Chapter 4
Smuggling Networks and the Black Market in Ozone Depleting Substances

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Introduction

The black market in ozone-depleting substances (ODS) is a direct consequence of international agreement on targets to reduce and phase-out the production and consumption of such chemicals. In effect, the Montreal Protocol on Substances that Deplete the Ozone Layer, which was agreed in 1987 and which came into force in 1989, created the opportunity structure for illegal activity in situations where perverse incentives generate high profits and low entry costs. Yet neither the Protocol nor the framework Vienna Convention, under whose auspices it was negotiated, say anything about illegal trade (as opposed to unauthorised trade) and it is widely accepted that the Parties had not anticipated such an outcome and were slow to respond.¹

Since the Protocol came into effect, Meetings of the Parties (MOPs) have agreed a number of decisions on the topic of illegal trade. The language in these is generally cautious: no reference is made to criminal activity, primarily on the grounds that activities are seen to be defined as illegal and/or as criminal only in the context of the national legislation and regulations that Parties adopt to give effect to their obligations under the Protocol (see Montreal Protocol 2002, p. 2). The concern with illegal trade is driven by fears that it undermines the effectiveness of the Protocol and threatens Parties’ compliance records, rather than any worry about the broader implications of transnational criminal activity. The Parties have directed most of their efforts to calls for tracking, labelling and licensing systems, better coordination and cooperation between relevant agencies, and more streamlined strategies for

¹ The Vienna Convention for the Protection of the Ozone Layer was adopted in 1985. Although it contained no specific targets for dealing with ODS, it did give effect to the precautionary principle which provides that scientific uncertainty should not be used as an excuse to avoid action in situations where the balance of evidence called for a political and legal response.
the exchange of information. The logic behind these moves is that by improving the management of legal trade, they will also help to prevent illegal trade even though the Parties have also recognised that such systems can still be evaded.

In theory, the black market in ODS is time bound: it will come to a natural end when all production and consumption of ODS is phased out under international law, through the development and adoption of substitute chemicals and as existing ODS-using equipment reaches the end of its useful life. In practice, the illegal trade has remained active over the last two decades even though it has involved different pollutants and engaged different geographies over that time.

This chapter examines this illegal trade. It provides an overview of the main components of the trade with a discussion of the chemicals involved and an analysis of the drivers of the trade and the patterns of illegal ozone supply chains. It concludes with some thoughts on the nature of smuggling networks and those involved in the illicit trade.

Defining the Illicit Market in ODS

The illegal trade in ODS is defined by the provisions of the Montreal Protocol and the steps that governments take to implement those provisions. The ozone-depleting (OD) chemicals that have been most prevalent in the illegal international trade are chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and halons. ODS for which there are limited volumes of production or for which there are very specialised markets and a narrow range of uses or a limited number of end users are less likely to be attractive to smugglers (see Montreal Protocol 2002, p. 6). CFCs and HCFCs, on the other hand, have had a wide range of uses particularly in refrigeration and in automobile air-conditioning units, as foaming agents and as cleaning solvents. Halons have a primary use in special purpose fire extinguishers and protection systems.

The procedures established under the Protocol and managed through MOPs, various working groups, and formal amendments and adjustments, identify controlled chemicals and set targets for phasing out the consumption and production of those chemicals. Article 4 of the Protocol contains provisions to control trade, particularly that between Parties and non-Parties. But it does not define what makes trade illegal. Indeed, the general approach under the Protocol is that illegality is identified when Parties adopt legislation and regulatory structures to implement control, licensing and phase-out provisions. In brief, industrialised countries were required to phase out domestic production and consumption of halons by 1994; CFCs, carbon tetrachloride and methyl chloroform entirely by January 1996; and methyl bromide

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2 The full list of chemicals subject to control provisions under the original Protocol and subsequent amendments includes CFCs, halons, other fully halogenated CFCs, carbon tetrachloride, methyl chloroform, HCFCs, hydrobromofluorocarbons, methyl bromide and bromochloromethane.

