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World Oil Transit Chokepoints

The following presents information on major world oil transit centers. Over 35 million barrels per day (bbl/d) pass through the relatively narrow shipping lanes and pipelines discussed below. These routes are known as chokepoints due to their potential for closure. Disruption of oil flows through any of these export routes could have a significant impact on world oil prices.

The information in this report is the best available as of March 2004 and is subject to change.

GENERAL BACKGROUND

Given the fact that oil consumption occurs mainly in the industrialized West, while oil production takes place largely in the [Middle East](#), [former Soviet Union](#), [West Africa](#), and [South America](#), a significant volume of oil is traded internationally. This oil is moved mainly by two methods: oil tanker ships and oil pipelines. About 2/3 of the world's oil trade (both crude oils and refined products) moves by tanker. About 43 million barrels per day of that trade is crude oil. Tankers have made global (intercontinental) transport of oil possible; they are low cost, efficient, and extremely flexible.

Oil transported by sea generally follows a fixed set of maritime routes. Along the way, tankers encounter several geographic "chokepoints," or narrow

channels, such as the Strait of Hormuz leading out of the Persian Gulf and the Strait of Malacca linking the Indian Ocean (and oil coming from the Middle East) with the Pacific Ocean (and major consuming markets in Asia). Other important maritime "chokepoints" include the Bab el-Mandab passage from the Arabian Sea to the Red Sea; the Panama Canal and the Panama Pipeline connecting the Pacific and Atlantic Oceans; the Suez Canal and the Sumed Pipeline connecting the Red Sea and Mediterranean Sea; and the Turkish Straits/Bosporus linking the Black Sea (and oil coming from the Caspian Sea region) to the Mediterranean Sea. "Chokepoints" are critically important to world oil trade because so much oil passes through them, yet they are narrow and theoretically could be blocked -- at least temporarily. In addition, "chokepoints" are susceptible to pirate attacks and shipping accidents in their narrow channels.

Not all tanker trade routes use the same size ship. Each route usually has one size that is the clear economic winner, based on voyage length, port and canal constraints and volume. Thus, crude exports from the Middle East -- high volumes that travel long distances -- are moved mainly by VLCC's (200,000 to 300,000 dead weight tons) typically carrying over 2 million barrels of oil on every voyage.

Pipelines, on the other hand, are the mode of choice for transcontinental oil movements. Pipelines are critical for landlocked crudes and also complement tankers at certain key locations by relieving bottlenecks or providing shortcuts. Pipelines come into their own in intra-regional trade. They are the primary option for transcontinental transportation, because they are at least an order of magnitude cheaper than any alternative such as rail, barge, or road, and because political vulnerability is a small or non-existent issue within a nation's border or between neighbors such as the United States and Canada. Pipelines are also an important oil transport mode in mainland Europe, although the system is much smaller, matching the shorter distances.

Bab el-Mandab

Location: Djibouti/Eritrea/Yemen; connects the Red Sea with the Gulf of Aden and the Arabian Sea

Oil Flows (2000E): 3.2-3.3 million bbl/d

Destination of Oil Exports: Europe, United States, Asia

Concerns/Background: Closure of the Bab el-Mandab could keep tankers from the Persian Gulf from reaching the Suez Canal/Sumed Pipeline complex, diverting them around the southern tip of Africa (the Cape of Good Hope). This would add greatly to transit time and cost, and effectively tie up spare tanker capacity. The Bab el-Mandab could be bypassed (for northbound oil traffic by utilizing the East-West oil pipeline, which traverses Saudi Arabia and has a capacity of about 4.8 million bbl/d. However, southbound oil traffic would still be blocked. In addition, closure of the Bab el-Mandab would effectively block non-oil shipping from using the Suez Canal, except for limited trade within the Red Sea region.

Security remains a major concern of foreign firms doing business in the region, particularly after the French-flagged tanker Limburg was attacked off the coast of Yemen by terrorists in October 2002. The Canadian oil company Nexen, which operates the ash-Shihr oil export terminal, agreed in January 2003 to provide assistance to the Yemeni government in improving security. Prior to this, the region had faced different security concerns. In December 1995 and again in August 1996, Eritrean and Yemeni forces clashed over control of the Hanish Islands, located just north of the Bab el-Mandeb. In October 1996, the two countries signed an agreement over the islands.



