind the Chun Xiao dispute is the fact that the "rise" at the bottom of the Trough may well contain the richest petroleum deposits in the East China Sea. This is the underlying explanation for what would otherwise appear to be a completely unreasonable Chinese stance. Another complicating factor is that China has been exploring Chun Xiao and surrounding areas for more than a decade. Beijing knows what it would lose if it agreed to joint development with Japan and does not yet know whether there is enough petroleum on the Japanese side to make joint development attractive.

In principle, both Chinese and non-Chinese participants agreed that it makes sense to determine the extent and location of the petroleum resources to be developed before seeking to demarcate a joint development zone. But this principle is easier to apply in the Senkakus (Tiao Yu Tai), where neither side has done much exploration, than in Chun Xiao, where Chinese exploration is so far advanced. To the extent that cooperative exploration can begin before discoveries are made, the participants concluded, the prospects for avoiding conflict will improve.

Most, but not all, participants reached a consensus that the Chinese and Japanese governments should authorize their oil companies to take these steps:

- Conduct seismic surveys in areas envisaged for possible joint development, either separately or jointly
- Exchange data
- Conduct joint evaluation workshops to review the data
- Seek to negotiate the boundaries of exploration and development zones
- Conduct exploratory drilling, separately or jointly
- Negotiate the terms of production operations and profit sharing

In the absence of government support, it was agreed, efforts by oil companies such as those related in Yarita's paper are unlikely to succeed.

NEW OPPORTUNITIES IN THE YELLOW SEA

Compared to the high hopes for major petroleum discoveries in the East China Sea, China, South Korea and North Korea have adopted a more guarded, wait-and-see attitude concerning the magnitude of the petroleum resources in the Yellow Sea. The most optimistic predictions of significant discoveries center on two areas: the Kunsan Basin in the southern Yellow Sea and the West Korea Bay Basin off the west coast of North Korea.

Kook-Sun Shin, vice-president for exploration and production of South Korea's state oil company, the Korea National Oil Corporation, pointed in his paper to a promising geological structure (the Southwest Sub-Sag of the Kunsan Basin) that straddles the hypothetical median line with China and has thus not yet been fully explored. North Korea, for its part, has found evidence of significant seabed reserves near Anju. The exploitation of these reserves could help to stabilize Pyongyang's shaky economy. But jurisdictional conflicts with China, coupled with U.S. economic sanctions that block investment by Western companies, have paralyzed exploration.

Tensions between China and South Korea over the Yellow Sea seabed started to develop soon after the 1968 UN survey mission report. The report was less ecstatic about petroleum prospects there than in the East China Sea but said that the Yellow Sea seabed and adjacent areas of the East China Sea seabed had "great potential as oil and gas reservoirs."

In April 1969, the Gulf Oil Company was awarded the first two concessions granted by Seoul to explore the Yellow Sea seabed. This was followed by Shell and Texaco concessions in January and February of 1970.

At first, China made little effort to interfere with the seismic survey ships that crisscrossed the Yellow Sea after Seoul had granted its concessions to foreign companies. As this survey work grew more intense, however, Chinese naval craft began to harass survey vessels operating in a potentially disputed middle zone of the Yellow Sea.

In Chinese eyes, Seoul had acted provocatively by allocating concessions "unilaterally" without first reaching a boundary agreement with Beijing or Pyongyang or both. Beginning in 1971, China conveyed its displeasure over these concessions by sending lightly armed fishing vessels into the vicinity of survey operations. The floating tracer cables used in seismic studies were systematically cut on at least four occasions. When Gulf conducted drilling operations from February to June 1973, in one of its two concession areas, Beijing escalated its response by dispatching Komar-class gunboats. The Chinese boats appeared intermittently less than

a mile from the Gulf drilling rig Glomar IV, remaining menacingly nearby for three days in early March.

This encounter was followed by a Chinese Foreign Ministry statement on March 15, 1973, attacking the drilling activities of Glomar IV as "the latest step taken by international oil monopolies in their attempt to grab China's coastal seabed resources… The areas of jurisdiction of China and her neighbors in the Yellow Sea and the East China Sea have not yet been delimited. The Chinese government hereby reserves all rights in connection with the possible consequences rising therefrom."

Seoul interpreted the reference to "China and her neighbors" as an indirect invitation to negotiate and responded promptly with a statement on March 16, 1973, offering to hold talks with "the authorities of the People's Republic of China on the question of the delimitation of the continental shelf areas between the two countries." But China maintained a stern silence, and six days later Gulf quietly capped the well it had been drilling and shifted its operations to a new site within the same concession zone. Finally, on June 10, 1973, Gulf terminated its drilling. South Korea later created the state-owned Korean National Oil Corporation, which has since drilled numerous wells in the Yellow Sea close to shore, avoiding disputed areas.

North Korea...has found evidence of significant seabed reserves near Anju. The exploitation of these reserves could help to stabilize Pyongyang's shaky economy.

A report by Gulf geologists prepared for a technical conference in late 1974 made it clear that the most promising parts of the zone in geological terms were the Kunsan Basin and the western Yellow Sea Subbasin, both located at the western end of the concession area where Chinese and South Korean claims appeared to overlap. The report stressed that the two 1973 wells have provided data covering only "a limited portion of the area" and that a "considerable area remains to be tested by the drill."[3]

From the outset Gulf knew in general terms that the most attractive structures were located in the western portions of the areas involved and were geologically linked with more extensive structures still closer to China. Viewed in terms of international law, the issue at stake was whether Beijing had a right to claim a group of four islands, located between 38 and 69 miles from the Chinese coast, as appropriate base points for a median line or whether the line should properly be drawn on the basis of three different islands within 24 miles of the coast.

Kook Sun Shin's paper, together with exchanges between Chinese and South Korean participants in the Yellow Sea workshop, confirmed what Gulf geologists had reported in 1974: that the most promising deposits in the Kunsan Basin lie in an area that straddles the median line and has thus been off-limits to China and South Korea alike. Similarly, North Korea's exploration of the seabed west of Anju has been constrained by a jurisdic-

tional conflict with China that was acknowledged publicly for the first time by both Chinese and North Korean participants in the workshop. Even if the United States removes the sanctions that block investment by U.S. and U.S.-linked companies in North Korea, this conflict would constrain exploration.

North Korean participants in the workshop did not quantify the possible extent of Pyongyang's seabed reserves, but on a subsequent visit to Pyongyang in April, 2005, Petroleum Ministry officials told me that two foreign consulting firms, Cantek of Canada and an affiliate of Nissho Iwai of Japan, had both estimated that there are potential reserves of 12 billion barrels of oil in the seabed west of Anju. To illustrate the inhibiting effect of boundary tensions with China on North Korea's exploration of these reserves, a workshop participant noted that the Malaysian state oil company Petronas had concluded a concession agreement with Pyongyang but had cancelled the agreement after receiving indications of Chinese displeasure. This was not disputed by North Korean participants and was later confirmed during my discussions in Pyongyang in 2005.

The Yellow Sea discussions on joint development zones produced several ideas that went beyond the recommendations made by the East China Sea workshop. One was a suggestion by a Chinese participant for a permanent seabed commission with members from each of the three littoral states adjacent to the Yellow Sea. The commission would begin as an advisory body and would gradually acquire increasing powers related to seabed boundary and joint development issues. Another proposal envisaged a sequence of steps leading to petroleum production that differed from the East China Sea recommendations.

The first five of the six conflict avoidance steps suggested by the East China Sea workshop would be the same in the Yellow Sea, one participant suggested, but after the completion of exploration, there would be an effort to negotiate a boundary settlement before the start of actual production. Once the location of petroleum deposits is known, it was argued, the prospects for a boundary settlement would improve. In the event of a settlement, or settlements, Beijing, Seoul and Pyongyang could assess whether the nature and location of the geological structures involved make joint development desirable or whether they prefer to conduct separate production operations. There was considerable support for this proposal and no expression of dissent.

The fact that Korea is divided into two states that are both committed to the goal of reconciliation and eventual reunification poses issues that make

the long-term resolution of seabed disputes more complicated in the Yellow Sea than in the East China Sea.

Should the two Koreas negotiate separate seabed agreements with China, or should they form a joint seabed development enterprise that would give Korea unified representation in boundary or joint development agreements, as one Korean participant suggested?

