

# Taming Troubled Waters: Joint Development of Oil and Mineral Resources in Overlapping Claim Areas

MARK J. VALENCIA\*

*Many offshore areas with mineral or petroleum potential are claimed by more than one nation. Joint development is an arrangement by which such nations can avoid questions of sovereignty through joint exploration and development of any resource in an agreed area. Frequently appearing elements in precedents for joint development include: the extent of the area; the contract type; financial arrangements; the process of selection of concessionaires or operators; the length of the agreement; and the nature and functions of the joint management body. Geology plays a fundamental role in the selection and evolution of joint development agreements. The success of joint development agreements is dependent on the given knowledge of actual deposits, good political relations, practical mindedness, and cooperative private companies.*

## INTRODUCTION

With the extension of jurisdiction over resources and certain activities to 200 nautical miles or more, many seabed areas became subject to overlapping claims. The expectation of enlarged resource bases stimulated the extended maritime jurisdiction movement; these expectations were justified. Known resources include deep-water oil and gas,<sup>1</sup> cobalt-rich manganese

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\* Research Associate, Resource Systems Institute, East-West Center, Honolulu, Hawaii. B.S. 1966, University of Massachusetts; M.A. (geology) 1968, University of Texas; Ph.D. (oceanography) 1972, University of Hawaii; M.A. (marine affairs) 1977, University of Rhode Island.

1. Considerable petroleum potential remains to be discovered on the continental shelves and in deeper water on the continental slope and rises of the marginal basins bordering the major circum-Pacific land masses, and perhaps behind the small island arcs in the western and southwestern Pacific. Further potential exists in pre-Tertiary sediments underlying already productive basins, and in gas hydrates (gas and water in

the solid state) in sediments in deep water. These gas hydrates may also form an impermeable seal capping more gas and oil.

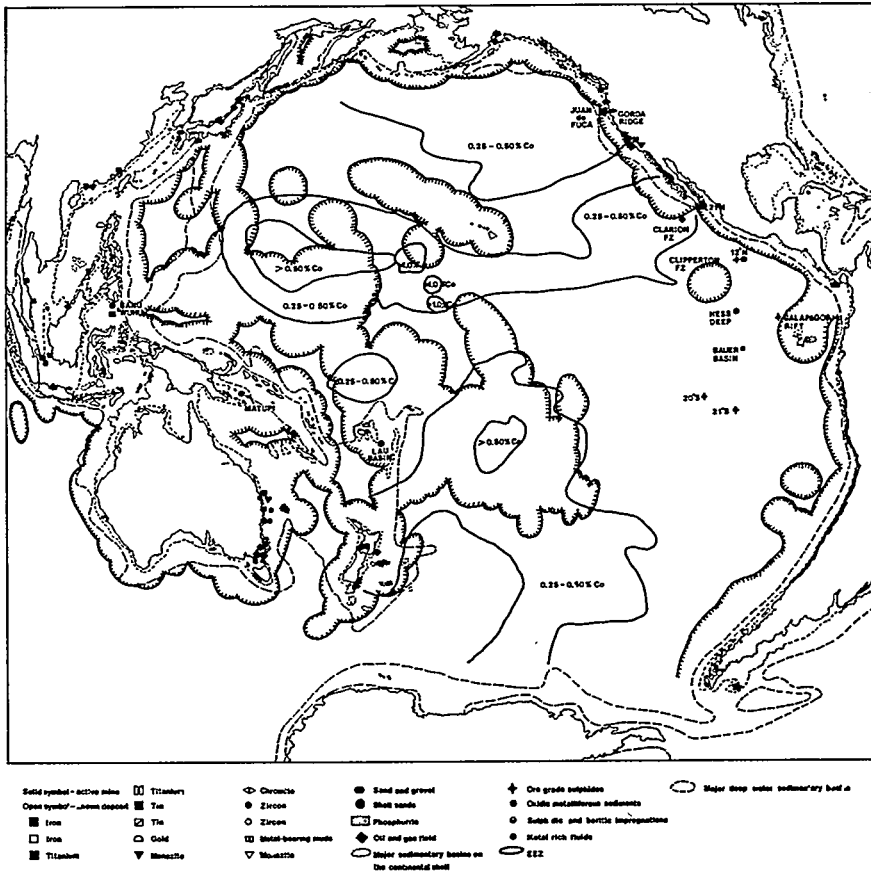
The estimated total gross value of undiscovered oil and gas resources in Southeast Asia ranges from 1.1 trillion to 11 trillion dollars, in Northeast Asia from 0.4 trillion to four trillion dollars, and in Oceania from 0.5 trillion to six trillion dollars. This estimate for Oceania does not include resources expected in Tonga, Vanuatu, the Solomon Islands, and most important, Papua-New Guinea, all of which could be worth as much as another trillion dollars. By comparison, the United States Pacific area, including Alaska, might harbor 0.3 trillion dollars worth of oil and gas. Valencia & Marsh, *Southeast Asia Extended Maritime Jurisdiction and Development*, 3 MARINE RESOURCE ECONOMICS \_\_\_\_\_ (1986); R. ROLAND, M. GOUD & B. MCGREGOR, THE U.S. EXCLUSIVE ECONOMIC ZONE—A SUMMARY OF ITS GEOLOGY, EXPLORATION, AND RESOURCE POTENTIAL, U.S. GEOLOGICAL SURVEY CIRCULAR 912 (1983); United Nations. Economic and Social Commission for Asia and the Pacific. Symposium on Petroleum Potential in Island Areas, Small Ocean Basins, Submerged Margins and Related Areas, 1980.

2. Cobalt-rich manganese crusts have been reported from seamounts in the Hawaiian and Line Islands at depths between 1100 and 2600 meters. The thickness of crusts reaches seven to nine centimeters and averages 2.5 centimeters. These crusts contain a mean of 25% manganese, 0.8% cobalt, 0.5% nickel, .07% copper and .0005% platinum. A seamount may contain between two million and four million tons of crust, approximating the amount of ore required for a yearly production of a commercial deep-sea mine. The concentration of cobalt is about one percent greater than cobalt ores mined on land—and the current market price of cobalt (\$27.56/kg) is about five times that of nickel (\$4.98/kg) and 15 times that of copper (\$1.77/kg). Total values of cobalt, nickel, copper, and molybdenum in the mid-Pacific Mountains and Line Islands crusts from water depths less than 2600 meters, are 170 dollars to 202 dollars per wet ton of crust or 340 million dollars to 808 million dollars worth of wet ore per deposit, not counting platinum. The exclusive economic zones around the Hawaiian Islands and Johnston and Palmyra Islands contain an estimated 10 million tons of cobalt, six million tons of nickel, one million tons of copper and 300 million tons of manganese. A prime mine site might contain \$165/metric ton of cobalt, \$37.50/ton of nickel, \$1.32/ton of copper and \$43.57/ton of manganese for a total of \$247.74/ton of ore, or perhaps four dollars of gross contained metal value per square meter. See Clark, Johnson & Chin, *Assessment of Cobalt-Rich Manganese Crusts in the Hawaiian, Johnston and Palmyra Islands' Exclusive Economic Zones*, 8 NAT. RESOURCES FORUM 163 (1984); Halbach, *Deep-sea Metallic Deposits*, 9 OCEAN MGMT. 35 (1984). Additional deposits have been found in the Marshall Islands, the Northern Mariana Islands, and Guam. *Asia and the Pacific*, Honolulu Advertiser, Oct. 12, 1985, at B1, col. 1.

3. Marine polymetallic sulfide deposits are located at 2000 meters to 4000 meters around high-temperature hydrothermal vents in sea-floor spreading centers or mid-ocean rift zones. Known locations include the Galapagos Ridge, the East Pacific Rise, the Gorda-Juan de Fuca Ridge System, and the Guaymas Basin. See *infra* figure accompanying note 5. Recently, deposits have been found off Tonga, in the Lau and North Fiji basins, and in the Bismark Sea; more are expected. Minerals of commercial interest include iron, zinc, copper, gold, manganese, platinum, and vanadium. Some deposits contain up to 21% copper, 50% zinc and 45% iron. See *Pacific Island Notes*, Honolulu Advertiser, May 7, 1984, at A6, col. 1; Cronan, *Metalliferous Sediments in the CCOP/SOPAC Region of the Southwest Pacific with Particular Reference to Geochemical Exploration for the Deposits*, 4 CCOP/SOPAC TECH. BULL. 8 (1983); NATIONAL ADVISORY COMMITTEE ON OCEANS AND ATMOSPHERE, MARINE MINERALS: AN ALTERNATIVE MINERAL SUPPLY 15 (1983).