Bosphorus/Turkish Straits

Location: [Turkey](#); this 17-mile long waterway divides Asia from Europe and connects the Black Sea with the Mediterranean Sea

Oil Flows (2003E): 3.0 million bbl/d (nearly all southbound; mostly crude oil with several hundred thousand barrels per day of

products as well)

Destination of Oil Exports: Western and Southern [Europe](#);

Concerns/Background: Only half a mile wide at its narrowest point, the Turkish Straits are one of the world's busiest (50,000 vessels annually, including 5,500 oil tankers), and most difficult-to-navigate waterways. Many of the proposed export routes for forthcoming production from the [Caspian Sea region](#) pass westwards through the Black Sea and the Turkish Straits en route to the Mediterranean Sea and world markets. The ports of the Black Sea, along with those in the Baltic Sea, were the primary oil export routes of the former Soviet Union, and the Black Sea remains the largest outlet for Russian oil exports. Exports through the Turkish Straits have grown since the breakup of the Soviet Union in 1991, and there is growing concern that projected Caspian Sea export volumes exceed the ability of the Turkish Straits to accommodate the tanker traffic. Turkey is concerned that the projected increase in large oil tankers would pose a serious navigational safety and environmental threats to the Turkish Straits. The largest tankers that can pass through the Turkish Straits are the Suezmax class tankers (120,000-200,000 dead weight tons).

Under the Montreux Convention of 1936, commercial shipping has the right of free passage through the Bosphorus and Turkish Straits in peacetime, although Turkey claims the right to impose regulations for safety and environmental purposes. In October 2002, Turkey placed new restrictions on

oil tanker transit through the Bosphorus that have slowed tanker transit, including a ban on nighttime transit for ships longer than 200 meters, effectively including all crude oil and large petroleum product tankers. Poor weather has caused transit delays as well; during the past winter, delays reportedly reached as much as 20 days for tankers waiting to transit the Turkish Straits.



Panama Canal and Trans-Panama Pipeline

Location: Panama; connects the Pacific Ocean with the Caribbean Sea and Atlantic Ocean

Oil Flows (2003): 0.4 million bbl/d

Concerns/Background: The Panama Canal extends

approximately 50 miles from

Panama City on the Pacific Ocean to Colon on the Caribbean Sea. The largest vessel that can transit the Panama Canal is known as a PANAMAX-size vessel (ships ranging from 50,000 - 80,000 dead weight tons in size). A long-term program is underway to widen the narrow, eight-mile stretch of Gaillard Cut to allow unrestricted two-way traffic of PANAMAX-size vessels.

The United States is the dominant country of origin for products transiting the Panama Canal, and it is also the single largest destination as well. Most of the traffic through the Panama Canal moves between the east coast of the United States and Asia, while movements between Europe and the west coast of the United States and Canada comprise the second major trade route at the waterway. However, other regions and countries, such as the neighboring countries of Central and South America, are proportionately more dependent on the Panama Canal for their trade.

In fiscal year (FY) 2003, petroleum and petroleum products were the second

largest commodity (by tonnage) shipped through the Canal after grains, accounting for 11% of total canal shipments. Petrochemicals and coal (including coke from coal) are also shipped through the canal, accounting for 1% and 4%, respectively, of total Canal traffic. About 62% of total oil shipments went south from the Atlantic to the Pacific, with oil products dominating southbound traffic. The United States is not heavily reliant on the Panama Canal for its petroleum imports. In 2003, only 1% of total U.S. petroleum imports (crude oil plus petroleum products) transited the Canal en route to American ports. On the whole, very little crude oil destined for U.S. shores (31,000 bbl/d or 0.3% in 2003) passes through the canal. As a share of U.S. imports, however, the Canal is more important for petroleum products. In 2003, a little over 3% of all U.S. imported petroleum products came to the United States through the Panama Canal.