The workshop discussions left the door open for a joint approach. Keun Wook Paik in his paper urges the two Koreas to discuss bilateral seabed petroleum cooperation and to promote trilateral exchanges with Chinese oil officials and Law of the Sea experts.

Despite their recognition that the petroleum potential of the Yellow Sea might not rival that of the East China Sea, the participants in the Yellow Sea workshop ended their discussions on an upbeat note. The prospects for seabed agreements between China and the two Koreas are brighter than between China and Japan, they agreed, for geological as well as geopolitical reasons: There is no pot of gold yet apparent in the Yellow Sea, like the "rise" in the Okinawa Trough, to influence the calculations of the protagonists, and there is no emotion-laden territorial conflict like the Senkakus (Tiao Yu Tai) dispute to frustrate a seabed compromise based on mutual economic advantage.

NOTES

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2. "Basic Geophysical Exploration in 2004: The Interim Report on the Operation of the Interpretation of the 'Northwestern Sea Area in Okinawa (3D)'," Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry, Tokyo, February 18, 2005. (Translation by Diane Oh).

3. Selig S. Harrison, *China, Oil and Asia: Conflict Ahead?* (Columbia University Press, New York, 1977), p. 131.

Conference Participants

Seabed Petroleum in the East China Sea: Geological Prospects, Jurisdictional Conflicts and Paths to Cooperation

April 12–13, 2004, Beijing, China

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Seabed Petroleum in the Yellow Sea: Geological Prospects, Jurisdictional Conflicts and Paths to Cooperation

April 15-16, 2004, Beijing, China

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Selected Working Papers

Seabed Petroleum in the East China Sea: Geological Prospects, Jurisdictional Conflicts and Paths to Cooperation
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SEABED BOUNDARY ISSUES IN THE EAST CHINA SEA

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The Contending Claims

Between March 1969 and September 1970, altogether 11 seabed petroleum blocks were unilaterally staked out by Japan, South Korea, Taiwan and Okinawa (which was still under United States administration). The four Japanese blocks and Okinawa's one were claimed by private oil interests, unlike South Korea's two and Taiwan's four by the respective governments (Map 1).[1]

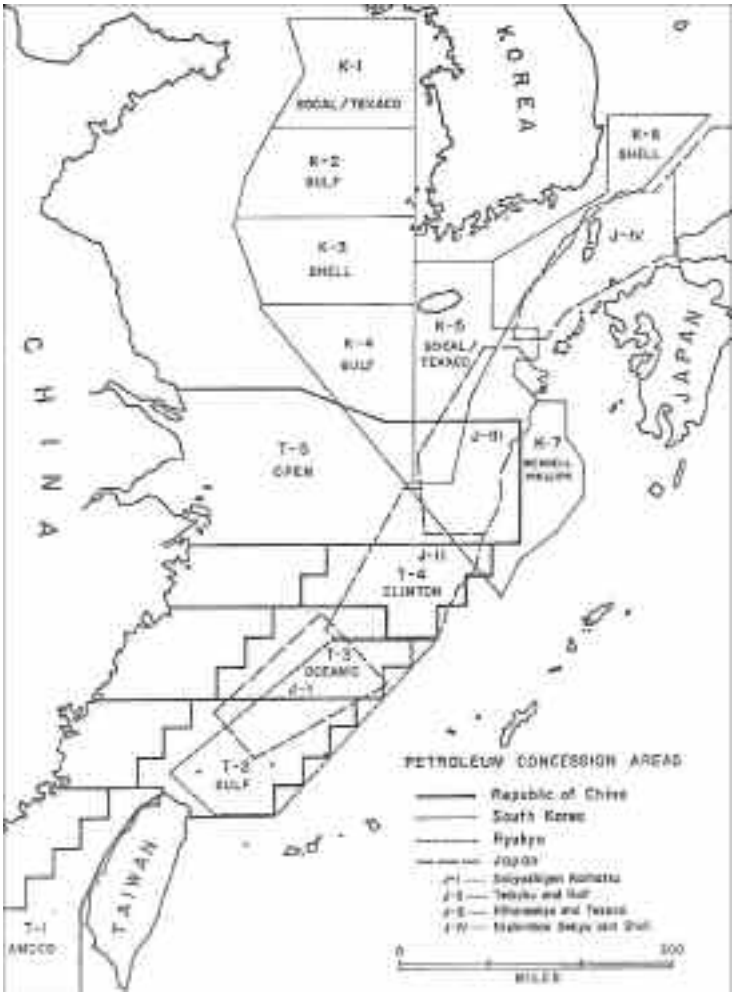
In staking out their respective unilateral claims, Japan applied the median-line principle, and South Korea and Taiwan the so-called natural prolongation of land territory principle. Inevitably, the claims overlapped with one another to different extents.

The contending claims of the three claimants centered on the legal status of the Okinawa Trough, which lies parallel close to the east of the Okinawa Islands chain. Japan ignored the Trough as a limiting factor in staking out its claims, while South Korea and Taiwan invoked the 200-meter-depth criterion as defined in the Geneva Convention on the Continental Shelf of 1958, the Trough being much deeper than 200 meters. Thus, the claims of South Korea and Taiwan extended to the west bank of the Trough.

In search of a breakthrough from what was otherwise likely to remain an endless legal scramble among the three claimants, they agreed to try joint development of mineral resources, leaving boundary demarcation aside for future negotiation.

Late in 1970, the three claimants had agreed to proceed with some form of joint development, when China came forward with a strong protest. Later an informal agreement was reached between Japan and South

MAP 1: *Unilateral Claims and Concession Areas in the Yellow Sea and the East China Sea, as of Sept. 1970*



Source: Choon-Ho Park, "Oil Under Troubled Waters: The Northeast Asia Sea-Bed Oil Controversy," *Harvard International Law Journal*, Vol. 14, No. 2, Spring 1993, p. 219.

Korea to proceed with the scheme without Taiwan.

Finally, Japan and South Korea signed two agreements in January 1974, one of them relating to their shelf boundary in the northern part of the Korea Strait (called Tsushima Strait in Japan) and the other relating to joint development in the overlapping area (Map 2).[2]

The two agreements came into force in 1978. Based on the median-line

MAP 2: *Japan–South Korea Joint Development Zone*

Source: Choon-Ho Park, "Joint Development of Mineral Resources in Disputed Waters: The Case of Japan and South Korea in the East China Sea," *Energy,* Vol. 6, No. 11, 1981.

principle, the first agreement still remains the only instance of a continental shelf boundary agreement in Northeast Asia. The second one on joint development has a mandatory period of 50 years, i.e., to the year 2028.

It is now for China, Japan and South Korea to negotiate and agree on a trijunction from which to draw their respective sectors of the continental shelf.

In this paper, the author tries to identify critical legal issues with respect to the delimitation of the seabed boundaries among China, Japan and South Korea. For unavoidable reasons, no opinion is given on how or on what international legal criteria the issues should be finally settled among the three parties.

Legal Issues

On a broad basis, four legal issues are relevant with respect to the demarcation of shelf boundaries in the East China Sea.

1. The first issue has to do with the applicability of the natural prolongation of land territory principle, because, within 200 nautical miles from the coast, this criterion would appear to have been superseded by the new regime of the 200-mile exclusive economic zone (hereinafter "EEZ").[3]

In other words, from the standpoint of Japan, it would appear that, under the new law of the sea regime, the legal status of the Okinawa Trough could no longer be a limiting factor in the demarcation of maritime boundaries in this particular area. Now, it is for the other two coastal states, namely, China and South Korea, to justify the legal grounds on which to sustain their common position vis-a-vis Japan.

2. The second issue is related to the status of the Japan–South Korea joint development agreement, which was signed and came into force before the 1982 UN Convention on the Law of the Sea came into force for the three coastal states. The fact that China has been strongly opposed to the joint development scheme from the beginning would make it necessary, as a prerequisite, for the three coastal states to agree on a boundary between China on the one side and Japan and South Korea on the other.

3. The third issue concerns Japan and South Korea only. Their joint development scheme being not a boundary agreement, the two parties have yet to agree on their shelf boundary within their common sector. In this regard, the fact that most of the joint development zone happens to lie apparently on the Japanese side of what would likely be the median-line between the two states could emerge as a critical legal point at issue.

4. The fourth issue relates to the fact that South Korea has applied the median-line principle toward China in the Yellow Sea and the natural prolongation of land territory principle toward Japan in the East China Sea. It is now for South Korea to justify its application of two different criteria in the two Seas contiguous to each other.