4. Manganese nodules containing nickel, copper, cobalt, and manganese had long been considered the prime economic mineral resource in the deep sea. There are about 10 trillion tons of nodules in the Pacific. However only a small portion of these deposits contain the economic cutoff percentage of two percent nickel plus copper plus cobalt and are found in concentrations greater than 10 kg/m<sup>2</sup> over an area sufficient for 20 years production. The highest concentration of nodules (more than 8 kg/m<sup>2</sup>) with the highest

Figure 1<sup>5</sup>



nickel plus copper (at least 1% combined content) are found between 3200 meters and 5900 meters in the northeast Pacific. Mean values of potential mining sites here have the following ranges: manganese 22% to 27%; nickel 1.2% to 1.4%; copper 0.9% to 1.1%; cobalt 0.15% to 0.25%. Economic-grade nodule fields have also been reported within the exclusive economic zone of Mexico. In the South Pacific, nodule distribution is more irregular; one area of concentration is around the Manihiki Plateau, the Society Islands, Tahiti and the Tuamotu Archipelago. More to the south, nodules occur west of the East Pacific Rise and northeast of New Zealand. Another nodule area lies in the circumpolar region of Antarctica. In the northern Peru Basin, nodule density is 7 kg/m<sup>2</sup> to 14 kg/m<sup>2</sup> up to 30 kg/m<sup>2</sup> with 1.1% to 1.2% nickel and thus may be of economic interest. Manganese nodules might be mined in the 1990s when economic, technical, legal and political factors are more favorable. In a first phase of mining, about 0.6 million km<sup>2</sup> in the northeast Pacific nodule belt and two million km<sup>2</sup> in the total Pacific may contain fields of sufficient nodule density, weight and metal content. The *in situ* reserves amount to 16 billion tons of nodules in the first phase with recoverable reserves of 5.6 billion tons. The area for each mining site would be between 80,000 km<sup>2</sup> and 120,000 km<sup>2</sup>. There would be space and abundance for at least 40 to 45 mining sites in the Pacific during a first generation of deep-sea mining, Halbach, *supra* note 2, at 42, 45-47, 55-58.

5. Base from *Pacific Mineral Resources*, in THE RAND McNALLY ATLAS OF THE

Petroleum and mineral resources are likely in some overlap areas, and the trend is to explore further offshore into such disputed areas. The United Nations Convention on the Law of the Sea<sup>6</sup> provides that, pending agreement on boundary delimitation of the Exclusive Economic Zone (EEZ) and continental shelf, the states concerned shall make every effort to enter into provisional arrangements, and in the meantime, not jeopardize or hamper the reaching of the final delimitation.<sup>7</sup> International joint development—the setting aside of the boundary dispute and jointly exploring and developing any resources in an agreed area—is one such provisional arrangement.<sup>8</sup> This Article reviews precedents for joint development, defines the essential elements of a joint development agreement, and sketches the basic parameters of joint development schemes for two areas of overlapping claims in Southeast Asia.

#### OVERLAPPING CLAIMS IN THE PACIFIC REGION

There are at least eight unresolved boundary situations in the southwest Pacific which might lead to overlaps and controversies,<sup>9</sup> especially if mineral deposits are suspected or discovered in these areas. Between Fiji and Tonga—the frame which was drawn around the Kingdom of Tonga in 1887, and within which Tonga still claims all rights—overlaps 4860 nautical square miles of waters and seabed which Fiji can claim. Also, Tonga's claim to Minerva Reefs as islands would increase Tonga's claimed area by 56,500 nautical square miles at the expense of 18,500 nautical square miles of Fiji's claimed area. The boundary between Western Samoa and American Samoa is unsettled and Western Samoa may not accept Swain's Island as a fair basis for restricting its claim in the northeast. Papua-New Guinea's claim extends east of an equidistance line and enclosed a 6,500 nautical square mile area which could be claimed by the Solomon Islands. A disagreement between New Caledonia and the Solo-

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Oceans 164 (M. Bramwell ed. 1977). Distribution of cobalt concentrations and of hydrothermal activity and sulphide occurrences from Halbach, *supra* note 2, at figures 2, 8. Schematic outline of the exclusive economic zones added by the author.

6. United Nations Convention on the Law of the Sea, done Dec. 10, 1982, U.N. Doc.A/CONF.62/122, art. 83(3), *reprinted* in 21 I.L.M. 1261, 1286 (1982) [hereinafter cited as LOS Convention].

7. "[P]ending ratification, the States concerned, in a spirit of understanding and cooperation, shall make every effort to enter into provisional arrangements of a practical nature and, during this transitional period, not to jeopardize or hamper the reaching of the final agreement." *Id.*

8. See generally Lagoni, *Interim Measures Pending Maritime Delimitation Agreements*, 78 AM. J. INT'L L. 345 (1984).

9. See Prescott, *International Maritime Boundaries in the Southwest Pacific Ocean* in LAW OF THE SEA AND OCEAN DEVELOPMENT ISSUES IN THE PACIFIC BASIN 488 (E. Miles & S. Allen eds. 1981); Prescott, *Existing and Potential Maritime Claims in the Southwest Pacific* in 2 OCEAN YEARBOOK 317 (E. Borgese & N. Ginsburg eds. 1980).

mon Islands would arise if New Caledonia rejected the Solomon Islands' archipelagic baseline around Indispensable Reefs; this would place the equidistance line thirty nautical miles to the north. A dispute between New Caledonia and Vanuatu may arise over the ownership of Hunter and Matthew islands and the 53,800 nautical square miles of sea and seabed the owner can claim from these islands. There is also a potential problem between New Caledonia and Australia because of tiny outlying islands that each claim and the necessity to determine which of these islands is usable as points on baselines for the determination of the boundaries. Further, The Lord Howe Rise, on which these islands lie, are separated from the continental margins of these two countries by deeper areas. The Lord Howe Rise is thus a continental margin beyond the 200 nautical mile claims of Australia, New Caledonia, and New Zealand, and must be divided among them. Also, at least for Australia and New Zealand, the proceeds of any seabed resources harvested from the area beyond 200 nautical miles must be shared with the International Seabed Authority.<sup>10</sup>

There are many areas of unresolved boundaries in Southeast Asian seas possibly containing petroleum or mineral resources.<sup>11</sup>

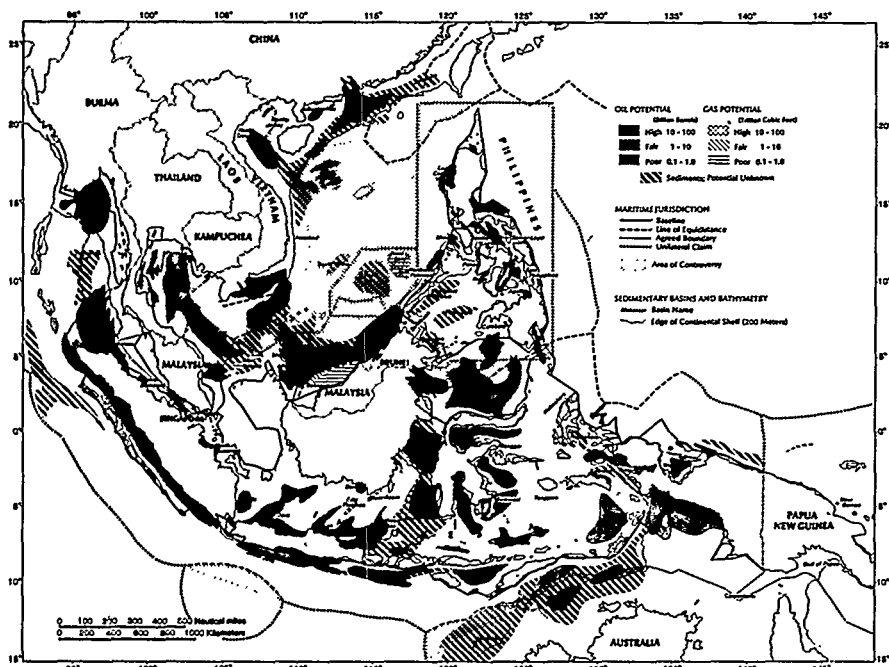
[SEE FIGURE ON NEXT PAGE]

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10. LOS Convention, *supra* note 6, art. 82.