The Trans-Panama pipeline (Petroterminal de Panama, S.A.) is located outside the former Canal Zone near the Costa Rican border, and runs from the port of Charco Azul on the Pacific Coast (near Puerto Armuelles, southwest of David) to the port of Chiriqui Grande, Bocas del Toro on the Caribbean. It was opened in October 1982 as an economical alternative to the Panama Canal for transporting Alaskan oil across Panama en route to Gulf Coast ports. More than 2.7 billion barrels of Alaskan crude oil were transported through the 81-mile pipeline at peak rates exceeding 860,000 bbl/d. However, the pipeline was closed in April 1996 after Alaskan oil shipments to the Gulf Coast declined with falling Alaskan oil production and increased oil consumption on the west coast of the United States, especially in California. In addition, the decision to allow Alaskan oil to be exported outside the United States reduced the incentives to ship Alaskan oil to the Gulf Coast. The Trans-Panama pipeline re-opened in November 2003, and began shipping over 100,000 bbl/d of Ecuadorian crude oil to US Gulf ports.



Russian Oil and Gas Export Pipelines/Ports

Location: Russian oil and gas exports transit via pipelines that pass through Russia, Ukraine, Belarus, Hungary, Slovakia, the Czech Republic, and Poland,

Major Oil Export Ports:

Novorossiisk (Russia -- Black

Sea); Primorsk (Russia -- Baltic Sea/Gulf of Finland); Tuapse (Russia); Ventspils (Latvia); Odessa (Ukraine)

Major Oil Pipelines (capacity, 2003E): Druzhba (1.2 million bbl/d); Baltic Pipeline System/Primorsk (840,000 bbl/d)

Major Natural Gas Pipelines (capacity, 2003E): Brotherhood, Progress, and Union (1 trillion cubic feet -- tcf -- capacity each); Northern Lights (0.8 tcf); Volga/Urals-Vyborg, Finland (0.1 tcf). Yamal (to Europe, via Belarus; 1.0 Tcf, partly operational); Blue Stream (to Turkey via Black Sea; 0.56 Tcf, construction completed in October 2002)

Destination of Oil and Gas Exports: Eastern Europe, Netherlands, Italy, Germany, France, other Western Europe.

Concerns/Background: Russia is a major supplier of crude oil and natural gas to Europe. All of the ports and pipelines are operating at or near capacity, leaving limited alternatives if problems arose at Russian export terminals. With a windfall in oil export tariffs over the past several years, Transneft, the state oil transport monopoly, has taken steps to upgrade the country's pipeline system, with an emphasis on building new export pipelines to increase and diversify export routes for oil exporters.

Nearly 90% of Russia's natural gas exports to Europe are routed through Ukraine. In an effort to diversify its export routes, as well as reach new markets, Russia is expanding its natural gas pipeline system. The Blue Stream pipeline to Turkey is the centerpiece of Russia's export diversification

strategy. Construction on the 565-Bcf-capacity pipeline, which consists of twin pipelines laid on the bottom of the Black Sea, was completed in October 2002.

Strait of Hormuz

Location: [Oman/Iran](#); connects the [Persian Gulf](#) with the Gulf of Oman and the Arabian Sea

Oil Flows (2003E): 15-15.5 million bbl/d



Destination of Oil Exports: [Japan](#), [United States](#), Western [Europe](#)

Concerns/Background: By far the world's most important oil chokepoint, the Strait consists of 2-mile wide channels for inbound and outbound tanker traffic, as well as a 2-mile wide buffer zone. Closure of the Strait of

Hormuz would require use of longer alternate routes (if available) at increased transportation costs. Such routes include the 5 million-bbl/d capacity Petroline (East-West Pipeline) and the 290,000-bbl/d Abqaiq-Yanbu natural gas liquids line across [Saudi Arabia](#) to the Red Sea. Theoretically, the 1.65-million bbl/d Iraqi Pipeline across Saudi Arabia (IPSA) also could be utilized, more oil could be pumped north to Ceyhan (Turkey), and the 0.5 million-bbl/d Tapline to Lebanon could be reactivated.

Strait of Malacca

Location: Malaysia/Singapore; connects the Indian Ocean with the South China Sea and the Pacific Ocean.

Oil Flows (2003E): 11 million bbl/d
Destination of Oil Exports: Japan, South Korea, China, other Pacific



Rim countries.