3 Universal ratification of the Protocol and its amendments has rendered that provision moot.
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by 2005. The control provisions for HCFCs required a 90% reduction in domestic production and consumption in developed countries by 1 January 2015. Under the Protocol, developing countries (known as the ‘article 5 Parties’) are subject to different freeze and reduction provisions. Control measures also allowed for export-related production in industrialised countries to meet the basic domestic needs of developing countries. As explored later in this chapter, while this approach to differentiation facilitated developing country commitment to the Protocol, it also opened a significant loophole for illegal trade.

Market Drivers

The discussion later in this chapter reveals a continued market demand in both industrialised and developing countries for ODS for use in refrigeration, automobile air conditioning, and small business operations. That market has been exacerbated by price and profit differentials that have encouraged rather than dampened demand and that have attracted criminal entrepreneurs to this illegal commodity market. The complex control and trade provisions of the Protocol that have made production and consumption illegal in some parts of the world but legal in others have ensured a ready supply of ODS for diversion into black markets.

Price and Profit

To meet their obligations under the Montreal Protocol to freeze and reduce production and consumption of ODS, governments in the USA, the UK and in other parts of Europe adopted policies as early as the early 1990s to minimise demand and to encourage the development of substitutes. The combination of scarcity of legal supply and monopoly of production had the opposite effect and created an opportunity for illegal markets. For example, after January 1996, the only entities that could legally import ODS into the USA were those who held essential use exemptions, who had unexpired consumption allowances, or were authorised to destroy CFCs to remove them from the market. The US government also imposed a substantial tax on the sale of legal (stockpiled) CFC-12. This meant that as stockpiles of legal CFCs for recharging air-conditioning and refrigeration units became increasingly scarce, they also became increasingly expensive as did the costs of retrofitting units

4 More detail on the control provisions under the Montreal Protocol can be found at http://ozone.
unep.org/new_site/en/Treaties/treatiesDecisions-hb.php?sec_id=6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24.

5 Under the provisions of the Protocol, these ‘domestic needs’ provisions would last only until the date at which full phase-out for developing countries was reached. At that date, no Party can produce controlled substances except where there is provision for essential uses agreed under the Protocol.
to use CFC substitutes. Demand for cheap ODS therefore went ‘underground’, creating an opportunity for illegal supply and, equally important, illegal suppliers. The difference in price between legal and illegally sourced ODS also generated substantial profits for those involved in managing the illegal trade. In the mid-1990s, US officials calculated the profit ratio for smuggled CFCs at anything up to 13 to 1 (see Goldberg 1996). Reports from the USA suggest that CFCs bought legally in Mexico for $150–185 a canister were being sold to auto shops in the USA for $300–450 (McArrol 2011) a profit of anything between 100 and 300%.7 In the early 2000s, CFC-12 purchased in China for US $1 a kilogram could fetch 12–16 times that on the UK black market (Newman 2001, p. 14). By 2011, HCFCs could be purchased in developing countries for little more than 2.00 € a kilo whereas the cost in the EU could be anything between 18 and 30 € a kilo (Environmental Investigation Agency 2011a). Similar price incentives and profit drivers characterised the black market in developing countries. In Thailand, for example, import duties of 30% on ODS provided an incentive for smuggling activities to access cheaper sources. High domestic prices for ODS in India—a result of supply cartel activity—had a similar impact.