Concluding Remarks

In the particular case of continental shelf boundary demarcation in the East China Sea, the fact that the law of the sea itself has basically changed from the 1958 Geneva Conventions to the new Convention of 1982 has caused seabed controversies which would otherwise have not arisen.

In other words, the median-line criterion as defined in the 1958 Convention was superceded by the 1969 natural prolongation criterion, which in turn has been overtaken by the 200-mile EEZ regime. As a result, it would appear that the applicability of the median-line criterion has been revived.

NOTES

1. For further details with cartographic illustrations, see Choon-Ho Park, "Oil Under Troubled Waters: The Northeast Asia Sea-Bed Controversy," *Harvard International Law Journal*, Vol. 14, No. 2, Spring 1973, pp. 212-260.

2. For further details with cartographic illustrations, see U.S. Department of State, Bureau of Intelligence and Research, Office of the Geographer, Limits in the Seas, No. 75, Sept. 2, 1977 (contains the texts and maps of the two agreements); Choon-Ho Park, "Joint Development of Mineral Resources in Disputed Waters: The Case of Japan and South Korea in the East China Sea," *Energy*, Vol. 6, No. 11, 1981; and Masahiro Miyoshi, *The Joint Development of Offshore Oil and Gas in Relation to Maritime Boundary Delimitation, Maritime Briefing,* Vol. 2, No. 5, 1999.

3. For further details, see Choon-Ho Park, "The Sino-Japanese-Korean Sea Resources Controversy and the Hypothesis of a 2—Mile Economic Zone," *Harvard International Law Journal*, Vol. 16, No. 3, Summer 1975, pp. 27-46.

Opinions expressed in this paper are strictly the author's own, and do not reflect those of the Tribunal in any way.

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TOWARD COOPERATION IN THE EAST CHINA SEA

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The need to develop the hydrocarbon potential of the East China Sea is increasingly critical for both Japan and China, not only to meet their energy requirements but, more broadly, to promote a climate of regional economic stability that will reduce political and military tensions. Both sides clearly recognize this need and have periodically discussed the possibilities for joint petroleum development since 1985. However, domestic political problems in both countries have blocked the success of these discussions.

I would like to review the basic facts relating to the jurisdictional disputes in the East China Sea before discussing what can be done to pursue the goal of joint development.

The Position of Japan and China on the Territorial Dispute and the Exclusive Economic Zone (EEZ)

The Japanese government officially denies the existence of a dispute between Japan and China concerning the Senkaku islands (Tiao Yu Tai), arguing that these islands have historically been ruled under Japanese law. China, for its part, has been claiming ownership of these islands since 1971 and in 1992 promulgated the Law of the Territorial Sea, which declared the islands to be Chinese territory.

Regarding the Exclusive Economic Zone, the Japanese government claims that the boundary of the EEZ of each country shall be a median line. However, the Chinese government claims that the border of the EEZ shall be the margin of the continental shelf, which extends far to the east of the Japanese-claimed median line. Therefore, China has been insisting that the area between the Japanese-claimed line and the Chinese-claimed line shall be considered a "disputed area."

If the UN Law of the Sea clearly defines how to fix the boundary of the EEZ, then neither China nor Japan would have any margin to maneuver. But the status of the treaty remains unclear and inoperative.

History of the Joint Petroleum Development Negotiations

Since 1985, Japan and China have been discussing the concept of joint operations in the East China Sea through various channels. Both basically

agreed on the desirability of joint operations but had different views on the demarcation of the area to be developed.

In 1985, Japex and China had been discussing the concept of joint operations in the East China Sea. Teikoku Oil separately proposed to the China National Offshore Oil Corporation (CNOOC) that joint seismic shooting in the East China Sea be undertaken to determine the geological prospects. The CNOOC was then nominated by the Chinese government to negotiate with its Japanese counterpart on possible joint operations in the East China Sea.

In mid-1986, China proposed that the joint area must be located in the southern part of the East China Sea where Deng Xiao Peng had once envisaged a possible joint development area.

In late 1986, CNOOC proposed that if Japan agreed that the area around the Senkaku (Tiao Yu Tai) islands should be jointly developed, with territorial claims indefinitely suspended, China would be ready to discuss joint operations. But at the same time it said that it was not ready to discuss joint development in areas north of these islands, which Japan insisted should be included in the joint area.

In mid-1987, CNOOC proposed to Uruma the specific latitudes and longitudes within which a joint area could be established. However, the area proposed was to be located only to the east of the median line: i.e., E124° 00' – E125° 00' and N26° 20' – N27° 50'. Uruma insisted that the joint area should include an area to the west of the median line and proposed that an expert meeting be held to discuss how to define such a joint area.

In early 1988, Uruma held discussions with CNOOC and proposed adoption of these basic concepts with respect to the proposed joint areas:

- Neither should raise the issue of the ownership of the Senkaku (Taio Yu Tai) islands
- Japan should not raise the issue of the median line
- China should not raise the issue of the continental shelf margin as the basis for its seabed jurisdiction

China countered that the proposed joint area must be limited to an area located to the south of N28° and requested that Uruma provide the entire funding for the joint operations to be conducted.

In mid-1988, a Japanese mission consisting of representatives of Japex and the Japan National Oil Corporation (JNOC), both government-sponsored entities, met with officials of the Chinese government and of CNOOC.

The mission proposed a 100,000 km^2 joint area straddling both sides of the median line. The area was to be divided into blocks, with joint exploration work conducted gradually on a 50-50 basis.

China commented that both sides should invent some measures to avoid possible arguments on the ownership of the Senkaku (Tiao Yu Tai) and the EEZ. China then expressed these ideas on what such measures should be:

- China would float a tender for the areas located to the west of the median line where they have envisaged joint operations. Japanese participation in such a tender would be most welcome.
- The "disputed area" based on the Japanese-claimed EEZ would be suitable for joint operations.

In early 1989, a CNOOC delegation visited Japan and explained that domestic problems were impeding progress on initiating joint operations. The delegation said that the Ministry of Foreign Affairs, Ministry of Geology and Mines and CNOOC had different positions on joint operations in the East China Sea. The CNOOC officials made clear that a Japanese government approach to top Chinese officials concerning joint operations would be highly appreciated because CNOOC itself was not in a position to raise the issue with its own high-level officials.

In early 1991, Uruma officials visited Beijing and learned the following in discussions with CNOOC:

- Chinese officials and CNOOC thought that the Japanese counterparts in negotiations on joint operations should be the same as those appointed by the Japan National Oil Corporation in the 1988 negotiations and should have the appropriate high-level standing.
- Regarding the scope of the joint area, China would still like to stick to the southern part of the East China Sea to start with.
- Regarding the southern part, China would like to leave it untouched for about ten years.

In May, 1991, a CNOOC delegation visited Japan and met JNOC officials, who said that even if joint operations were to start from the south, there should be an understanding that the north would also be developed jointly, and that the two governments should agree on an overall framework for joint operations, including the area to be covered. CNOOC

claimed that if Japan insisted on raising such basic principles once again, negotiations would be set back to where they were in 1987.

Uruma later learned that Chinese exploration and production operations in the East China Sea were being conducted at that time separately by CNOOC and the Ministry of Geology and Mines. CNOOC was responsible in the southern part and Geology and Mines in the northern part. Thus, even though China had nominated CNOOC as the official negotiator with Japan on joint operations in the East China Sea, CNOOC did not actually have the authority to negotiate concerning the north.

Since time had been consumed without any progress in negotiations, China finally decided to act unilaterally and floated an international tender in 1992 covering part of the area that had earlier been proposed to Japan as the joint area. Japex and Teikoku Oil decided to participate in this tender and were awarded a few blocks. However, their results were miserable. There was no indication in those blocks of the existence of hydrocarbons.

After this failure, the dialogue on joint operations stopped, and both sides decided to await the outcome of official negotiations on the Senkakus (Tiao Yu Tai) and EEZ before resuming dialogue on joint operations. Japan and China have continued negotiations on these issues but with no progress.

In June, 2001, Uruma representatives met CNOOC officials in Tokyo and reopened dialogue. CNOOC claimed that the ball regarding joint operations was already in the Japanese court. Uruma found later that China had made an approach to JNOC and that JNOC, unknown to Uruma, had replied that matters in which sovereignty is involved should be handled by the two governments. This led CNOOC to give up pursuing the issue.