Concerns/Background: The Strait of Malacca, linking the Indian and Pacific Oceans, is the shortest sea route between three of the world's most populous countries -- India, China, and Indonesia -- and therefore is considered to be the key choke point in Asia. The narrowest point of this shipping lane is the Phillips Channel in the Singapore Strait, which is only 1.5 miles wide at its narrowest point. This creates a natural bottleneck, with the potential for a collision, grounding, or oil spill (in addition, piracy is a regular occurrence in the Singapore Strait). If the strait were closed, nearly half of the world's fleet would be required to sail further, generating a substantial increase in the requirement for vessel capacity. All excess capacity of the world fleet might be absorbed, with the effect strongest for crude oil shipments and dry bulk such as coal. Closure of the Strait of Malacca would immediately raise freight rates worldwide. More than 50,000 vessels per year transit the Strait of Malacca. With Chinese oil imports from the Middle East increasing steadily, the Strait of Malacca is likely to grow in strategic importance in coming years.



Source: Oil Capital Ltd.

Suez Canal and Sumed Pipeline

Location: Egypt; connects the Red Sea and Gulf of Suez with the Mediterranean Sea
Oil Flows (2003E): 3.8 million bbl/d. Of this total, the Sumed Pipeline transported 2.5 million bbl/d of oil northbound (nearly all from Saudi Arabia) and the Suez Canal about 1.3 million bbl/d total.

Destination of Sumed Oil Exports: Predominantly Europe; also United States.

Concerns/Background: Closure of the Suez Canal and/or Sumed Pipeline would divert tankers around the southern tip of Africa (the Cape of Good Hope), adding greatly to transit time and effectively tying up tanker capacity.

In 2003, about 2,800 oil tankers passed through the Suez Canal carrying 1.3 million bbl/d of oil. This represented a 26% increase in oil shipments from 2002 levels, when 2,500 ships transported about 1.0 million bbl/d of oil through the canal. Oil historically has represented about 25 percent of Suez Canal revenues. Currently, the Suez Canal can accommodate Suezmax class tankers with drafts of up to 62 feet and 200,000-dead-weight-ton maximum cargos. In 2001, the Suez Canal Authority (SCA) launched a 5-year program to reduce tanker transit times (from 14 hours to 11 hours) through the Canal. The SCA also is moving ahead with a 10-year project to widen and deepened the Canal, so that by 2010 it can accommodate Very-Large-Crude-Carrier (VLCC) and Ultra-Large-Crude-Carrier (ULCC) class tankers with oil cargos of up to 350,000 dead-weight-tons.

The Sumed pipeline, with a capacity of about 2.5 million bbl/d, links the Ain Sukhna terminal on the Gulf of Suez with Sidi Kerir on the Mediterranean. Sumed consists of two parallel 42-inch lines, and is owned by Arab Petroleum Pipeline Co., a joint venture of EGPC (50%), Saudi Aramco (15%), Abu Dhabi's ADNOC (15%), three Kuwaiti companies (15% total), and Qatar's

QGPC (5%). The pipeline has been in operation since January 1977, and has served as an alternative to the Suez Canal to transport loads from tankers that are too large to pass fully laden through the canal.

Sources for this report include: Egyptian Cabinet's Information and Decision Support Center/Suez Canal Authority; Panama Canal Authority; Petroterminal de Panama, S.A.; U.S. Energy Information Administration

LINKS

For more information on any of the countries or topics listed in this report, see these other sources on the EIA web site:

[EIA - Energy Supply Security](#) - The latest information on events that could affect energy security

[EIA - International Energy Data](#)

[EIA - Oil Market Basics \(trade\)](#)

[Panama](#)

[World Crude Oil Flows 1997 - Map](#)

Links to other U.S. government sites:

[National Defense University, Institute for National Strategic Studies](#) - South China Sea: Future Source of Prosperity or Conflict in South East Asia?

[National Defense University, Institute for National Strategic Studies](#) - Southeast Asian Chokepoints

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[Egypt Cabinet's Information and Decision Support Center](#) - Egyptian Economic Bulletin

[Egypt State Information Service, Calendar](#) - The Inauguration of the Suez Canal

[Intertanko](#)

[Panama Canal Authority](#)

[Petroterminal de Panama \(PTP\)](#)

[Suez Canal Guide](#) - Atlas Marine Services

[Turkish Maritime Pilots' Association](#)

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