Significant Discoveries in 2005*

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Introduction

Below is a summary of some of the world's major new discoveries and resources that were tapped in 2005, as reported and provided by IHS Energy (www.ihsenergy.com), The accompanying map (Figure 1) shows the countries with the discoveries summarized herein.

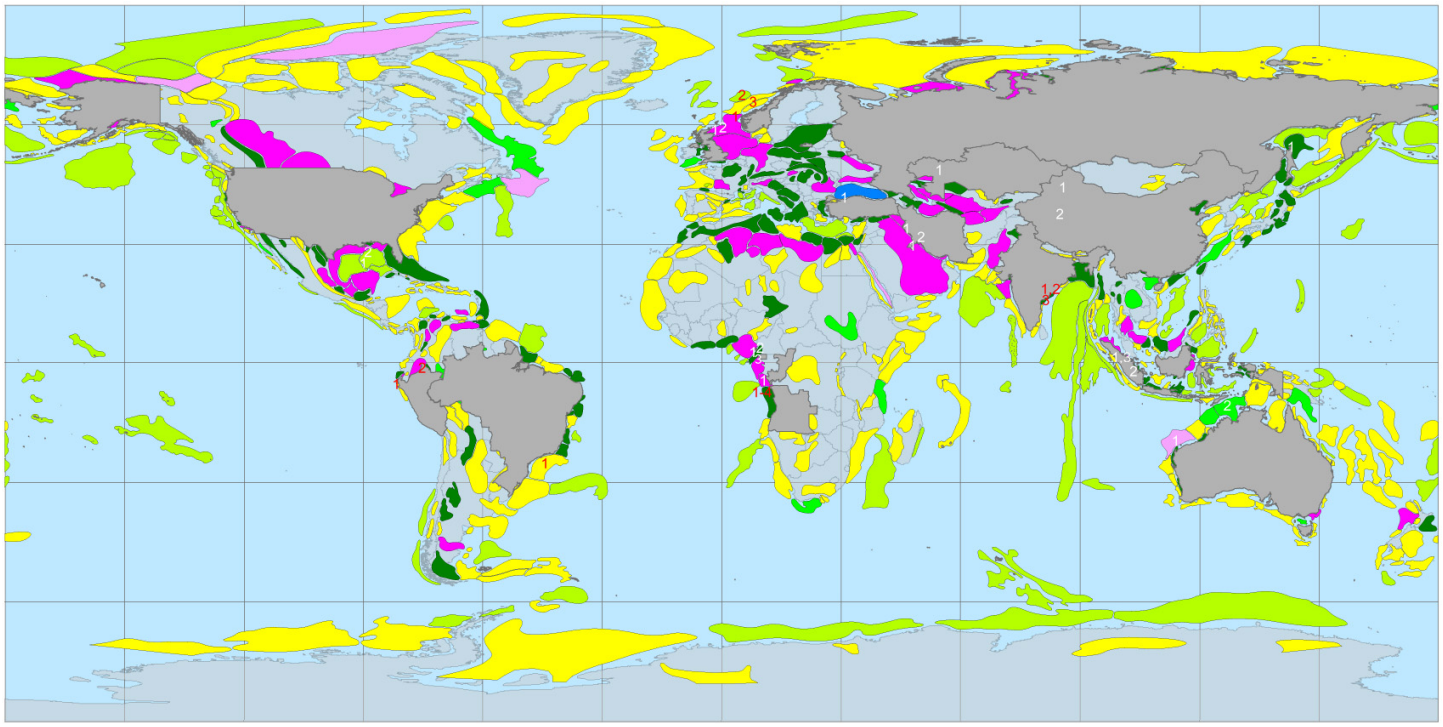

Figure 1. Global map of sedimentary provinces, from St. John et al. (1984), with overlay of countries (in gray) that had 2005 discoveries summarized in this article.

Australasia

Australia

Pluto 1 is a large gas discovery in the Carnarvon Basin, encountering 111 meters of net gas pay in the Mungaroo and Brigadier formations and the overlying Tithonian sediments. Estimated reserves are 3.0 Tcf of gas. Owned and operated (100 percent) by Woodside, it was discovered in April and has been fast-tracked, with Woodside announcing in December that it had agreed to key commercial terms with customers in North Asia for the supply of LNG from Pluto.