In October, 2001, Uruma representatives met with CNOOC in Beijing and discussed practical proposals to permit joint operations. I will outline the differing concepts in these discussions in Section 3. Despite such discussions and the best efforts of the private sector in Japan to find ways to make things move, this will take a long time because the two governments must first decide how to handle the issues relating to territorial sovereignty.

Conflicting Concepts of Joint Development

Japanese Concept:

The joint area should be an area which includes areas on both sides of the median line. In the western part, China would hold a 51 percent stake and Japan 49 percent. In the eastern part, China would hold a 49 percent stake

and Japan 51 percent. Chinese law shall apply in the west and Japanese law in the east.

Chinese Concept:
China and Japan should each hold an undivided 50 percent interest in the overall area covering both sides of the median line. Neither Chinese nor Japanese law shall apply in this area. Both governments shall agree on new governing rules to be applied to the joint operations.

The Japanese and Chinese Rebuttal

Japanese Rebuttal:
The Japanese stand that Chinese law shall apply in the western area and Japanese law in the eastern area would lead to arguments over where each law shall apply because the demarcation of the two areas could well become a subject of contention given the unresolved territorial issue.

Chinese Rebuttal:
Even though the Chinese concept envisages a joint area covering both sides of the median line, in which neither Chinese nor Japanese law shall apply, China wants Japanese companies to secure exploration rights under Japanese mining laws as a prerequisite for participation in joint operations. China also wants Japan to enact new laws stipulating that Japanese laws are not applicable in the joint areas.

Paths to Cooperation
Taking into account the current difficulties and differences concerning joint operations, as stated above, Japan and China should nonetheless seek to find a realistic way to achieve mutual cooperation. To this end, though we can expect many problems ahead, we should continue to maintain dialogue. Through such continuous dialogue, we can deepen mutual understanding and may find a realistic solution.

Following are examples of possible cooperative steps that Japan and China could take:

Data Exchange: SINOPEC, CNOOC, JNOC and Japanese private entities are in possession of indigenous seismic data relating to the East China Sea seabed. Although this data is the property of those who have conducted the seismic surveys, it would, nevertheless, be worthwhile to exchange this data so that both parties can better understand the potential of the East China Sea and lay the basis for future cooperation.

Workshop: After such an exchange of data, both sides should conduct independent assessments of the data and then hold a workshop to review the results of these assessments and to evaluate them.

Joint Seismic Shooting: Both sides should propose possible areas for seismic shooting spreading across both sides of the median line. If both can agree on an area, joint shooting should then be conducted with the results made available to both sides. A workshop should then be held to evaluate these results.

Joint Exploration and Production Activities: Regarding 1, 2 and 3, CNOOC may initiate contacts and propose these steps to JNOC and/or Japanese private companies. Such an initiative would be most realistic when both governments have agreed on territorial issues and the demarcation of each EEZ. When 1, 2 and 3 have been carried out, both sides should propose areas within which joint exploration and production projects can be implemented.

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Although I am not an expert on international law, I sincerely hope that the UN Law of the Sea Treaty will be reactivated and put into effect on a priority basis. This would greatly facilitate the resolution of seabed jurisdictional issues in the East China Sea. We must search positively for a realistic way to solve the East China Sea dispute on a basis that might contribute to the resolution of disputes between other countries that face each other in similar geographical circumstances.

The basic concept in arriving at such a solution should be that each country can have an EEZ extending up to 200 nautical miles and that this concept shall supersede the continental shelf concept.

Four principles should then be applied to reach a solution:

- If the distance between facing countries is less than 400 nautical miles, then the median line should be the border of the EEZ.
- If the distance between facing countries is more than 400 nautical miles, then each facing country can have an EEZ boundary up to 200 miles from an agreed base point.
- If the distance between facing countries is less than 650 nautical miles and both countries have a continental shelf, then the median line shall be the border of the EEZ. If one country has a continental shelf, that country shall respect the other country's 200 nautical mile limit, i.e. the EEZ of the country with the shelf shall be the balance of the area remaining between the total distance and 200 nautical miles.

- If the distance between facing countries is more than 700 nautical miles and both have a continental shelf, each can claim up to 350 nautical miles.

Zhao Li Guo

SEABED PETROLEUM IN THE EAST CHINA SEA: GEOLOGICAL PROSPECTS AND THE SEARCH FOR COOPERATION

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Geological Structure of the East China Sea

The East China Sea is a semi-closed sea lying between the east bank of the Chinese mainland and the Pacific Ocean. It connects with the Yellow Sea on the north, from the north of the Yangtze River estuary to the Jeju Island of South Korea; on the south, with the South China Sea from the Nan'ao Island of Guangdong Province and the south of Taiwan Island; and on the east is separated from the Pacific Ocean by Kyushu Island of Japan, the Ryukyu Archipelago and Taiwan Island. The East China Sea has a total area of about 770,000 square kilometers with average water depth of 370 meters, of which the continental shelf covers 460,000 square kilometers with average water depth of 72 meters. The seabed terrain of the East China Sea mainly consists of the continental shelf and the Okinawa Trough Basin.

The continental shelf basin of the East China Sea is the largest Cenozoic sedimentary basin in offshore China. It covers 2.4 million square kilometers, consisting of, from north to south, Yangtze Trough, Zhedong Trough, Taipei Trough and Pengjiayu Trough. With a maximum sediment thickness of over 10,000 meters, it is abundant in oil and gas resources.

Xihu Trough

Xihu Trough, located within Zhedong Trough, has an area of 43,000 square kilometers with geological reserves of about 30 million tons of crude oil and 100 billion cubic meters of natural gas. Now the Pinghu oil and gas field is in operation. The natural gas cooperation program in Xihu Trough of the East China Sea has five foreign contract areas covering 22,108 square kilometers, three of which are exploration areas (12/21 area, 20/14 area and 27/05 area) and the other two are development areas (Chunxiao Area and Baoyunting Area). The partners are the China National Offshore Oil Corporation (CNOOC), holding 30 percent of the

shares, Sinopec 30 percent, Unocal Corporation 20 percent and Shell 20 percent. The foreign companies shall bear the risk of prospecting the three exploration areas, and the four partners shall develop the two development areas together according to their ratio of shares. CNOOC will be the operator, and establish a joint management committee made up of the four partners with the Star Oil Company of Sinopec Corporation as the first chair of the committee. The foreign partners shall pay compensation for the resources that have been explored.

Lishui Trough

This is one of the main areas on which the fourth round of exploration is focused. With an area of 14,700 square kilometers, it has been identified by the fourth round of cooperation with foreign partners as the trough with the richest oil and gas reserves.

These conclusions have been reached concerning the Lishui Trough:

- One condensate gas field has been proven to reach the bottom line for commercial production. In this field, the proved reserve of natural gas is 6 billion cubic meters.
- Two layers of Paleocene hydrocarbon source rock have been discovered, and the lower layer is richer than the upper one.
- There is a low risk in the lower trap assemblage.
- There are still structure traps in the lower assemblage of the Trough to be drilled.

Yangtze River Trough

This trough covers 16,000 square kilometers, including an area of 11,820 square kilometers covering the substructure unit of Jinshan Trough which is being explored with foreign cooperation. Compared with the nearby Xihu Trough, this area boasts the Paleocene source-reservoir-cap assemblage. Current seismic data also show that there exist several large areas of formation.

CNOOC plans to continue its cooperation with foreign companies to explore the areas around Lishui Trough and Yangtze Trough.

China's Position on Joint Development Efforts

Japan, South Korea and Taiwan

A report released in 1969 by the Committee for the Coordination of Joint Prospecting for Mineral Resources in Asia Offshore Areas, which was set

up by the United Nations Economic Commission of Asia and Far East in 1966, indicated that the continental shelves between Taiwan and Japan are probably one of the most prospective oil and gas reserve areas in the world. Subsequently, Japan, South Korea and the Taiwan authorities all respectively declared seabed exploration and development boundaries delimited by themselves. The three sides discussed jointly developing the oil resources of the East China Sea, and proposed establishing a private company for developing the East China Sea in order to avoid boundary issues. The Chinese side made a protest against it and pointed out that the establishment and activities of such a joint company violated the interests and rights of China. With strong opposition from the Chinese side, the Taiwanese authorities retreated from the joint development, and the three sides' joint development attempt failed.