11. See generally Prescott, *Maritime Jurisdictional Boundaries*, in *MARINE POLICY IN SOUTHEAST ASIA* 64 (G. Kent & M. Valencia eds. 1985).

Figure 2<sup>12</sup>



For example, the area offshore Brunei, claimed also by Malaysia, China, and Vietnam, and the Arafura Sea areas, claimed by Indonesia and Australia, may each contain 300 billion to three trillion dollars worth of oil and gas. The basins in the eastern Gulf of Thailand claimed by Thailand, Kampuchea and Vietnam, may contain fifty-three billion to 530 billion dollars worth of oil and gas. The Natuna area claimed by Vietnam and Indonesia and the Gulf of Tonkin area claimed by China and Vietnam may contain from twenty-five billion to 250 billion dollars worth of oil and gas.<sup>13</sup>

Although these gross values do not include discovery and extraction costs, their magnitude explains in part why these countries are adamant about their claims to these areas. However, these countries rely on foreign private capital, foreign technical expertise and foreign equipment for offshore hydrocarbon development, and companies may be reluctant to invest in hydrocarbon development in disputed areas. Joint development may be an appropriate response to this dilemma.

12. Valencia, *Oil and Gas Potential, Overlapping Claims, and Political Relations*, in *MARINE POLICY IN SOUTHEAST ASIA*, figure 5.4, at 164 (G. Kent & M. Valencia eds. 1985).

13. Valencia & Marsh, *supra* note 1.

## JOINT DEVELOPMENT IN AREAS OF OVERLAPPING CLAIMS

Joint development agreements between Thailand and Malaysia,<sup>14</sup> South Korea and Japan,<sup>15</sup> Saudi Arabia and Kuwait,<sup>16</sup> and Iceland and Norway<sup>17</sup> are sufficiently well documented to delineate elements in common and their variations. A similar agreement between Sudan and Saudi Arabia<sup>18</sup> and that recommended for Tunisia and Libya<sup>19</sup> provide supplemental information.

Although Malaysia and Thailand agree on a boundary, extending approximately fifty kilometers (thirty-one miles) from land, from

14. See generally M. Valencia, *SOUTHEAST ASIAN SEAS: OIL UNDER TROUBLED WATERS* 62 (1985); Ariffin, *The Malaysian Philosophy of Joint Development*, in *GEOLOGY AND HYDROCARBON POTENTIAL OF THE SOUTH CHINA SEA AND POSSIBILITIES OF JOINT DEVELOPMENT* 533 (M. Valencia ed. 1985); Polahan, *Thailand-Malaysia Memorandum of Understanding*, in *THE SOUTH CHINA SEA: HYDROCARBON POTENTIAL AND POSSIBILITIES OF JOINT DEVELOPMENT* 1355 (M. Valencia ed. 1981).

15. See generally Miyoshi, *The Japan-South Korea Agreement of Joint Development of the Continental Shelf*, in *GEOLOGY AND HYDROCARBON POTENTIAL OF THE SOUTH CHINA SEA AND POSSIBILITIES OF JOINT DEVELOPMENT* 545 (M. Valencia ed. 1985); Park, *Joint Development of Mineral Resources in Disputed Waters: The Case of Japan and South Korea in the East China Sea*, in *THE SOUTH CHINA SEA: HYDROCARBON POTENTIAL AND POSSIBILITIES OF JOINT DEVELOPMENT* 1335 (M. Valencia ed. 1981); Takeyama, *Japan's Foreign Negotiations Over Offshore Petroleum Development: an Analysis of Decision-Making in the Japan-Korea Continental Shelf Joint Development Program*, in *JAPAN AND THE NEW OCEAN REGIME* 276 (R. Freidheim ed. 1984); Miyoshi, *Licensing in Japan-South Korea Joint Development Arrangement* (a paper presented at the Third East-West Center Workshop on the Hydrocarbon Potential of the South China Sea and Possibilities of Joint Development, Bangkok, Thailand) (Feb. 1985).

16. See generally Onorato, *A Case Study in Joint Development: The Saudi Arabia-Kuwait Partitioned Neutral Zone*, in *GEOLOGY AND HYDROCARBON POTENTIAL OF THE SOUTH CHINA SEA AND POSSIBILITIES OF JOINT DEVELOPMENT* 539 (M. Valencia ed. 1985); Fesharaki, *Joint Development of Offshore Petroleum Resources: The Persian Gulf Experience*, in *THE SOUTH CHINA SEA: HYDROCARBON POTENTIAL AND POSSIBILITIES OF JOINT DEVELOPMENT* 1325 (M. Valencia ed. 1981).

17. See generally Richardson, Anderson & Evensen, *Report and Recommendations to the Governments of Iceland and Norway of the Conciliation Commission on the Continental Shelf Area Between Iceland and Jan Mayen*, 20 I.L.M. 797 (1981); Østreng, *Reaching Agreement on International Exploitation of Ocean Mineral Resources with Special Reference to the Joint Development Area Between Jan Mayen and Iceland*, in *GEOLOGY AND HYDROCARBON POTENTIAL OF THE SOUTH CHINA SEA AND POSSIBILITIES OF JOINT DEVELOPMENT* 555 (M. Valencia ed. 1985).

18. See generally A. EL-HAKIM, *THE MIDDLE EASTERN STATES AND THE LAW OF THE SEA* 180-88 (1979); Blissenbach & Nawab, *Metalliferous Sediments of the Seabed*, in *OCEAN YEARBOOK* 377 (E. Borgese & N. Ginsburg eds. 1982); Emery, Hunt & Hays, *Summary of Hot Brines and Heavy Metal Deposits in the Red Sea*, in *HOT BRINES AND RECENT HEAVY METAL DEPOSITS IN THE RED SEA: A GEOCHEMICAL AND GEOPHYSICAL ACCOUNT* 557 (E. Degens & O. Ross eds. 1969).

19. See *Concerning the Continental Shelf (Tunisia v. Libyan Arab Jamahiriya)*, 1982 I.C.J. 278, 321 (Judgment of Feb. 24) (Evensen, J., dissenting), *reprinted in* 21 I.L.M. 225, 295 (1982) [hereinafter cited as *Tunisia/Libya Continental Shelf*].

this point their respective boundary claims diverge to the north and south. The area of overlap is roughly a triangle, athwart the northwestern core of the Malay Basin with its apex pointing towards land. The overlap area includes a gas discovery by Texas Pacific. A line of equidistance between Thailand and Malaysia would extend even further south than the Thai claim and include another gas discovery, Pulong 1. Assuming the new Vietnamese government still asserts the 1971 continental shelf claim of South Vietnam, the Vietnamese claim encompasses the northwestern tip of the area claimed by both Malaysia and Thailand. Thailand had awarded concessions in the northeastern part of the disputed area and in the southeastern part to Triton 1 to Texas Pacific.

On February 21, 1979, the prime ministers of Thailand and Malaysia, General Kriangsak Chomanan and Datuk Hussein Onn, signed a memorandum of understanding establishing the Malaysia-Thailand Joint Authority.<sup>20</sup> Both governments agreed it was in their best interests to exploit the resources of the seabed in the area of overlapping claims as soon as possible. Thus, in a defined Joint Development Area, they agreed to jointly explore and exploit the seabed and subsoil nonliving resources for a period of fifty years and to share equally the costs incurred and the benefits derived. During this time the countries will continue to negotiate the boundary. The countries ratified the memorandum of understanding by an exchange of the instruments of ratification on October 24, 1979, creating joint authority to manage the area.