**Differentiation and Loopholes**

As noted above, the provisions of the Montreal Protocol adopted a differentiation approach to the production and consumption of ODS, providing less restrictive phase-out provisions for developing countries. This included allowing production in industrialised countries for export to meet the domestic consumption demands of developing countries. The logic for the former was to offer a grace period for developing countries in recognition of their limited technological and financial capacity for producing or adapting to the use of ODS substitutes. The logic for the latter was to ensure that production capacity was contained (admittedly mainly in industrialised countries) and therefore more easily managed for compliance with the provisions of the Protocol and domestic implementing legislation. Together these provisions created a ready supply for illegal exports, imports and trans-shipments. For example, the production of CFCs such as R-12/Freon was legal in Mexico, Russia, China and India for another 10 years after it became, in effect, illegal in industrialised countries in January 1996. Some of those production facilities in Mexico and India, as well as others in Brazil and Venezuela, were joint ventures with the major ODS producers such as US companies DuPont and Allied Signal and French company Elf-Atochem who together continued to control about 40% of the global market. Chinese companies accounted for about the same proportion, with much of the rest produced in Russia and in India, where four companies were licensed to produce ODS (see Lobe 1997).

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6 This compared with a ratio of only 4 to 1 for crack cocaine.

7 This was still far below the price of $850–1200 for the same quantity of legal but scarce CFC.
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Other loopholes for illegal activity—and challenges for customs and border pro-
tection officials—were created by the complexity of the Protocol’s trade and control 
provisions, the lack of an agreed labelling and naming system, and varying import 
and export licensing requirements that were legislated for at different times by In-
dividual Parties. The Protocol processes initially controlled only ODS chemicals 
and mixtures, but not products or equipment containing ODS. ODS for essential 
uses—either generally or for individual countries—were also exempt from control 
provisions until substitutes became easily and cheaply available.8 It was not until 
1999, when the Montreal Amendment to the Protocol came into force, that govern-
ments were required to put in place systems for licensing the import and export of 
controlled ODS including new, used, reclaimed and recycled chemicals. The wide 
range of names and labels used globally for ODS also created problems for enforce-
ment agencies when it came to tracking and identifying the movement of ODS 
chemicals and products or equipment containing such chemicals. For example, the 
World Customs Organization’s Harmonised Customs Code grouped chemicals such 
as HCFCs and halons together in broad categories rather than coding them individu-
ally.

Mapping the Illegal Market

The illegal trade was directed initially to meeting market demand for CFCs in de-
veloped countries, especially the USA and parts of Europe. The most commonly 
smuggled OD chemical in the 1990s was CFC-12, also known as R-12 or by the 
trade name Freon as marketed by DuPont Chemicals.9 Freon was used mainly in the 
air-conditioning systems of cars manufactured prior to 1994. The destined end users 
for much of the ODS smuggled into the USA in the late 1990s and early 2000s were 
small automobile workshops and air-conditioning businesses who may or may not 
have known that they were purchasing illegal products. In the UK, demand came 
particularly from retailers and small businesses that required refrigeration systems.

As these markets began to shrink by the end of the twentieth century, in re-
sponse to domestic regulation and increased enforcement, the illegal market shifted 
to other industrialised countries, particularly Japan. The demand for CFCs in Japan 
followed a pattern similar to that of the USA: over a quarter of the 70 million cars 
on the road were fitted with air-conditioning units that required CFCs to function 
(Clark 2003, p. 5). New markets for smuggled CFCs also opened up in developing 
countries in the face of international provisions to freeze consumption of ODS in 
such countries from 1999. According to Liu Ning (2007, p. xi), markets for illicit

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8 Essential uses included propellants for metered-dose inhalers and some agricultural, labora-
and analytical uses. They were either recognised as essential under the Protocol’s procedures or 
nominated by Parties as essential in particular circumstances.

9 R-12 was the designator given to CFC-12 by the American Society of Heating, Refrigeration and 
Air-Conditioning Engineers (ASHRAE).
ODS were expanding in China, India, Malaysia, Thailand, Indonesia, the DPRK (North Korea), the Republic of Korea (South Korea), Iran, Pakistan, Sri Lanka, Vietnam, the Philippines and Bangladesh. Demand in those countries remained high because of their continued reliance on equipment that used ODS and because substitute chemicals were expensive. So too was the cost of replacing OD-using equipment especially when that equipment continued to have a useful working life.