Japan and South Korea

In June 1972, Japan and the Republic of Korea (ROK) started to draft a bilateral agreement on joint development. China's Ministry of Foreign Affairs stated, "according to the principle of natural prolongation of continental shelves, it is up to China to consult with relevant countries to decide how to delimit the continental shelves of the East China Sea. The establishment of a joint development zone by Japan and the ROK infringes China's sovereignty. The Japanese side admitted that China had not been consulted. Nevertheless, in June, 1978, South Korea and Japan exchanged instruments of ratification, the agreement came into effect, and the Chinese side made a strong objection once again.

China and Japan

China and Japan both claim territorial sovereignty over Diaoyu Island, and diverge greatly on the delimitation of the East China Sea. The Chinese side maintains that the delimitation should be in accordance with the principle of equality and the principle of natural prolongation of continental shelves, while the Japanese side stands for the principle of a median line. In view of the situation, the Chinese leaders put forward the principled position of setting aside the dispute and pursuing joint development as early as 1978, which received a positive response from the Japanese side. However, in August 1979, the Japanese side changed its position and proposed that the adjacent waters of Diaoyu Island should be excluded from the proposed joint development zone.

After the 1980s, the Japanese government started to discuss nongovernmental seabed petroleum cooperation with the Chinese side in the East

China Sea but continued to insist on excluding areas adjacent to Diaoyu Island from the zone. The oil circles of the two sides reached an extensive common understanding concerning the contents of joint development, but still diverged greatly on how to locate the joint development area. The Japanese side claimed that the joint development zone should straddle its unilaterally proposed "median line," and meanwhile rejected the inclusion of the adjacent waters of Diaoyu Island. The Chinese side claimed that the joint development zone should be limited within the disputed areas of the East China Sea, that is, the area between the Japanese-proposed median line and the Chinese-proposed natural prolongation of continental shelves. For the Diaoyu Island, the Chinese side proposed setting aside the dispute on the territorial sovereignty of the island and jointly developing its adjacent sea area. But the Japanese side refused to set aside the dispute on the Diaoyu Island, paralyzing relevant discussions.

Zhiguo Gao and Jilu Wu

KEY ISSUES IN THE EAST CHINA SEA: A STATUS REPORT AND RECOMMENDED APPROACHES

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The Evolution of Seabed Petroleum Issues in the East China Sea

Offshore oil and gas exploitation and development have grown throughout the world in recent decades due largely to two major factors. First, the advance of science and new technology for the exploitation of ocean resources. Second, the demand for petroleum by the major industrialized economies. The demand for oil has also been witnessed in the East Asian states that were also growing rapidly. This combination of factors led to the formation of the Committee for Coordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP) under the auspices of the United Nations Economic Commission for Asia and the Far East (ECAFE) in 1966.

Late in 1968, a geophysical survey was conducted by CCOP in the Yellow Sea and the East China Sea. It was reported in their report by the scientists that "a high probability exists that the continental shelf between Taiwan and Japan may be one of the most prolific oil reservoirs in the

world. A second most favorable area for oil and gas is beneath the Yellow Sea." This report caused a great sensation among the literal states. In the case of the East China Sea, the immediate reaction of the coastal states was to make conflicting claims of sovereignty over the oil-rich continental shelf, often in the form of establishing unilaterally offshore concession blocks and boundary limits.

Japan unilaterally asserted the principle that the shelf should be divided on the basis of an equidistant median line, and following this principle, delineated four exploration blocks defined by the median line and the Okinawa Trough on the east. China claimed in December 1970 both sovereign rights over the continental shelf up to the Okinawa Trough and its underlying resources and the ownership of the Tiaoyutai Islands.

Japan and South Korea engaged in bilateral negotiations concerning disputed seabed areas that ended in the conclusion of a joint development agreement in January 1974. South Korea ratified this agreement in December 1974. But it was not until June 1978 that Japan finally ratified the agreement.

The Korea-Japan Agreement

The Korea-Japan agreement was concluded with no regard to Chinese claims to sovereignty over the shelf up to the Okinawa Trough. The major contents and features of its 31 articles can be summarized as follows:

The Joint Development Zone. The Zone is the overlap of 24,092 square nautical miles enclosed by the outer limits of each party's claims to the continental shelf. Japan's claim is based on the median-line toward China and South Korea, and South Korea's claim is based on the natural prolongation of land territory toward China and Japan. The Zone is divided into nine Subzones to be jointly explored and exploited by concessionaires nominated by both parties (Article III).

Nomination of Concessionaires. Each party is required to nominate a concessionaire or concessionaires for each Subzone within three months following the coming into force of the agreement (Article IV).

Equality of Rights and Obligations. Each party is entitled to one-half of the proceeds recovered from each Subzone, and is also obligated to meet one-half of the expenses incurred for the recovery (Article IX).

Duration of Contracts. The rights of concessionaires comprise the rights of exploration and the rights of exploitation. The rights of exploration are tenable for a period of eight years; and the rights of exploitation are tenable for an initial period of 30 years, five-year extensions being possible thereafter (Article X [1-3]).

Commencement and Suspension of Operations. Concessionaires are required to commence operation within six months from the date on which the rights of exploration or exploitation are granted, and operation may not be suspended for longer than six months (Article XI1).

Measures for Prevention of Marine Pollution. Each party is required to take measures necessary for the prevention of collision at sea and marine pollution with reference to the 1954 International Convention for the Prevention of Pollution of the Sea by Oil, as amended in 1962 and 1969.

Non-Interference with Other Uses of the Sea. Exploration and exploitation activities are not to interfere with other uses of the superjacent waters, such as navigation or fishing (Article XXVII).

Non-prejudice Clause. It is stipulated that the agreement does not, in any way, affect each party's sovereign rights over the Joint Development Zone or otherwise prejudice its stand with respect to the delimitation of the shelf boundary with the other (Article XXVIII).

Duration of the Agreement. The agreement is to remain in force for a period of 50 years, being subject to abrogation upon or following the expiry of this period. This provision notwithstanding, it is also subject to termination by agreement between the parties should they recognize that the natural resources are no longer economically exploitable in the Joint Development Zone (Article XXXI [2-4]).

China and Japan: Recent Developments

After more than 30 years of periodic seabed controversies with no progress in the East Asian region in general and in the East China Sea in particular, the beginning years of the 21st century began to see positive developments. This progress has been led by China and Japan in developing a "conflict avoidance" regime for the East China Sea where they have extensive overlapping claims. Two aspects of this regime merit attention as possible precursors of future cooperation relating to seabed petroleum development: a joint fishing agreement and a prior notification scheme for scientific research.

Fisheries Agreement

Negotiations for a new fisheries agreement between China and Japan started in 1996. In the process of the negotiations, China wanted a small X factor and a larger joint management area than Japan, while Japan just wished for the reverse. Japan had wanted the eastern boundary of the joint zone set at 127~ E. After seven rounds of negotiations, China and Japan finally concluded their new agreement in November 1997. The two

countries agreed to establish three different zones where different fisheries regimes apply.

Exclusive Fishing Zones. The exclusive fishing zones extend up to 52 nautical miles from their respective baselines in the area between 27~ N and 30~ 40' N. Within this zone the principle of coastal-state jurisdiction applies.

Fishing Quotas. If Japan or China does not have the capacity to harvest the entire allowable catch in their respective zones, as provided for in Article 62 of the 1982 Law of the Sea Convention, each state can allow the nationals and fishing vessels of other states to fish its EEZ in accordance with this agreement and other related laws and regulations, based on the principle of mutual interest. Every year Japan and China are to determine the quotas of catch, fishing areas, and other terms of fishing of the nationals and fishing vessels of other signatory states that are allowed to fish in its EEZ.

Joint Fisheries Commission. A Joint Fisheries Commission is set up as a management body to enforce the treaty. Its responsibility and functions include making recommendations on matters relating to catch quotas and other terms and conditions of fishing operations for the nationals and fishing vessels of each signatory state in the other's EEZ, on matters regarding the maintenance of the fisheries order, and on matters relating to fisheries cooperation between the two states.

Conservation Measures. The Agreement also provides that each party may take necessary measures in its EEZ in accordance with international law to ensure that the nationals and fishing vessels of the other observe its conservation measures. To this end, each state is to immediately notify the other state to observe its conservation measures. To this end, each state is to immediately notify the other state of its measures for the conservation of the marine living resources and other terms provided for in its domestic laws and regulations.