The South Korea-Japan case has both similarities to and differences from the Thailand-Malaysia case. Stimulated by a 1969 ECAFE (Economic Commission for Asia and the Far East) report that the continental shelf between Taiwan and Japan may be one of the most prolific oil reservoirs in the world, Japan, South Korea, and Taiwan made overlapping claims to the continental shelf situated between them.<sup>21</sup> These disputes were further complicated by a dispute between Japan and Taiwan over the Senkaku (or Diaoyutai) islands. In 1970 Japan, South Korea, and Taiwan agreed to set aside the boundary issues for future negotiation and to jointly develop any oil in the overlapping area; however, Chinese protests resulted in the abandonment of this arrangement. Japan and South Korea then entered into a joint agreement in January 1974. The agreement was ratified by South Korea in December 1974, but not by Japan until

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20. Memorandum of Understanding, Oct. 24, 1979, Malaysia-Thailand, *reprinted in* Polahan, *supra* note 14, at 1356.

21. Emery, *Geological Structures and Some Water Characteristics of the East China Sea and the Yellow Sea*, UN ECAFE, Committee for the Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas, 1969 TECH. BULL. 2.



1978.<sup>22</sup>

Kuwait and Saudi Arabia have a joint development zone in the northeastern corner of the Saudi Arabian peninsula along the eastern head of the Persian Gulf. The zone was created in place of a boundary as a buffer between rival nomadic tribes. The zone lay dormant until the petroleum exploration boom. On June 28, 1948, the American Independent Oil Company obtained a concession from Kuwait covering its undivided half of the zone. On February 20, 1949, Pacific Western Oil Corporation, later Getty Oil Company, acquired a corresponding concession from Saudi Arabia for its undivided half of the zone. Kuwait's "special relationship" with Great Britain ended in 1961 and on July 7, 1965, the two fully independent states agreed to formally partition the zone and draw an international boundary to divide it equally.<sup>23</sup> However, the agreement maintained the unified joint development of petroleum reserves in the zone, as well as the existing rights of the concessionaires.

In February 1979 the Norwegian government declared its right to establish an EEZ around the island Jan Mayen. Iceland countered by maintaining that Jan Mayen was a rock, and that under international law it could not have a continental shelf or EEZ. Two problems evolved from negotiations—control of fishing in the area and continental shelf rights. On May 28, 1980, the parties reached an agreement in which Iceland recognized Norway's right to an EEZ around Jan Mayen, while Norway limited the zone to the median line with Iceland.<sup>24</sup> However, the agreement applied mainly to fish, which explains why the next day Norway declared a 200 nautical mile zone for fisheries only. Article 9 of the agreement provided for the establishment of a conciliation commission to make recommendations with regard to a dividing line for the continental shelf.<sup>25</sup> The conciliation commission drafted a geological report on the area involved, resolved various questions of international law, and most important, recommended a joint development of hydrocarbons in the area. On October 22, 1982, Iceland and Norway accepted the rec-

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22. Agreement Concerning Joint Development of the Continental Shelf, *opened for signature* Jan. 30, 1978, Japan-Korea, *reprinted in* Park, *supra* note 15, at 1342.

23. Agreement Relating to the Partition of the Neutral Zone, July 7, 1965, Kuwait-Saudi Arabia, *reprinted in* 4 I.L.M. 1134, *and in* Fesharaki, *supra* note 16, at 1330.

24. Agreement Concerning Fishery and Continental Shelf Questions, May 28, 1980, Iceland-Norway, *overenskomst med fremmede stater* 912 (1980). *See generally* Ostreng, *supra* note 17.

25. Agreement Concerning Fishery and Continental Shelf Questions, *supra* note 24, art. 9.

ommendations of the conciliation commission.

### COMMON ELEMENTS<sup>26</sup>

Common elements in precedents for joint development define the extent of the area, the contract type, the financial arrangements, the process of selection of concessionaires or operators, the length of the agreement, and the nature and functions of the joint management body. Joint development does not have to be in place of a boundary; indeed the parties agreed to boundaries in the land portion of the Saudi Arabia-Kuwait arrangement,<sup>27</sup> in the Saudi Arabia-Sudan agreements,<sup>28</sup> and between the respective continental shelves and EEZs in the Iceland-Norway arrangement.<sup>29</sup> Nevertheless, an agreement on the extent of the area in question is fundamental to a joint development arrangement. In the Thailand-Malaysia<sup>30</sup> and South Korea-Japan<sup>31</sup> cases, boundary delimitation was shelved and the area of overlap of the respective claims became the agreed joint development area. In the Saudi Arabia-Kuwait case, the land portion of the joint development area was originally a neutral zone established as a buffer to prevent clashes of nomadic tribes.<sup>32</sup> In 1965 the countries agreed to a boundary and partitioned the zone; however, the partitioned zone (the area covered by the neutral zone before partition) became the joint development area. The two countries did not partition the submerged area adjoining the partitioned zone but agreed to joint exploration outside territorial seas of six nautical miles.

In the Iceland-Norway case, the countries based the recommended joint development area on the extent of the prospective sediments. This area covers seventy percent of the Norwegian side of an agreed EEZ boundary.<sup>33</sup> An interesting variation is the recommendation that if a field extends outside the joint development area into the Icelandic shelf, then Iceland should have sole rights to that portion in its territory, but if a field extends into the Norwegian shelf, the whole field should come under the joint development scheme. In the Saudi Arabia-Sudan arrangement in the Red Sea, the joint develop-

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26. See Valencia, *Elements for Negotiations: An Introduction* (a paper presented at the Third East-West Center Workshop on the Hydrocarbon Potential of the South China Sea and Possibilities of Joint Development, Bangkok, Thailand) (Feb. 1985).

27. Miyoshi, *Some Comments on Legal Aspects of Precedents for Joint Development*, in *THE SOUTH CHINA SEA: HYDROCARBON POTENTIAL AND POSSIBILITIES OF JOINT DEVELOPMENT* 1359 (M. Valencia ed. 1981).

28. A. EL-HAKIM, *supra* note 18, at 185.

29. *Id.*

30. See Ariffin, *supra* note 14.

31. Miyoshi, *supra* note 15, at 545.

32. Onorato, *supra* note 16, at 540.

33. Østreng, *supra* note 17, at 560.

ment area lies between the 1000 meter isobaths extending from each coast and includes the main Red Sea brine deposits.<sup>34</sup> In the minority opinion recommendation for Tunisia-Libya, the joint development area would be that formed by lines deviating ten to fifteen degrees on either side of an adjusted equidistance line.<sup>35</sup>

Jurisdiction is clearly defined in the Japan-Korea,<sup>36</sup> Thailand-Malaysia,<sup>37</sup> Iceland-Norway,<sup>38</sup> and Saudi Arabia-Kuwait<sup>39</sup> agreements; it is not so clearly defined in the Saudi Arabia-Sudan<sup>40</sup> arrangement. In the Thailand-Malaysia arrangement, the governments jointly retained sovereign rights to the area, and to regulation of customs, fishing, navigation, hydrographic and oceanographic surveys, marine pollution and security. The countries divided criminal jurisdiction by a line equidistant between the two claim lines.<sup>41</sup>

If the two countries have different contractual systems, such as concessions versus production sharing, they must agree on one or the other. Also difficult are questions of respective management rights, taxation, and the allocation of financing. If the area is sufficiently prospective, private companies could arrange the financing; but the countries must agree to this arrangement as well as to the choice of company. Thailand and Malaysia agreed to use a production-sharing contract system even though Thailand was using a concession system. The agreed terms for contractors were different than those in use in either country.<sup>42</sup> Under the South Korea-Japan arrangement, each country names a concessionaire and each party collects taxes from its own concessionaire.<sup>43</sup> The Saudi Arabia-Kuwait scheme uses concessions and OPEC tax rates, royalties, prices, and production and maintenance costs.<sup>44</sup> The conciliation commission recommended a joint venture contract for the Norway-Iceland arrange-

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34. A. EL-HAKIM, *supra* note 18, at 185.

35. *Tunisia/Libya Continental Shelf*, 1982 I.C.J. at 321.

36. Agreement Concerning Joint Development of the Continental Shelf, *supra* note 22, arts. 19, 21.

37. See Polahan, *supra* note 14.

38. Østreng, *supra* note 17, at 560.