Caldita 1 is a large ConocoPhillips gas discovery with estimated reserves of 1.5 Tcf of gas. The discovery is located about 55 kilometers east of Tassie Shoal, where Methanol Australia has received approval to build a methanol and LNG complex on concrete artificial islands. Development of infrastructure in this region may also assist development of 11.5 Tcf Evans Shoal gas discovery.

Central and Southern Africa

Angola

Astraea 1, Ceres 1, Hebe 1, and Juno 1 are discoveries located in the ultra-deepwater Block 31 in the Congo Fan. All are in Tertiary channel deposits; presumably each does not exceed 250 MMbo reserves, suggesting a joint development as an attractive option.

Congo

Murphy announced in January, 2005, that its Azurite Marine 1 wildcat in 1381 meters of water in the Mer Profonde Sud exploration permit encountered more than 49 meters of net oil pay with no associated water in two main levels in the Lower Miocene. The oil is described as high quality, and the reservoir properties are excellent. Indications are that the structure could contain more than 100 MMbo. The first appraisal, Azurite Marine 2, has been successfully completed, testing nearly 8000 bo/d from a single zone.

Equatorial Guinea

Three discoveries were the Esmeralda 1, drilled by ExxonMobil in Block B; O-1, drilled by Noble in Block O (Douala Basin), and P-1, drilled by Devon in Block P (Rio Muni Basin). The Devon and Noble wildcats are particularly interesting, as both were drilled in little explored areas. The size and characteristics of the oil find made by Devon in Block P will be further evaluated in 2006. The gas and condensate flow rates in well O-1, 24 MMcfg/d and 1225 bc/d, were limited by surface test equipment. The structure remains very promising, and a multi-well exploration and appraisal program is being considered for 2006. Gas processing infrastructure is relatively close by.

CIS

Kazakhstan

The Zhaik 1 well may be considered significant as it is OMV's first success. The Carboniferous and Permian carbonate play is well established in northwestern Kazakhstan; this well's full potential is yet to be established. Sulfur-free 40 degree API oil was recovered.

Russia

The BP/Rosneft Elvary Neftegaz joint venture recorded a second discovery in an unexplored basin with the Udachnaya 1 wildcat in the offshore Kaygan-Vasyukanskiy block (Sakhalin-5 project). The well encountered three pay zones, and one was tested flowing 2190 bo/d through an 11mm choke. The Udachnaya prospect is located some 40 kilometers offshore (east), between the northeasternmost Sakhalin coast and Pela Lache 1, the joint venture's first discovery drilled in 2004. Rosneft estimates potential hydrocarbon resources of the entire Kaygan-Vasyukanskiy block at 1.8 billion barrels oil and 1 Tcf gas.

Europe

Norway

Norsk Hydro's 35/2-1 (Peon) encountered a large Pliocene gas deposit at a total depth of 687 meters -- the shallowest prospect ever drilled on the Norwegian Continental Shelf. Located in 384 meters of water, the discovery marks a whole new regional exploration model; Hydro says the possibility for a commercial development is very good.

Norsk Hydro tested gas in the 6605/8-1 (Stetind-A6) well in a relatively unexplored area of the Norwegian Sea. Located in 828 meters of water, the well targeted Cretaceous Lysing Formation sandstones; a production test flowed 4.2 MMcfg/d.

Shell reported its 6406/9-1 well in the Onyx South West prospect as a significant discovery. Gas was encountered in Jurassic sandstones, where two zones were tested; each flowed at a maximum rate of about 1.4 million cubic meters per day. Several layers in the Jurassic also contained condensates. The results indicate the presence of a significant gas column while the NPD estimates that the size of the discovery may approach 2 Tcf of producible gas.

United Kingdom
Talisman's 13/23b-5 exploration well is a new Lower Cretaceous sandstone discovery with reserves of between 20 to 50 MMbo. Appraisal 13/23b-5Z, sidetracked to the southwest, found thicker oil bearing sands and tested 35-degree API oil at a rate of 6700 bo/d.