Each state is to take appropriate measures to control its catch in order to avoid over-exploitation in the joint management area, taking traditional fishing operations into consideration.

The parties also agreed to allow a total of 600 fishing boats from China annually into its exclusive economic zone east of the "free" fisheries zone, while China agreed to allow 317 Japanese vessels into its EEZ to the west of the zone. These numbers are to be renegotiated each year.

The application of the fisheries agreement does not extend to the area south of 27~ N. The agreement is valid for five years (2000-2005) and after this period will continue to remain in effect until a six-month advance notice of abrogation from either party terminates it.

In summary, under the provisions of the agreement, each country will manage its fisheries within 52 miles of its baselines; beyond 52 nm, and between 27° N and 30° 40' No boats of the two countries may fish without prior approval of the other's government. The area south of 27° N including the area around the disputed Tiaoyutai islands remains excluded from the treaty coverage.

The Agreement is by nature provisional pending boundary delimitation of the EEZ and the continental shelf. The two states have committed themselves to continue negotiating the boundary delimitation in good faith, so as to reach an agreement. However, both China and Japan have made it clear that the provisions of the Fisheries Agreement do not affect their positions on other legal matters, including the issue of disputed islands and boundary delimitation of their EEZs and the continental shelves.

The Agreement adversely affects the fishermen of both countries. More than 17,000 Chinese fishing boats will be unemployed, affecting 170,000 fishermen, and the Chinese fish catch is expected to be reduced by a million tons a year in Zhejiang Province alone.

Although this bilateral agreement is a step in the right direction, the agreement may be said to have a number of inherent inefficiencies including its ambiguity of third party application. The fact that boats from other countries and regions also fish in the East China Sea is a complication, since it is not clear whether the joint management areas are with the EEZ of Japan and South Korea. Moreover, there is no effective dispute settlement mechanism built into the Agreement. Nevertheless, this shortcoming will not offset its merits toward the building of a transitional bilateral regime governing fishing activities in overlapping areas.

Notification on Scientific Research

Entering the 21st century, China and Japan began to encounter a new sort of issue: incidents relating to research vessels in the areas of overlapping claims in the East China Sea. The two nations agreed on August 31, 2000 to negotiate an agreement for advance notification of such "surveys" by either party. The first working level meeting was held in Beijing on September 15, 2000. Finally, on February 13, 2001 China and Japan agreed on a mutual prior notification system.

The Agreement cleverly avoids specifying any line beyond which advance notification is required. It simply says that China is to give Japan at least two months' notice when its research ships plan to enter waters "near Japan and in which Japan takes interest" and that similarly, Japan is to

inform China before its vessels enter waters "near" China. The notification must include the name of the organization conducting the research, the name and type of vessels involved, the responsible individual, the details of the research such as its purpose and equipment to be used, the planned length of the survey, and the areas to be surveyed.

Findings and Policy Suggestions

The East China Sea is perhaps one of the most complicated marine areas anywhere in the world in terms of its overlapping claims, sovereign disputes over islands and boundary delimitation. No progress has been achieved in negotiating bilateral maritime boundaries over a long period of 35 years. The existing marine policy regimes are weak and frequently ineffective.

Significantly, the unilateral maritime claims made in Northeast Asian seas in general and in the East China Sea in particular have traditionally been inexplicit. This practice has either intentionally or unintentionally served as a buffer for conflict avoidance. Despite the lack of precise definition of bilateral marine boundaries, incidents and friction have been minimal because the governments of the states concerned have tried to control the extent of petroleum development activities by pursuing them solely in marine areas that clearly belong to them. For instance, the coastal states have generally refrained from oil and gas exploration in the East China Sea except in non-disputed sections of the continental margin.

Of the controversies over islands and boundary delimitation, the most contentious issue is beyond any doubt sovereignty over the Diaoyudai islands. It is China's consistent position and policy that Diaoyudai islands belong to China since time immemorial. Japan also claims these uninhabited features and has attempted to re-enforce its claim by actual control.

To shelve disputes and pursue joint development in overlapping areas has been China's consistent policy and position over the last two or three decades. On November 11, 2003, it was announced that China and the Philippines signed an agreement of intention to jointly develop oil and gas resources in the South China Sea. The agreement provides that the two parties shall proceed to set up a Joint Working Committee to: look for blocks suitable for exploration; study and examine geological and other relevant data and information; and prepare together the work program. This agreement represents a major breakthrough by China in the bilateral relations with its neighbors. It may well serve as a paradigm for resolving the issues in the East China Sea.

To move forward, the littoral states should work closely on confidence-

building measures, and avoid steps that increase mutual suspicion and cloud their political relations. In the longer term a partial or comprehensive resolution of the current dilemma in terms of island disputes and boundary delimitation is necessary to minimize the danger of conflict and promote regional peace and security.

Keun Wook Paik

NORTH KOREA AND SEABED PETROLEUM

Royal Institute of International Affairs

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.

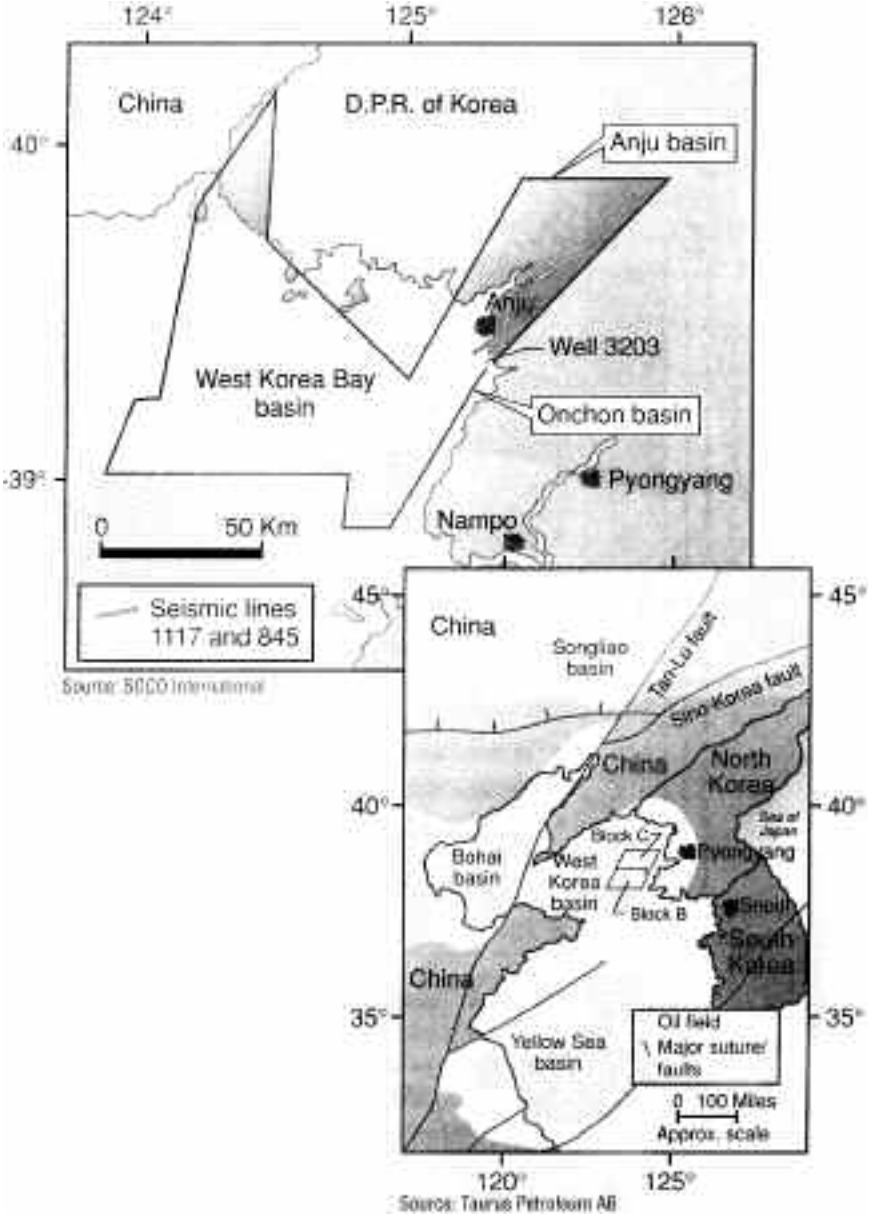
Exploring the Seabed: A Brief Review

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

MAP: *North Korea and East Asian Basins*



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 five-year exploration period, extendable by a further three 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 inves-

tigation 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 five 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 two 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 fact 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 minnow 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 coun-

terclaims 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.