39. Agreement Relating to the Partition of the Neutral Zone, *supra* note 23, arts. 3, 7.

40. Miyoshi, *supra* note 27, at 1359.

41. See Polahan, *supra* note 14.

42. Ariffin, *supra* note 14, at 535; Ahmad, *Agreement Solves Border Dispute*, *Petroleum News*, Feb. 1985, at 18.

43. Agreement Concerning Joint Development of the Continental Shelf, *supra* note 22, arts. 4, 17.

44. Fesharaki, *supra* note 16, at 1329.

ment.<sup>45</sup> The commission also recommended that each party participate with a twenty-five percent share in joint ventures with oil companies in the other's portion of the joint development area. However, it also recommended that if no commercial companies became involved, and if the countries each financed exploration themselves in their own portions of the joint development area, Norway should carry Iceland's interest in Norway's portion. Similarly, Saudi Arabia will bear all the operating expenses of the joint commission.<sup>46</sup>

In both the South Korea-Japan and Saudi Arabia-Kuwait land agreements,<sup>47</sup> both parties nominate a concessionaire for the entire subzone or area, and these concessionaires reach an operating agreement between them, or in the South Korea-Japan agreement, by drawing lots, if necessary.<sup>48</sup> Saudi Arabia and Kuwait agreed on one operator for the offshore portion of the joint development area. The countries made no specific reference to a contractual system in the Saudi Arabia-Sudan agreement.

Countries engaging in joint development must also decide on the duration of the agreement as well as on the reasons and procedures for terminating the agreement. A short-term agreement (such as ten years) may provide impetus to hasten exploration and development but may also make investors shy away from a situation which will obviously change. A long-term agreement (such as fifty years) provides a more stable investment climate but a longer commitment. The Thailand-Malaysia agreement extends fifty years or until the parties agree on delimitation.<sup>49</sup> Although the South Korea-Japan arrangement also extends for fifty years, it can be terminated by mutual consent if the parties recognize that the natural resources are no longer exploitable.<sup>50</sup> The Saudi Arabia-Kuwait agreement is of indefinite duration, and either party can terminate it; however, a sixty year concession in the area was given to one company.<sup>51</sup>

If a joint development body is established, the countries involved must agree on the degree of the body's autonomy and authority. A joint development body may be strong—a full legal person with powers to license, stipulate terms and exemptions, and enter into contractual agreements with foreign companies—or it may be

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45. Richardson, Anderson & Evenson, *supra* note 17, at 841.

46. Blissenbach & Nawab, *supra* note 18, at 98.

47. Onorato, *supra* note 16, at 540.

48. Agreement Concerning Joint Development of the Continental Shelf, *supra* note 22, art. 6.

49. See Polahan, *supra* note 14.

50. Agreement Concerning Joint Development of the Continental Shelf, *supra* note 22, art. 21.

51. "Either party shall be relieved of its obligations under the agreement if the other cedes or alienates all or part of [its] equal rights to any other State or if the other refuses to abide by [a] judgment made against it." Agreement Relating to the Partition of the Neutral Zone, *supra* note 23, arts. 5, 22.

weak—simply a liaison or consultative body between national oil companies. The Thailand-Malaysia and Saudi Arabia-Sudan arrangements produced joint authorities with strong powers, in contrast to the consultative status of the joint commissions produced by the South Korea-Japan and Saudi Arabia-Kuwait arrangements.<sup>52</sup>

In the Thailand-Malaysia case, the countries established a joint authority to explore and exploit the nonliving natural resources of the seabed and subsoil in the overlapping area.<sup>53</sup> The joint authority assumed all rights, responsibilities, and powers on behalf of both parties in this regard for the development, control, and administration of the area. The assumption of the joint authority of such rights and responsibilities was not supposed to affect or curtail the validity of concessions or licenses hitherto issued or agreements or arrangements made by either party. The joint authority has a constitution and licensing powers; it can retain profit and it is taxable. It consists of two joint chairpersons, one from each country and an equal number of members from each country. The joint authority has one legal and two technical subcommittees.

The Saudi Arabia-Sudan agreement stipulated to the establishment of a joint commission. The commission's responsibilities are to survey and delimit the common zone, to carry out the requisite studies concerning the exploration and exploitation of the natural resources there, to encourage specialized bodies to undertake exploration activities in the zone, to look into applications for licenses and concessions concerning exploration and exploitation in the common zone, and specifically, to render a decision on the previous agreement between Sudan and Preussag for exploration rights.<sup>54</sup>

South Korea and Japan established the Japan-Republic of Korea Joint Commission with a mandate to review operation of the agreement and *recommend* action to the parties.<sup>55</sup> The Commission has a permanent secretariat and a subcommittee of experts. The parties must approve the operating agreement between the concessionaires, and the laws of each party apply to its concessionaire if its concessionaire is the operator. One interesting variation is that the Japanese Ministry of Agriculture, Forestry, and Fishery must be consulted in approving the operating agreement and can restrict

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52. See Agreement Concerning Joint Development of the Continental Shelf, *supra* note 21; Agreement Relating to the Partition of the Neutral Zone, *supra* note 23.

53. See Polahan, *supra* note 14.

54. A. EL-HAKIM, *supra* note 18, at 186.

55. Miyoshi, *supra* note 15, at 548.

exploration and exploitation in designated fishing zones.

Saudi Arabia and Kuwait established a joint operating committee to supervise the concessionaires' field operators.<sup>56</sup> The committee studies projects and new licenses, contracts and concessions relating to exploitation of shared natural resources and recommends action to the respective ministers of natural resources; it can also sign contracts. A permanent consultative committee was recommended in the Tunisia-Libya case.<sup>57</sup>

Common elements which may later become important include: unitization provisions for deposits which straddle the boundaries of the joint development area; procedures and principles for conflict resolution such as direct negotiation; and provisions for, or governing, a conciliation commission, or for bringing the matter to the International Court of Justice. Transfer of technology may be important, particularly if there is a great gap between the technical levels of the two entities, or if political difficulties exist between one of the partners and the home country of interested companies, such as Vietnam and the United States.

#### THE ROLE OF GEOLOGY IN JOINT DEVELOPMENT ARRANGEMENTS<sup>58</sup>

The geology, particularly the hydrocarbon or mineral potential, in an area of overlapping claims, is the given natural reality upon which legal and institutional edifices are built. Geology played a direct role in the recommendations for joint development for Iceland and Norway and the actual joint development arrangement between Thailand and Malaysia. Geology played a more indirect role in the arrangements between Sudan and Saudi Arabia and between Japan and South Korea.

In the Iceland-Norway case, the finding that the Jan Mayen Ridge is not a natural geological prolongation of Jan Mayen or of Iceland, prompted the conciliation commission to discard the concept of natural prolongation as a suitable basis for the solution of the outstanding issues. In proposing a joint development scheme for Iceland and Norway, the conciliation commission gave special consideration to the very low hydrocarbon potential of the shelf surrounding Iceland, and to the Jan Mayen Ridge as the only possible area with hydrocarbon potential. Indeed, the proposed joint development area was specifically defined to include the major part of the Jan Mayen Ridge. Because the potential is unknown, the commission suggested

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56. Onorato, *supra* note 16, at 541.

57. *Tunisia/Libya Continental Shelf*, 1982 I.C.J. at 321.

58. See Valencia, *Geological Factors* (a paper presented at the Third East-West Center Workshop on the Hydrocarbon Potential of the South China Sea and Possibilities of Joint Development, Bangkok, Thailand) (Feb. 1985).

that the Ridge be assessed at the earliest possible date through a joint venture between Norway and Iceland.<sup>59</sup>

The commission noted that joint cooperation agreements must consider the fact that investment and economic risks differ substantially in each stage of exploration—predrilling, drilling, and development. Because the unpromising geology and great water depths make the financial risks very large, the commission suggested involving oil companies with deep-water experience in the drilling stage, or alternatively, that Norway carry Iceland's interest. The commission also recommended that, if necessary, Norway should carry Iceland's interest in exploration in the joint development area north of Iceland's EEZ boundary but not vice versa for the area south of Iceland's EEZ boundary.<sup>60</sup> The motivation for this recommendation may be the slight extent and lower petroleum potential of the Jan Mayen Ridge to the south of the boundary.