At the same time, a black market was also developing in the most common CFC substitute, HCFCs. HCFCs were intended to be a transition chemical on account of their lower OD potential but they were also always intended to be subject to phase-out provisions under the Montreal Protocol. As with CFCs, their uses have varied but they are predominantly used in air-conditioning and refrigeration systems. While the European Union (EU) banned the import and use of virgin HCFCs from the beginning of January 2010, these chemicals were rapidly becoming the ODS of choice in many developing countries. By 2011, consumption was estimated to be growing by about 15% per annum (Hurley 2011). In those parts of the world where bans on consumption and production were in force, demand continued to outstrip supply, thus creating scope for continued illegal production and trade. In 2012, US chemicals manufacturer DuPont estimated that in the USA alone, the demand for HCFC-22 in service industries would exceed 27.5 million pounds (weight) annually in the years to 2015.

While most of the interest in the ODS black market has focused on consignments of the chemicals in their gaseous form, this market has been further complicated by the development of an illegal trade in so-called ‘banked ozone’ held in products or equipment such as second hand refrigerators and chilling units that contain ODS. The trade in banked ozone began in the second half of the 1990s (see Dauvergne 2008, p. 109) although it was not controlled or made illegal under international law until the early 2000s. Reports from this period identify the growth of an illegal trade in products or equipment containing ODS. In 2000, the EU banned the export of used equipment containing ODS, thus potentially increasing rather than reducing the incentives for illegal trade. Indeed, companies in a number of European countries have been investigated for attempts at export of this kind in contravention of EU law. In 2007, customs authorities in Denmark twice stopped export containers that included used refrigerators containing CFCs. Two years before, eight companies had been prevented from similar illegal exports although only three were prosecuted (UNEP 2008, p. 4). In 2007, French authorities seized a number of CFC-charged refrigerators destined illegally for Senegal.

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10 The use of HCFCs has become more general problem because they are also a greenhouse gas with a higher global warming potential than carbon dioxide.
Measuring the Trade

It is difficult to be precise about the size of the market. Detailed studies on ODS imports and exports have revealed significant irregularities, though illegal trade is only one possible explanation for these discrepancies. Data on seizures provide one useful source of information although, as noted below, these data say little about what proportion of illegal trade is actually being intercepted. Seizures can range from small captures—individual cylinders carried by smugglers or concealed in cars—through to substantial consignments that represent repeat events over time. It is these larger and more regular smuggling efforts that have attracted most attention, in the main because the intention to deceive, conceal, and profit from illegal activity is clear.

From the middle of 1998–2003, US authorities seized 900 tonnes of CFCs although they estimated that as much as 7000 tonnes entered the USA illegally in that time (Clark 2003, p. 5). If the latter figure is accurate, authorities were intercepting less than 15% of smuggled consignments. One of the largest cases prosecuted in the USA involved 418,654 kg of ODS—more than 29,000 cylinders in total—smuggled by the Kroy Corporation in 11 separate shipments between 2007 and 2009. Between July 2010 and August 2012, customs and enforcement officers involved in the Europe and Central Asia Enforcement Network reported seizures involving 3016 cylinders and 72 pieces of equipment containing more than 61 metric tonnes of ODS chemicals and mixtures (see UNEP DTIE 2012). Between September 2012 and April 2014, customs and enforcement officers in the same region reported 133 successful seizures of 7370 pieces of equipment (appliances and compressors) and 9513 refrigerant cylinders or containers which contained, in total, more than 467 metric tons of OD chemicals and mixtures (see UNEP 2015, p. 6–7). Seizures have also been made at the point of export. In two separate incidents in 2010, French authorities intercepted the attempted illegal export of 44 tons of HCFCs (World Customs Organization 2010).