Zhang Hai Qi

OIL AND GAS EXPLORATION AND DEVELOPMENT IN THE YELLOW SEA

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With ever increasing demands for resources caused by global economic development, there has been a severe shortfall in petroleum resources on land. Therefore, men have turned their eyes to the sea that is rich in oil and gas potential.

Geographically, the Yellow Sea is encompassed by the coasts of China's Liaoning Province, Shandong Province and the northern part of Jiangsu province as well as the Korean Peninsula. It is separated from the Bohai Sea by Miaodao Island and Chanshan Island in the northwest and joins the East China Sea in the south with a shared line linking Qidong Mouth on the Yangtze River Estuary and Jeju Island of the Republic of Korea (ROK), covering an area of around 380,000 square kilometers. The Yellow Sea is divided into two sections by the line linking Chengshan Mount on the Shandong Peninsula and Baengnyeongdo Island to the west of the Korean Peninsula, namely the South Yellow Sea and the North Yellow Sea, covering an area of 80,000 square kilometers and 300,000 square kilometers respectively.

The Yellow Sea waters include both the North Yellow Sea Basin and the South Yellow Sea Basin with a number of Mesozoic and Cenozoic sedimentary basins in its neighboring area. The basin group in the North Yellow Sea waters is comprised of the Anju Basin near the West Korean Bay, the Bohai Bay Basin, the Jiao-Lai Basin and the Yanbian-Yanji Basin in the Yalu River Area. As for the basin group in the South Yellow Sea waters, it mainly includes the Northern Basin of the South Yellow Sea, the Southern Basin of the South Yellow Sea, the Northern Jiangsu Basin, the Mountains Basin and the Heishan Basin.

The Current State of Exploration in the North Yellow Sea

The Democratic People's Republic of Korea (DPRK) conducted large-

scale geophysical prospecting and drilling work in the eastern part of the North Yellow Sea Basin with the purpose of identifying oil and gas resources. In 1980, the DPRK started to mark some zones in the eastern section of the North Yellow Sea and opened the marked sections to international tenders in an effort to cooperate with western oil companies in oil and gas exploitation. As a result, several oil wells were drilled in the area.

The DPRK carried out quite a number of studies into the geological condition of the oil reserves in the central and eastern part of the North Yellow Sea Basin, such as the formation and evolution of the basin, its stratum structure, its tectonic and sedimentation characteristics as well as its combination of sluice reservoir and covering rock.

In general, exploration by the DPRK in the central and eastern part of the North Yellow Sea Basin has reached a high level and the DPRK is speeding up the exploration and exploitation of oil and gas resources in the area. Some of the DPRK's exploration work is carried out in areas over which China and the DPRK have a dispute.

The Current State of Exploration in the South Yellow Sea

In 1968, a scientific research ship of the U.S. Navy, *Hunter*, conducted a seismic magnetic survey in the Yellow Sea and drew sections of four major areas. In 1969, U.S. oceanographer K.O. Emery and his colleagues issued a research paper, *The Geographical Structure and Hydrological Features of the East China Sea and The Yellow Sea,* which acknowledged that oil and gas might exist in the sedimentary basins in the Yellow Sea.

On January 1, 1970, the ROK formulated a law on the development of seabed mineral resources and identified concession zones. The legal principle applied in defining the concession zones was based on a "median line" presumed unilaterally by the ROK. However, considering the lack of delimitation of an agreed maritime boundary in these zones, the two sides had disputes over the exploration end exploitation of oil and gas resources in the area.

The U.S. Gulf Oil Corporation was the first company to win an offshore petroleum mining concession from the ROK, even though part of the western section of the area reaches to Chinese waters. In disregard of political troubles, Gulf Corporation was rather hasty in launching exploration in the concession zones and drilled two test wells from February to June in 1973. In response, the Chinese government issued a statement on March 15, 1973, opposing the move of the ROK.

On March 16 of the same year, the ROK issued a statement expressing its willingness to negotiate with China over delimitation of maritime

boundaries. However, given the situation then existing, it was impossible for the Chinese government to negotiate with the ROK government. Gulf Oil Corporation was put in an embarrassing position. On the one hand, there was the pressure from ROK calling for continued drilling, and on the other strong opposition from China. Moreover, the U.S. State Department also asked Gulf to shift its operations to areas close to the coast of the Korean Peninsula. Therefore, while the company had to cap the two wells drilled, it had no intention to withdraw from the concession zones.

The aftermath of the dispute over the Yellow Sea lingered on for years until 1976. In 1975, J.B. Harrison, General Manager of Zapata Exploration Company, Gulf Oil Corporation's small partner, decided to take the U.S. administration's advice and quit the controversial operation. In April 1977, with the expiration of the two concession contracts, Gulf Oil Corporation officially abandoned the two concession areas. Besides Gulf Oil, two other foreign oil companies, Shell and Texaco also acquired concession zones from the ROK. Exploration was conducted for some time, but the outcome was not so positive. Upon protests by the Chinese government, the two companies immediately stopped their exploration activities.

It is reported that in recent years, the ROK has reactivated its exploitation of oil and gas resources in the South Yellow Sea waters. However, due to the fact that the maritime boundary between China and the ROK in the South Yellow Sea is yet to be delimited, disputes still exist in terms of the oil development zones in the South Yellow Sea. At present, China has conducted some oil and gas prospecting in the western section of the South Yellow Sea. The results of these researches and studies suggest that there might be a certain amount of oil and gas reserves in the Northern Basin and the Southern Basin of the South Yellow Sea.

Kim Myong Gil

SEABED PETROLEUM AND THE ECONOMIC DEVELOPMENT OF THE D.P.R.K.

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Our people are now firmly rallied around the great leader, Comrade Kim Jong Il, to make strenuous efforts to activate and develop the national economy. The most essential prerequisite for developing the economy is

petroleum development, and the exploration and development of petroleum in our West Sea seabed is of great importance.

In addition to the petroleum sector, for making the economy active, we are concentrating on the overall renovation of technology and the development of science and technology. We are giving priority to the electric, coal and metal industries while attaching importance to the development of light industry and agriculture. As a result, the overall economy, which has been in difficulty since the late 1990s because of continuing natural disasters, is being gradually activated.

In accordance with the changed circumstances and conditions and the concrete reality of our country, we have adjusted the structure of the economy and continue to improve and perfect the methods of economic management on the principle of gaining maximum benefits.

Two years ago, new prices were applied to all commodities and we are now applying new criteria for the salaries of the working people based on the principle of giving favor to the producers. At the same time, we have taken a measure to replace the former farmers' market with the comprehensive market for all consumers.

As an example of the high priority given to petroleum, we organized a separate state agency for petroleum development and mobilized appropriate personnel to begin the oil exploration.

Because of lack of experience in oil exploration and development, the government of the Republic has attached importance to cooperation with other countries from the beginning. Cooperation with other countries began in the early 1980s.

A number of firms of many countries expressed interest in the oil development of our country and practical cooperation was realized with several among them. We conducted 2,000 meter x 2,000 meter geophysical surveys in the East Sea and West Sea jointly with the companies of the Soviet Union, Czechoslovakia and Norway.

After that, Swedish and Australian companies also did surveys. The survey data and seismic tapes were analyzed for us by oil exploration and development companies and experts from Austria, Singapore, Netherlands, Japan, France and Denmark reviewed many survey data and analyzed seismic geophysical survey tapes. This review and analysis gave us the conviction that there is the possibility of seabed oil deposits.

Initially, we did only regional surveys of 2,000 meters x 2,000 meters but failed to do detailed surveys of 1,000 meters x 1,000 meters or 500 meters x 500 meters. So we were not able to define the concrete oil reserves.

On the basis of the lessons learned from our early experience, we concluded long term contracts for detailed exploration and development with the Australian Meridian Company in July, 1987, and with the Swedish Taurus Company in February, 1993. We authorized them to conduct exploration and development in specific areas that they wanted at their disposal.

For example, Taurus was able to conduct seismic surveys and some drilling in an area that covered 9,278 square kilometers of a concession block known as C District located below latitude 39º.