If the countries know or expect little or nothing of the hydrocarbon or mineral potential, it may be easier to divide a disputed area; however, if they know or expect that some deposits exist in the area, each claimant would be afraid of giving something away. The United Nations Committee for the Coordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (UN-COOP) sponsored a survey which indicated a high probability that the continental shelf between Taiwan and Japan may be one of the most prolific oil reservoirs in the world. The initial stimulus for the overlapping Japanese, Korean, and Taiwanese claims on their shared continental shelf was this expectation of petroleum in the area.<sup>61</sup>

Since gas resources were known to exist in the area of overlap between Thailand and Malaysia, both governments initially agreed that it was in their best interests to exploit these resources as soon as possible. In Malaysia, the national Electricity Board could use the gas for its power station at Prai on the west coast of the peninsula. Thailand would use it to help fuel its eastern seaboard industrial complex. The details of establishing a joint authority thus became a task of harmonizing the two sets of national economic policies, particularly the respective national policies on gas utilization.<sup>62</sup>

At least three major brine deposits are known in waters about

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59. Though due to the expense and expertise required, the commission felt Norway should bear the costs of these surveys. Richardson, Anderson & Evensen, *supra* note 17, at 841.

60. *Id.* at 838.

61. Park, *supra* note 15, at 1335.

62. Ariffin, *supra* note 14, at 536-37.

2000 meters deep in the Red Sea—the Atlantis II, Discovery and Chain deeps. It was estimated that the Atlantis II deep contains about 2.5 billion dollars worth of zinc, copper, lead, silver, and gold at 1969 smelter prices.<sup>63</sup> Deposits in the adjacent Discovery deep contain lower, but still abnormally high, metal concentrations. Because the Atlantis II deep was known to extend across the median line, and because independent mining of the brines and semifluid muds from each side of the median line would not be efficient, fair, or profitable, the parties chose joint development.<sup>64</sup> The Saudi Arabia-Sudan agreement defined the common zone as the area beyond the 1000 meter water depth off each country's shore, and it includes these three deeps. Because the potential and its extent are still largely undefined, the agreement stipulated to the establishment of a joint commission to survey and delimit the common zone as well as to study the feasibility of exploiting the mineral-bearing sediments in such deep waters.

### PROBLEMS IN IMPLEMENTATION

How well has joint development worked? The Saudi Arabia-Kuwait arrangement is the only agreement which proceeded from political agreement through the establishment of the necessary legal and institutional organizations to successful exploration and development of resources. The Sudan-Saudi Arabia agreement functioned successfully through a three month prepilot mining test, but a commercial project has not been implemented due to uncertainty about its commercial viability.<sup>65</sup>

The success of the Kuwait-Saudi Arabia agreement is attributable to (1) an "unwritten agreement" to keep oil out of political differences; (2) the practical desire of both parties to develop the oil fields quickly; and (3) the small portion of total oil production by these states from the joint development area.<sup>66</sup> The two countries reached this agreement relatively easily and because of the good relations and practical attitude of the two countries the agreement works relatively smoothly.

Perhaps pan-Arabism and familiarity with the Islamic concept of

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63. See Bischoff & Manheim, *Economic Potential of the Red Sea Heavy Metal Deposits* in *HOT BRINES AND RECENT HEAVY METAL DEPOSITS IN THE RED SEA: A GEOCHEMICAL AND GEOPHYSICAL ACCOUNT* 535 (E. Degens & O. Ross eds. 1968).

64. See Østreng, *Joint Development of Hydrocarbons in the South China Sea: Opportunities and Constraints*, (a paper presented at the Third East-West Center Workshop on the Hydrocarbon Potential of the South China Sea and Possibilities of Joint Development, Bangkok, Thailand) (Feb. 1985).

65. Blissenbach & Nawab, *supra* note 18, at 394; Blissenbach, *Technical and Economic Aspects of Ocean Mining*, 7, 11 (a paper presented at the Pacific Marine Mineral Resources Training Course, East-West Center, Honolulu, Hawaii) (June 1985).

66. Miyoshi, *supra* note 27, at 1360; Fesharaki, *supra* note 16, at 1329-30.



*mushaa* (equal shares in joint and undivided property)<sup>67</sup> were additional factors in the successful implementation. The agreement of both countries on a single company (an operator who played a constructive and cooperative role in the exploration and development of the resources) was also a definite contribution to its success. Furthermore, the discovery of actual resources in the joint development area certainly cemented the effort.

The Iceland-Norway agreement is too recent to ascertain major problems in its implementation; implementation of other joint development agreements was unsuccessful for a variety of reasons. From the beginning, the South Korea-Japan joint development scheme was a highly sensitive political issue which strained relations between the coastal states. Although the agreement became effective in June 1978 and much drilling has occurred, the countries have yet to find any petroleum.<sup>68</sup>

The series of obstacles to the implementation of the Thai-Malaysian scheme is illustrative of the types of problems that can be encountered. Implementation of the Thailand-Malaysia agreement was long delayed. Initially, Thailand accommodated Texas Pacific by allowing it to keep its concession in the joint development area and Malaysia agreed to this. Then Thailand's disagreement with Texas Pacific over the pricing of gas in its "B" structure heated up. Consequently, Thailand apparently wanted to revoke Texas Pacific's concession in the joint development area to pressure the company in the pricing disagreement. Texas Pacific, on the other hand, did not recognize the joint development authority.

The fact that a line of equidistance between Thailand and Malaysia would extend the boundary further south than the initial 1973 Thai claim and include the gas discovery in Pilong 1, produced a disagreement between the Thai government and its concessionaire, Triton Oil Company. When Malaysia agreed to include Pilong 1 in the joint development area, Triton claimed that its concession boundary moved with the international boundary and now extended southward to the equidistant line. Thailand initially agreed to allow Triton to include Pilong 1 in its concession area but internal Thai inter-agency disagreement on this point followed. Indeed, in May 1985 government sources in Malaysia announced that the delayed implementation of the joint development agreement was due to Thai gov-

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67. Onorato, *supra* note 16, at 540.

68. Park, *supra* note 15, at 1341.

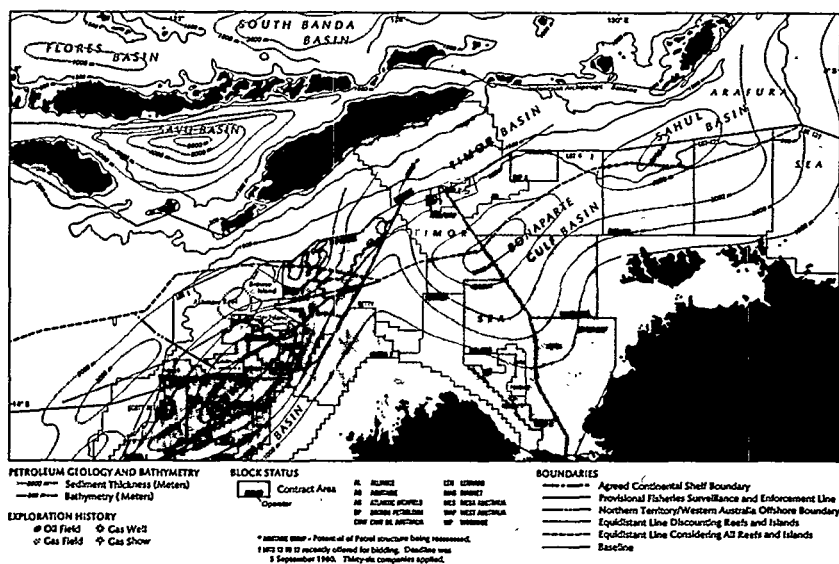
ernment problems with contractors in the area.<sup>69</sup>

Another problem was that Malaysia preferred to have one concessionaire, not three as proposed by Thailand—Petronas, Triton, and Texas Pacific. In an attempt to end the stalemate, Malaysian Prime Minister Mahathir proposed to Thai Prime Minister Prem Tinsulanonda that the Petroleum Authority of Thailand (PTT) enter a joint venture with Petronas and international oil firms approved by both governments. The foreign firms would then settle among themselves their respective equities in the joint venture and choose a representative to negotiate with the joint development authority. However, the Thai government may have been wary of this proposal because PTT is not as experienced in petroleum exploration as Petronas. Also, Triton Oil Company formally rejected joint operation as economically unfeasible. Despite these problems, Malaysia and Thailand have finally decided to move ahead with joint development of the area.<sup>70</sup>

