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## **An Inside Look: India's Procurement of Tributyl Phosphate (TBP) for its Unsafeguarded Nuclear Program**

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India's unsafeguarded nuclear program has relied on overseas, and often illicit, procurement of tributyl phosphate (TBP), a dual-use chemical used in purifying uranium, separating plutonium from irradiated fuel, and other nuclear processing operations. Although this material is not expressly controlled by suppliers' export control laws, it is controlled by many countries' "catch-all" requirements if the end user is an unsafeguarded nuclear program.

This case study highlights the role of trading companies or front companies inside a proliferant state as vital nodes in a transnational smuggling network. India's unsafeguarded nuclear program has successfully acquired TBP by utilizing a network of domestic trading companies and overseas suppliers that obscure the true end user and exploit loopholes in national export control laws. The 2008 waiver granted by the Nuclear Suppliers Group for the sale of civilian nuclear technology to India risks making it easier for India to procure items for its military nuclear programs, which are formally excluded from the exemption. It goes without saying that suppliers need to exercise greater vigilance against such schemes. However, even the most responsible suppliers in both the United States and abroad invariably have difficulty implementing catch-all clauses. For a less responsible supplier, catch-all clauses are often circumvented altogether, as the examples in this case study demonstrate.

An Indian national with detailed knowledge of the commercial chemical trade in India combined details in public records on imports of TBP to India with knowledge about which companies were winning bids for procuring specific amounts of TBP for the NFC and from which countries they were buying it. Based on the Indian national's findings, the Indian Department of Atomic Energy's (DAE) Nuclear Fuel Complex (NFC) in Hyderabad procured about 250 tonnes of TBP between 2006 and 2007 from Germany and Russia. Indian trading companies, which either obtained contracts to purchase TBP from the NFC, or from another Indian company, then sought the TBP from Europe and

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Russia without ever revealing the true end user to the supplier. Figure 1 summarizes the known chain of enquiries and purchase orders that originated at the NFC, and passed to domestic trading companies before being conveyed to brokers and suppliers in Germany and Russia. As is evident, the Indian trading companies served to camouflage the true recipient, India's unsafeguarded nuclear program.

The suppliers shipped the TBP to the Indian trading companies, with these companies and not the NFC listed as the recipient. According to the knowledgeable Indian source, the trading companies then transferred the TBP to the NFC or to one of its agent companies.

This strategy is similar to that used by Pakistan and Iran to illicitly obtain critical dual-use items usable in a nuclear program. Pakistan and Iran both use domestic companies that are not tied directly to the nuclear program and that may appear to be buying for a legitimate non-nuclear end use. One difference in the Indian case is that its tender process involves public advertisements in major newspapers and on the internet. One such tender was issued by the Indian Department of Atomic Energy's Directorate of Purchase and Stores for the Hyderabad Nuclear Fuel Complex on September 9, 2005, for a total of 216 tonnes of TBP to be delivered over a span of three years, commencing in April 2006.<sup>1</sup> Although the winner of such a bid may not be announced publicly in India, the fact that a major unsafeguarded nuclear entity is openly searching for nuclear dual-use items is often public and is detectable simply by scrutinizing Indian newspapers and other open sources.

India had acquired TBP from China before 2003, but it encountered difficulties with this procurement route after China tightened its controls on TBP. Prior to April 2003, according to the knowledgeable Indian expert, the NFC received shipments totaling at least 100 tonnes of TBP from China. However, this arrangement was inadvertently disrupted following the discovery by U.S. authorities of a Chinese shipment of 20 tonnes of TBP to North Korea.<sup>2</sup> The United States protested the shipment to the Chinese government, expressing its concern that North Korea was exploiting China's weak controls to obtain TBP for its nuclear industry. In response, China cracked down on exports of this chemical. By April 2003, the Chinese authorities had implemented new regulations restricting TBP exports. When in 2004 and 2005 the NFC attempted to purchase an additional 100 tonnes of Chinese-made TBP, Chinese companies did not make the sales due to problems with the Indian companies' end user certifications. When the Chinese supply dried up, the Department of Atomic Energy looked elsewhere.

In April 2006, a Mumbai trading company, labeled Trading Company E in figure 1, obtained a contract to seek 160 tonnes of TBP for NFC. The trading company contacted a German chemical company's subsidiary liaison office also located in Mumbai (Trading Company F in figure 1). The company's headquarters in Germany received the order for

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<sup>1</sup> Public tender accessed at <http://www.nucfuel.gov.in/tender-con-38.html> in May 2006.