This exploration and the analysis of its seismic data showed that the seabed basin of sediments had big oil deposits and the potential for the commercial development of petroleum. However, cooperation with other countries could not be carried to its completion and as a result we have not been successful in the commercial development of oil.

There were several reasons for the failure of cooperation with other countries. First of all, the political element was there. Cooperation was affected by the hostile policy and hindering acts of the non-friendly countries, including the United States.

These countries put a brake into cooperation between our country and other countries for oil development. In particular, the United States aggravated the situation of the Korean peninsula by fabricating the nuclear issue, thus making the investors of other countries nervous in investing into our country.

Certain companies that were related with the U.S. said that they could not complete the cooperation with us because the U.S. government did not give them the necessary licenses. The hostile forces also hindered the international monetary institutions and private lending companies from furnishing funds to those companies that were cooperating with us.

Another reason why the cooperation was not completed was that the capability of the entities themselves was not sufficient. Their financial, technical and equipment standards were not high enough.

For example, the Swedish Taurus was capable until the exploration stage but could not but call off the cooperation because it could not find appropriate partners.

The maneuvers of the United States and other hostile forces that are not happy with the petroleum development in our country are still being continued. Nevertheless, we will attach importance to the petroleum development and will actively push ahead with all the work that we can internally.

In December, 2003, the General Bureau of Oil Industry in the Ministry of Natural Resources was elevated to the status of a separate Ministry of Petroleum.

At the same time, we will actively encourage cooperation with any other countries that have a sincere interest in cooperation with us. We are willing to provide them with all the conditions and convenience in their activities.

The oil development in our country will be beneficial not only to our country but also to our neighbors and those countries that offer cooperation. They could purchase, at a good price, crude oil and petroleum products initially processed by the abundant labor of our country.

We are convinced that petroleum development in our country will be practicable through friendly cooperation with the countries and peoples that wish tension reduction and stability in the Korean peninsula.

Kook-Sun Shin

HYDROCARBON POTENTIAL OF THE YELLOW SEA KUNSAN BASIN

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The Yellow Sea is surrounded by the mainland Chinese continent and the Korean peninsula. Two major sedimentary basins are situated in the Yellow Sea: The North and South Yellow Sea Basins. The basins developed in the North Yellow Sea from west to east include Jiaolai Basin, Bohai Bay Basin, the North Yellow Sea Basin in China and the West Korea Bay Basin in North Korea.

The South Yellow Sea Basin is subdivided into the Northern and Southern South Yellow Sea Basins by a central uplift area. The Northern South Yellow Sea Basin included the North Basin in China and Kunsan Basin in South Korea, and the Southern South Yellow Sea Basin developed the Subei Basin, the South Basin in China and the Heuksan Basin in South Korea. Commercial oil discoveries have been made in the Bohai Bay basin, the Subei basin and the South Basin in China. However, no commercial discovery has been made yet in the South Yellow Sea Basins in South Korea.

Petroleum exploration in the South Yellow Sea in South Korea dates back to the 1970s and led to the awarding of exploration concessions to several international oil companies, Gulf Oil, Texaco, Marathon Oil and Shell (Blocks I, II and III). These concession blocks cover approximately 117,320 square kilometers. By 2004, a total of 33,784 L-km of 2D seis-

mic data had been acquired in this area. Five wells were drilled. Most of the wells were drilled in the eastern portions of the Northern South Yellow basin and the Kunsan Basin. So far no well has been drilled in the Heuksan Basin.

The sedimentary successions in the Kunsan basin can be subdivided into three distinct tectono-stratigraphic units: Pre-Cretaceous, Cretaceous to Early Tertiary (Paleocene), and Tertiary (Eocene to Plio/Pleistocene). The Late Cretaceous and possible Paleocene shales are considered as the most probable source rocks in the basin, while the younger Paleocene and Eocene fluvial-deltaic rocks appear to be the likely reservoirs.

This paper is mainly focused on the hydrocarbon potential of the Korea portion of the Northern part of South Yellow Sea Basin—that is, the Kunsan Basin.

Hydrocarbon Potential

Several of the previous wells drilled tested fairly substantial but relatively young structural features. It is clear that these features postdate hydrocarbon generation and migration in the basin and do not form effective traps. This is notably the case for the Kachi-1 well, which while testing substantial older, Cretaceous age strata, drilled a very young structure that is evidently still somewhat active. In other cases, the wells tested off-structure or where the structural trap may not have been present.

Regarding source rock, none of the five wells encountered favorable section, although there are some indications that the maturity level necessary to generate hydrocarbons was reached in the area. The Late Cretaceous and possible Plaeocene shales are considered the most likely source rocks in the basin.

Finally, the issue of reservoir rocks must be addressed. The five wells all encountered shaley to interbedded, poorly sorted sands and volcanoclastics which would not be considered good reservoir material. However, these wells were drilled in hindsight locations where the reservoir rock was less favorable to develop. This basin does have several areas that may have been the depocenters for well-sorted lacustrine sands in a lacustrine delta environment. Notably, two areas draw interest for further evaluation, namely the East Sag and Southwestern Sub-sag. It is thought that these areas have not been adequately tested.

East Sag

The combination of the findings cited above lead to negative conclusions concerning much of the area. However, there are two areas in which the

results of the previous five wells have not supplied the answers as to the exploration potential. The first of these lies in the vicinity of the Inga-1 well. This well was drilled on an intra-basinal high and tested a Cretaceous feature. However, the well encountered a thick Palecene section. This younger section climbs from this location to the northwest-northeast and to the west. There is a potential for updip stratigraphic traps and some structural traps along the margin of the east sag.

The stratigraphic play identified is a deltaic complex in the Middle Upper Eocene. It transitions to a fan system on the west flank of the basin. The seismic data shows a delta build-up with focused point source deposition on the basin margin that changes character and becomes thin into the basin. Conversely, from the east the deposition is more line- sourced into the basin. This pattern is similar to the pattern of half-graben depositional pattern from the Subei-basin. This view offers a possibility that a similar depositional system with good source rock and reservoir rock potential could be developed in the basin.

Southwest Sub-Sag

There are three structural traps in the Southwest Sub-sag area. They are all traps in close proximity indicating similar source rock and reservoir potential as well as trap timing. Play one is a downthrown three-way structural trap. At the top of the Paleocene horizon, this feature is a abroad southwesterly plunging nose with a small crestal four-way closure, cut by a northwest to southeast, down-to-the-west fault. Displacement along the fault ranges from minimal, increasing to over 50 meters. The structure has about 200 meters height of structural closure.

Support for source rock potential is based on two possibilities. There is a local source potential from the underlying Cretaceous section. The second play type is an upthrown three-way fault closure structural trap. At the top of the Paleocene horizon, this trap is a long yet narrow closure, highside to a bifurcating down-to-the-northeast normal fault pair. The fault displacement ranges from less than 50' to over 250' and the trap has about 150' of structural closure. At the top of the Cretaceous horizon, the trap is bounded by a single down-to-the-northeast fault but the fault displacement is quite variable.

The third play in the Southwest Sub-sag area is an upthrown three-way fault closure structural trap. At the top of the Cretaceous horizon this trap is a very elongated yet narrow closure, highside to a northwest to southwest trending normal fault with variable displacement. At the top of Paleocene mapping horizon the structure is subdivided by a saddle, which results in two smaller but significant closures.

Conclusion

On the basis of integrated analyses of the geological and geophysical data of South Korea and China, the Kunsan Basin has a good condition to form lacustrine sand reservoir and source rocks, mainly with the Late Cretaceous and Paleocene shale. The faults developed well in this area and these faults could act as an important passage of petroleum migration.

Two areas of significant lead potential have been recognized in this basin. In both areas, they target the Upper Cretaceous and Lower to Middle Tertiary sections.

The first of these lies in the designated East Sag. The Cretaceous and possible Paleocene strata may provide both source rock and reservoir rock for hydrocarbon potential in this moderate-sized basin. The second prospective area is the structurally complex sub-basin downthrown to the northeast of the Kachi-1 well in the Southwestern Sub-sag. This area appears to have both an Upper Cretaceous and a Lower Tertiary section that is found in both stratigraphic trapping and upthrown structural closures within a series of down-to-the-northeast normal faults.

Note: *This abridged version of Mr. Shin's paper omits his detailed geological analysis of the Yellow Sea. The full text of his paper may be consulted on the Wilson Center website at* ***www.wilsoncenter.org/asiapubs.***

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