### APPLICATIONS

There are two areas in Southeast Asia which are currently being considered for joint development by the countries concerned: the "Timor gap" between Indonesia and Australia,<sup>71</sup> and the Natuna Sea between Indonesia and Vietnam.<sup>72</sup>

Figure 3<sup>73</sup>



69. Energy Asia, May 10, 1985.

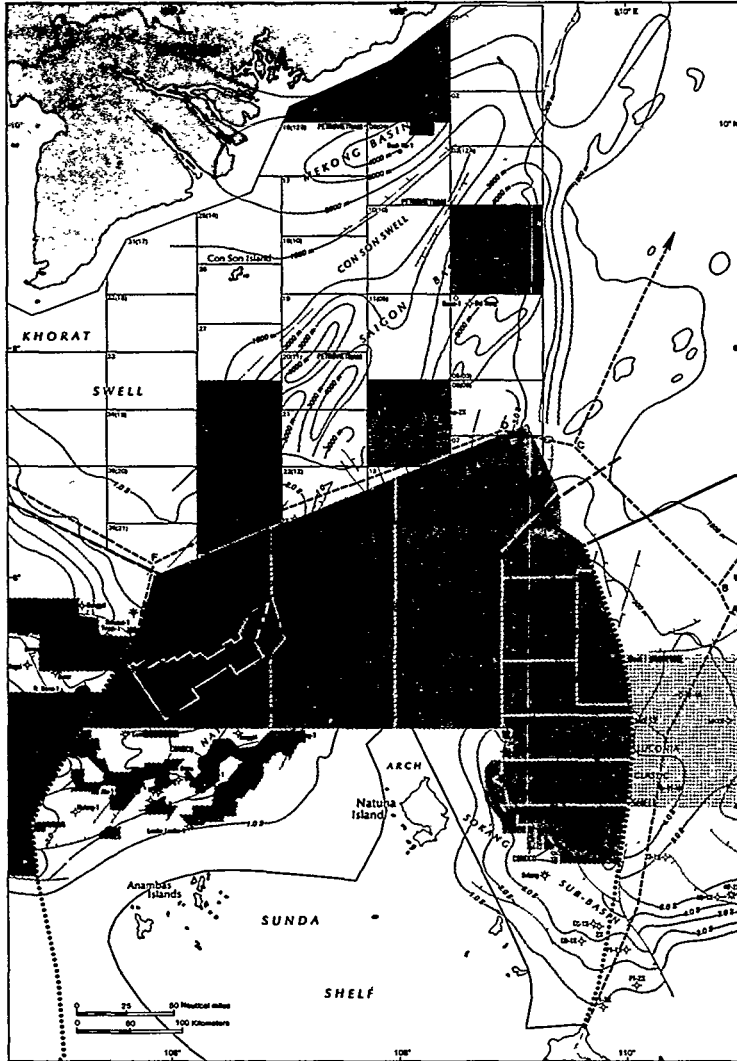
70. Petroleum News, July 11, 1985; Ahmad, *Agreement Solves Border Dispute*, Petroleum News, February, 1985, at 18.

71. Valencia & Miyoshi, *Southeast Asian Seas: Joint Development of Hydrocarbons in Overlapping Claim Areas*, 16 OCEAN DEV. INT'L L.J. 211 (1986); *Timor Tax Shelter*, FAR EAST. ECON. REV. Aug. 22, 1985 at 1.

72. Energy Asia, Aug. 30, 1985.

73. Valencia, *supra* note 12, figure 5.11.

Figure 474



**PETROLEUM GEOLOGY AND BATHYMETRY**

- 2.0 p — Sediment Thickness (Seconds, Two-Way Time, also Approximate Kilometers)
- 2000 m — Sediment Thickness (Meters)
- Fault, Barbs on Downthrown Side
- 200 m — Bathymetry (Meters)

**EXPLORATION HISTORY**

- Oil, Gas Field
- Oil Well, Show
- ⊙ Gas Well, Show
- ⊕ Oil and Gas Well, Show
- ⊖ Dry or Abandoned Well
- ⊗ Well being Drilled
- Approximate Location

**BLOCK STATUS**

- Block Number
- Contract Area
- Operator
- Many Number of Block / Old Number of Block
- Vietnam: Areas under Contract in 1980
- Vietnam: Open Block
- ▨ Malaysia: Areas Offered for Bidding, 1982

**BOUNDARIES**

- Baseline
- Line of Equidistance
- Section of Boundary Proclaimed by South Vietnam 1971
- ..... Seabed Boundary 27 October 1959
- Malaysian Continental Shelf Claim 1979

74. *Id.* figure 5.6.

In 1971 and 1972 Australia and Indonesia concluded treaties that established seabed boundaries extending from Papua-New Guinea in the east to the waters between Ashmore Island and Pulau Roti in the west. A gap of about 200 nautical miles was left in the boundary south of eastern Timor, then a colony of Portugal. When Indonesia formally incorporated eastern Timor in July 1976 the closing of the gap became the subject of negotiations beginning in February 1979.

Geology is the main factor in the dispute. As to the boundary south of Timor, Australia argues that two continental margins exist between Timor and Australia—a more than 200 nautical mile wide Australian margin to the south and a forty to seventy nautical mile wide Indonesian margin to the north separated by the Timor Trough. Further, Australia claims that either the axis of the trough, or, more generously, a line halfway down the Australian margin should be the boundary. Indonesia claims that there is a single continental margin between the two countries with the Timor Trough just a depression in this continuous feature, and that the boundary should be the line equidistant between the two countries' territories. The disputed area measures some 12,000 nautical square miles.<sup>75</sup>

Australia proposed to Indonesia that they form a joint authority to

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75. The "Timor gap" presents an interesting problem because it includes two prospective basins, Timor and Bonaparte Gulf. Little is known of the petroleum potential of the Timor basin although it is generally considered poor. However, in December 1983 there was supposedly the most significant find in Australia since the Bass Strait—Jabiru 1A in the Timor Sea (Vulcan sub-basin of the Browse basin). Test flows reached 7,500 barrels of oil per day (BOPD), and preliminary recoverable reserve estimates were at least 200 million barrels. *Petroleum News*, Dec. 1983. However, the results of appraisal wells were disappointing. These results, coupled with Australia's resources rent tax, and the politics associated with it, could result in the postponement of production. Kelp, another structure of interest, overlaps the northeastern portion of the "gap." Its oil reserves were estimated to range from 500 million to five billion barrels of oil and fifty trillion cubic feet of gas. *BHI Maps Plans to Appraise Big Jabiru Oil Strike, Drill More Wildcats in Timor Sea*, *OIL AND GAS JOURNAL*, Dec. 19, 1982 at 111-12.

An equidistance line would cut the core of the Bonaparte Gulf basin closure into a two-thirds/one-third proportion in favor of Australia, with Kelp falling to Indonesia. A continuation of the agreed continental shelf boundaries to close the "Timor gap" would place the entire Bonaparte Gulf basin and Kelp in Australian jurisdiction. The basin is also divided almost in half by the northwest-southeast boundary between Australia's Northern Territory and the State of Western Australia. Several holders of Australian contracts have acreage beyond the equidistant line: Tricentrol (awarded in 1980), Woodside Petroleum and Aquitaine in the Northern Territory portion, and Woodside Petroleum and Mesa Australia/West Australia in the Western Australia portion. The Woodside Petroleum and the Aquitaine acreages extend to the hypothetical connection across the "gap," which is halfway down the Australian continental "margin," thus overlapping into the Timor basin.

The Timor basin would be completely within the Indonesian "shelf" if the equidistance line were to become the agreed boundary. If the middle of the Australian margin is used as a guide to complete the "gap," a small portion of the core of the Timor basin would accrue to Australia, which already leased it for exploration. Former Portuguese Timor leased the area extending to the hypothetical "gap" connection, and thus the bulk of the basin to Oceanic.

administer the disputed area or at least those areas with the highest oil and gas potential.<sup>76</sup> In a joint development agreement, Australia and Indonesia could agree that the boundaries of the joint development area are the lines connecting the two agreed boundaries, the equidistance line and two longitudes connecting these lines.<sup>77</sup> Given this agreement, the line connecting the agreed continental shelf boundaries could be set as the continental shelf boundary in the area, and Australian criminal jurisdiction and defense could prevail in the joint development area.