Nexen says exploration well 15/18b-11 discovered 10 meters of gas and approximately 16 meters of oil pay in Paleocene Balmoral sandstone. The well flowed up to 1500 boe/d on test.

Far East

China
PetroChina-Xinjiang flowed commercial oil in new-pool wildcat An 5 in Lease Block Southern Margin West, southern Junggar Basin. The well tested 660 bo/d and 233 Mcfg/d, having previously flowed 121 bo/d and 42 Mcfg/d from the middle part of the Anjihai Formation. The well is significant in that this is the first time commercial hydrocarbon flows have been obtained from the Anjihai Formation along the basin's southern margin. The structure has hydrocarbon resources estimated at 668 MMboe.

PetroChina-Tarim flowed oil and gas from a second interval in new-field wildcat Tazhong 82, in the Takla Makan desert, central Tarim Basin. The company tested 1702 bo/d and 13,225 Mcfg/d from the second interval having earlier flowed 126 bo/d and 706 Mcfg/d from a deeper zone.

India
GSPCL's KG-8 well on the KG-OSN-2001/3 (Krishna-Godavari Offshore) block encountered an 800-850 meter gross gas column, and according to one minister, discovered an estimated 20 Tcf of in-place gas resources in Cretaceous reservoirs -- the largest ever discovery of its kind in the country. The announcement is somewhat premature as additional testing and technical evaluation needs to be undertaken to determine the amount of proven and probable gas reserves. The structure, which reportedly covers an area of 75-100 square kilometers, has been named "Deen Dayal."

ONGC's G-1-12 (Vashistha 1A) well on the KG-OS-DW-IV (Krishna-Godavari Offshore) block reportedly encountered multiple levels of gas-bearing sands between 1962 and 2182 meters, with an estimated pay thickness of 42 meters and potential reserves of around 4 Tcf. It is located in 540 meters of water and targeted turbidite deposits in Pliocene-aged Godavari Clays.

ONGC's D-1 well on the KG-DWN-98/2 (Krishna-Godavari Offshore) block is in about 600 meters of water. Although a formal announcement is yet to be made, the well apparently is a significant gas discovery, with approximately 60 meters of net pay encountered. Operational problems reportedly prevented the well from being tested.

Indonesia
The Kondur-operated MS BY-1ST Deepening is considered significant as it fits with the operator's plans to develop gas reserves in the block to supplement supply to Chevron's Duri steam flood project. Drilled by Lasmo in 1991-92, it was deepened to test the Pematang Brown Shale and Pematang Basal Clastics and also to evaluate the Menggala Formation oil shows. Kondur says that contingent gas resources range between 230-580 Bcf, with a most likely figure of 380 Bcf. Cumulative flow from four zones was quoted as 50 MMcfg/d plus more than 1000 bc/d. Two appraisals will be drilled in early 2006.

PetroChina's Betara Southwest 1 in the Jabung PSC flowed 4250 bo/d and 3.4 MMcfg/d, making it the country's highest flowing discovery of 2005.

PT Caltex Pacific proved with its deviated Reco 1 well that exploration upside still exists in mature basins. Targeting Upper Pematang Formation sandstones within the Rokan PSC, the well tested 2880 bo/d.

Gulf of Mexico

Two deepwater Gulf of Mexico discoveries could be considered significant: BP's "Stones" (WR 508) and Unocal's "Knotty Head" (GC 512) prospects. Stones is significant because it is yet another discovery made beneath the Sigsbee salt canopy in the Lower Tertiary section. It is on trend with the Lower Tertiary discoveries made by Chevron at "Jack" (WR 759), Unocal's St. Malo (WR 678), which has a 396-meter oil column and recoverable reserves over 250 MMboe, together with BHP's Chinook (WR 468) and Cascade (WR 206) discoveries. BP has yet to release Stones' reserve levels, but it does represent more success in the early stages of this major new deepwater trend.

Knotty Head was still drilling as end of 2005 (over 9700 meters) and has encountered pay in a shallower, secondary objective that Unocal says is large enough to develop on its own. No news as yet on the deeper objectives, but the well is drilling in the very prolific middle and Lower Miocene age trend just north of BP's Holstein and Chevron's Tahiti Fields.