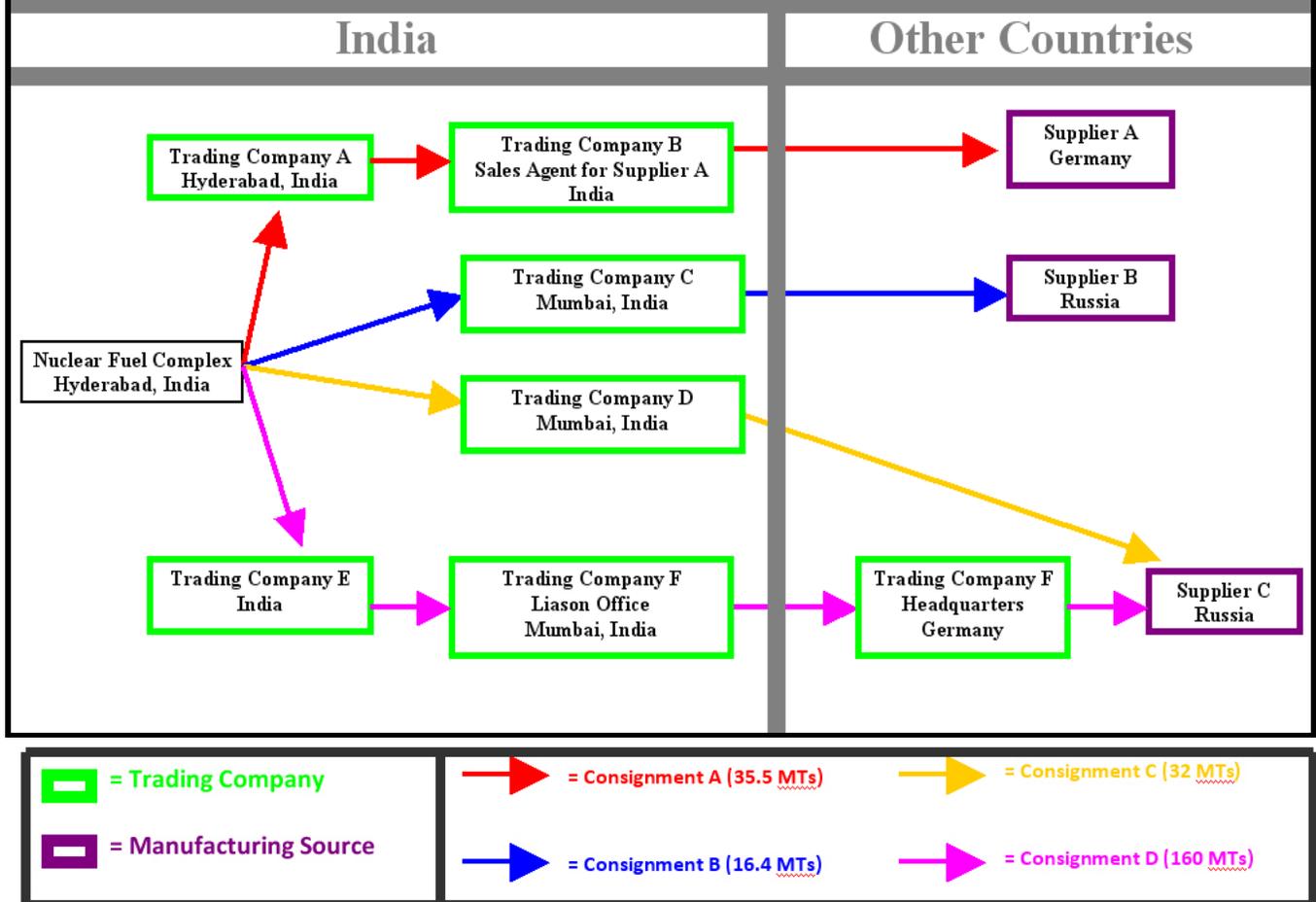
<sup>2</sup> Bill Gertz, "N. Korea Seeks Aid from China on Nukes; Attempts to Buy Fuel Component," *Washington Times*, Dec. 9, 2002; Bill Gertz, "China Ships North Korea Ingredient for Nuclear Arms," *Washington Times*, Dec. 17, 2002, p. A03.

the TBP and arranged for its supply by a Russian manufacturer located in Moscow (Supplier C). The NFC was apparently not aware of the identity of the TBP supplier; certainly, the NFC was not interested in the supplier learning of its role. In any case, the Russian company did not appear to inquire. Six shipments of TBP were sent to the Mumbai trading company between August 2006 and April 2007 from both Russia and Germany, via the German chemical company's Mumbai office. According to the knowledgeable Indian source, the consignments were delivered to the NFC. But the procurement efforts of the Indian NFC did not stop here.

In July 2006, another German company (Supplier A) exported a total of 35.5 tonnes of TBP to its subsidiary in Mumbai (labeled Trading Company B). This shipment was transferred to Nama Chemical Industries Hyderabad, which is India's indigenous manufacturer of TBP, although Nama appears to have been unable to produce sufficient TBP for the NFC. It is also possible that Nama found it cheaper to import the TBP instead of producing it themselves. According to the knowledgeable Indian source, the imported TBP was held at Nama under the cover that it was indigenously produced. It was later sent to the warehouses of the NFC.

A different Indian trading company (Trading Company D) acted without the assistance of an intermediary to directly procure a total of 32 tonnes of TBP from the same Russian company. These imports were received in two separate shipments that arrived in September 2006 and February 2007. Another Indian trading company in Mumbai (Trading Company C) imported an additional 16.4 tonnes TBP from a Russian company (Supplier B). It is not known whether India's illicit imports of TBP continued after April 2007.

# Illicit Procurement of Tributyl Phosphate



**Figure 1.** Diagram showing the route through which orders for tributyl phosphate (TBP), originating from the Nuclear Fuel Complex (NFC) in India, were made through Indian trading companies to suppliers in Russia and Germany. (ISIS removed the names of the companies from this chart) These suppliers or middlemen then shipped the TBP to these Indian trading companies and not the NFC. In each instance, the NFC hid behind these trading companies and procured TBP without the suppliers knowing that the materials were for the unsafeguarded nuclear program.