The joint authority established by the federal governments of Indonesia and Australia, or their assignees could be strong, but it must accommodate the interests of the Australian States of Western Australia and the Northern Territory, possibly through a division of powers similar to that between the Regional Fishery Management Councils and the federal government in the United States under the Fishery Conservation and Management Act.<sup>78</sup> *Pari Petroleum* which operates in both Australia and Indonesia might satisfy all parties concerned. The contract could be based on the Indonesian production-sharing model which is more favorable to oil companies than current Australian tax regulations. The oil companies would bear all the risk. To cement and stabilize relations between the two and allay suspicions, the agreement could be long-term. Conflict resolution could be by conciliation, although recourse to arbitration should not be ruled out.

In the Natuna Sea, Indonesia and Vietnam have disputed an area in the west, which includes the northeastern West Natuna basin;<sup>79</sup> in

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76. Richardson, *Drawing the Seabed Line*, FAR EAST. ECON. REV., Oct. 3, 1978, at 79; *Talks with Indonesia on Fishing, Seabed to Reopen*, The Weekend Australian, Dec. 27-28, 1980, at 9, col. 3; Richardson, *Tying up Timor's Loose Ends*, FAR EAST. ECON. REV., Jan. 5, 1979, at 44.

77. See *supra* figure 3 accompanying note 73.

78. 16 U.S.C. §§ 1801-1882 (1985).

79. The portion of the northeastern West Natuna basin includes a small part of a three-second core (two-way reflection time; one second approximately equivalent to one kilometer of sediment) and another three second thick sediment pod aligned northeast-southwest; both have been drilled once with dry holes. Conoco discovered oil in Block B, but reserves are only twenty million barrels, and the discovery is unlikely to be declared commercial. The Ikan Pari 1-A flowed 6,085 BOPD from two zones and 2,953 BOPD from a confirmation well. Energy Asia, Oct. 14, 1983; Petroleum News, Aug. 1983. Marathon was given approval to proceed with development of its KH field in the Kakap block and commercial production at 22,000 BOPD is expected in 1986. Petroleum News, July 1983. In late 1981 Conoco and Pertamina announced the discovery of "highly significant" natural gas. The Anoa-1 well flowed at 4,300 BOPD and 1.7 MMCFD. Energy Asia, Jan. 1, 1982. In April 1982 Sumatera Gulf Oil reported a significant discovery of high-gravity clean oil in Block A. The Tembang-1 well flowed at 325 million cubic feet

the north, the southern fringes of the Saigon basin;<sup>80</sup> in the center, the extension of the Natuna arch;<sup>81</sup> and in the east, much of the "South China Sea Block A, Eastern Part."<sup>82</sup>

The disputed area is divided east-west.<sup>83</sup> The eastern area appears gas-prone whereas the western area appears somewhat oil-prone. In the early negotiating sessions it was allegedly proposed that Indonesia have jurisdiction over areas in the West Natuna basin which Pertamina has contracted since 1970 to United States oil companies. These oil companies are currently exploring for, or developing, known reserves in the basin. It was also allegedly proposed that Vietnam obtain the northeastern portion (the South China Sea Block A, Eastern Part) of the overlap. The two sides were getting closer to a solution and the area in dispute was diminishing, although the northeastern portion remained a problem.<sup>84</sup> In October 1985 the two countries were discussing joint development.<sup>85</sup>

The exact area still in dispute is unknown. The following scenario assumes that the area in dispute is that situated between the continental shelf boundary claim made by South Vietnam in 1971 and a line equidistant between the northernmost Natuna islands and the southernmost Vietnamese islands. It is not necessary to delimit a boundary, but if one is deemed desirable, the boundary could be the line equidistant between the two claims. An east-west line would be logical given the north-south geographic relationship of the two countries and would fairly divide the oil-prone west, gas-prone east and unprospective central portions, in contrast to a north-south line

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per day (MMCFD), Energy Asia, Jan. 1, 1982.

80. Little is known of this basin. Seismic data suggest a northeast trending basin which terminates to the west and southwest against the extension of the Khorat Swell. Sediment thickness is 3000 to 4500 meters. Oil and gas were discovered in the southern portion of the basin bordering the disputed area. See Du Bois, *Review of Principal Hydrocarbon-Bearing Basins of the South China Sea Area*, THE SOUTH CHINA SEA: HYDROCARBON POTENTIAL AND POSSIBILITIES OF JOINT DEVELOPMENT 1127 (M. Valencia ed. 1981).

81. The central portion of the disputed area is an extension of the nose of the Natuna arch where sediment thicknesses are about one second, and thus, unprospective. However, thicknesses increase to two seconds across the arch in the northern part of the disputed area, offering some possibilities. The Vietnamese boundary claim line runs latitudinally across the middle of this basement high.

82. The "South China Sea Block A, Eastern Part" is a transition zone between the Saigon basin and the outer basinal area. Sediments generally thicken eastwards without large closure. Six dry holes were drilled in Indonesian concessions in the disputed area before the reunification of Vietnam, contrasting with the Dua and other discoveries north of the Indonesian claim line. Azienda Generale Italiani Petroli made a significant gas discovery approximately 250 kilometers north-northeast of Natuna Island near the northern limit of the thick pod of Plio-Pleistocene sediments referred to as the "Outer Basinal Area." The AL-1X well reported gas-in-place of 130 to 140 trillion cubic feet (TCF) of which 80% is said to consist of inerts, leaving 28 TCF. Energy Asia, Jan. 1982.

83. See *supra* notes 80-82 and accompanying text.

84. *Sea Dispute Evaporates*, FAR EAST. ECON. REV., May 15, 1981, at 9.

85. Petroleum News, Oct. 1985.

along the crest of the unprospective Natuna Arch.<sup>86</sup> Rather than a full jurisdictional boundary, this east-west line could divide national authority for security and criminal purposes.

Given the tenuous relationship between Indonesia and Vietnam, any joint commission should have consultative status only and recommend action to the respective governments. The area has already been the site of successful exploration by private companies—Gulf, Marathon and Amoseas—all United States companies. Thus, there is no need for the states to bear exploration expenses; however, Indonesia might consider carrying Vietnam's interest for the operation of the joint development commission. Although the more experienced country, Indonesia, should perhaps take the lead in managing development of the area, the training of Vietnamese counterparts should be a first priority.

Given the antipathy between Vietnam and the United States, the contract holders should be non-American, perhaps French, German, Italian, or Canadian, all of which have recently operated in Vietnam. The contract could be on the sophisticated Indonesian production-sharing model with all risks borne by the oil companies. The agreement must be sufficiently long-term to bolster the confidence of the companies and the countries in the stability of the agreement, but it must also be sufficiently flexible to accommodate changing conditions without breaking under tension.

#### CONCLUSION

International joint development is the common exercise of sovereign rights by two or more states for the purpose of exploration and exploitation of the nonliving resources of an area under national jurisdiction. Countries may establish an international joint development zone on a continental shelf or in an EEZ that has been delimited, or pending delimitation. Minimally, the joint development agreement should specify the area covered by the agreement, the jurisdictions to be applied within the zone, organizations which will manage the area, and the laws under which the mining licenses will be issued. The determination of the applicable contractual law can be left to the private companies operating within the zone, or to the

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86. The Natuna Arch is a tectonic and structural high composed of Mesozoic rocks. It extends northward from the Kuching area of Borneo, past Natuna Island terminating against the Saigon basin. Its northern flank consists of complexly faulted basement rocks overlain by less than 3000 meters of sediment. Du Bois, *supra* note 80, at 1123.

states concerned. Resources in the zone may be explored and exploited in various ways such as unitization, production-sharing, or scientific cooperation. Good political relations, practical mindedness, discovery of actual deposits, and cooperative private companies favor successful implementation of joint development arrangements. International joint development is a useful concept which has applicability as pressure mounts to develop oil and mineral resources in areas of jurisdictional overlap.