Middle East

Iran

Norsk Hydro spent three and a half months testing its Azar 2 oil discovery on the Anaran block. No test results have been disclosed, but Norsk Hydro's executive vice president with special responsibility for oil and energy, Tore Torvund, was quoted by Reuters as saying, "There may be more than a billion barrels, at least, in the structure. I would say that totally from this area we will in the long term be able to produce about 100,000 b/d."

The second sidetrack in Ramin 7 is significant in that it is deemed to have established a new deeper pool, assumed to be the Middle Cretaceous Sarvak Formation. According to oil minister Bijan Zanganeh, 5.7 billion barrels of oil in place had been indicated in the Ramin oil field and that recoverable reserves had been estimated at 855 MMbo from four reservoirs together with 8544 Bcf of gas, with 1200 Bcf recoverable. The field currently produces around 2000 b/d from the Asmari Formation, but with the new deeper pool, this should increase to 80,000 to 90,000 b/d.

Kuwait

Umm Niqa 1 is significant as it marks the first time that a well in Kuwait tested light crude in the Lower Jurassic Upper Marrat Formation; three test intervals yielded 1879 b/d of 45-degree API of crude with 10.2 MMcf/d of associated gas. Also, two intervals in the Middle Jurassic Najmah/Sargelu Formation flowed 1300 b/d of 49-degree API crude with 14.5 MMcfg/d while two intervals in the Lower Jurassic Middle Marrat Formation flowed 2455 b/d of 45.4-degree API crude and 14.4 MMcfg/d.

Turkey

Madison Oil's Akkaya 1 well in the 486-square-kilometer 3499 Black Sea block, South Akcakoca sub-basin, established a 283 meter gross gas column in which a test over an 84.5-meter interval flowed 7.6 MMcf/d from the Eocene Kusuri Formation through a 36/64-inch choke.

Latin America

Brazil

Petrobras filed an oil and gas show report with the ANP for the 4-SPS-043DA (4-BRSA-334DA-SPS) well, suggesting it was a successful confirmation of the 1-SPS-037A (1-BRSA-201A-SPS) gas discovery the operator completed in July 2003. Petrobras is calling this the Cedro Field, a separate pool discovery of the Mexilhao Field located 10 kilometers to the northeast. The find extends the Cedro Field eight kilometers to the southwest, and although not confirmed, reserves are estimated here to be at least in the 500 Bcf range.

Peru

Petro-Tech tested 1200 b/d of 35-degree API oil from the Paleozoic in San Pedro 1X, a wildcat in the southwest corner of offshore Sechura Basin shelf Block Z-2B. Petro-Tech calls it Peru's biggest crude oil discovery in the

last 30 years. It also is the first oil discovered in the Sechura Basin, despite an exploration history in the area dating back 100 years, and the basin's first substantial discovery of any kind. The basin's northern part has had some small gas discoveries, but only minor production. It also is farther south than any oil previously discovered offshore in Peru. San Pedro 1-X has opened a whole new productive trend in the Paleozoic in this basin, where reserves are thought to be 500 to 1000 MMbo. Peru has little Paleozoic exploration or production, and this find has renewed interest in the offshore.

Energy and Mines Minister Glodomiro Sanchez Mejia announced Buena Vista 1-X in the south central portion of Block 39 in the Maranon Basin as an important oil discovery. The well flowed 2830 b/d of 13.7-degree API oil from the Chonta and Casablanca formations. Reserves have been estimated at 70 MMb. The well is located about 14 kilometers south of Barrett Resources 1998 discovery well Pirana 1X and 19 kilometers northeast of Tangarana 1-X, abandoned in 1975 by Union Oil with heavy oil shows. The Buena Vista 1-X could be considered as the fourth heavy oil find in the area and, if developed together, could generate a 280 MMbo reserve estimate.

Reference

St. John, Bill, A.W. Bally, and H.D. Klemme, 1984, Sedimentary provinces of the world – hydrocarbon productive and nonproductive (map with booklet): AAPG.