Two of the best known international operations on ODS have been the two phases of Project Sky-hoe Patching coordinated by the United Nations Environment Programme (UNEP) and the World Customs Organization. In the first phase, which focused on the Asia Pacific, 21 customs agencies working collaboratively to share information and intelligence seized more than 700 tonnes of ODS between September 2006 and September 2009. The second phase expanded to include enforcement agencies in Europe, Africa and Central Asia and lasted from 3 May to 3 November 2010. More than 7500 cylinders of ODS (CFCs, HCFCs and others) were seized because they are also a greenhouse gas.

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11 Efforts to calculate the amount and value of illegal ODS are complicated also by the use of different methods of reporting and counting. Reports refer variously to the weight of contraband chemicals in pounds, kilograms, tons and tonnes (with the latter also being confused with metric equivalent ozone depleting potential tonnes). Other sources refer to the number of cylinders which come in multiple sizes.

12 The countries involved were Albania, Belarus, Bosnia and Herzegovina, China, Cyprus, Georgia, Germany, India, Israel, Kyrgyzstan, Montenegro, Russia, Serbia, Spain, Tajikistan, Turkey, Ukraine and Uzbekistan, plus the EU.
estimated 108 tonnes in total—as well as 668 pieces of equipment containing ODS were seized and confiscated (see World Customs Organization 2010).

This snapshot of seizures indicates that the market is a global one. Indeed, information submitted to the Montreal Protocol Secretariat reports seizures in Antigua and Barbuda, Argentina, Armenia, Georgia, Kenya, Kyrgyzstan, Jordan, Nepal, Thailand, the Philippines, Serbia, the Seychelles, South Africa, Sri Lanka and Uzbekistan. The Environmental Investigation Agency (EIA) also reports seizures in South Africa, Antigua and Barbuda, and Jordan (Clark 2003, p. 4). A total of 74 tons of CFCs and HCFCs were seized in Nepal in 2001 and 2002 alone: the country’s baseline quotas were 30 and 23 tons, respectively (Shandip 2004). Sri Lankan customs authorities detained 200 cylinders of Chinese-sourced CFC-12 in April 2003. In March 2004, authorities in the Republic of Georgia found illegal CFC-12, concealed in counterfeit cylinders and exported from the United Arab Emirates (almost certainly Dubai). In 2010, Thai customs confiscated 1200 cylinders of ODS. In 2012, 55 cylinders of R-12 were intercepted at the Kenyan port of Mombasa. As the discussion on logistic trails later in this chapter indicates, these are rarely isolated incidents.

This overview also gives some indication of how robust the illegal market might be. It tells us little about what proportion of smuggled chemicals and equipment is actually being intercepted. Nor does it give much indication of the overall value of that trade. Studies refer variously to illegal profits, to ‘street value’, to equivalent value on legal markets and to the cost to governments in lost excise and taxes. UNEP has estimated that in the mid-1990s the total amount of illegal CFCs in circulation was something between 16,000 and 30,000 tonnes, equivalent to 6–15% of global production (Montreal Protocol 2002, p. 3). Educated best guesses put the value of this market at the time at around US$ 300 million annually (Brack 2001, p. 5). The amount smuggled into the USA alone was estimated at the equivalent of one-quarter to one-third of US production (Clapp 1999, p. 113). By 2000, as much as 15% of CFCs used in the UK were thought to have entered the country through illegal means (Hayman and Trent n.d.). The amount being smuggled into India between early 1999 and March 2000 (more than 800 tonnes) was of a similar proportion, estimated as equivalent to 12% of national consumption (IPS 2001). By the middle of the first decade of the 2000s, the illegal trade was thought to constitute between 7000 and 14,000 tonnes of ODS a year, estimated still at about 10–20% of the legitimate trade (Clark 2007, p. 1).

Logistic Trails

The discussion thus far has identified the drivers of the black market in ODS and the overall patterns of trade associated with this market. It shows that as governments adopted more stringent regulations to meet their commitment to the Montreal Protocol and as the source of illicit ODS production shifted from developed to developing countries, so too did patterns of demand and the structure of the markets. This
part of the chapter now turns to offer a more focused examination of how the actual trade in illegal ODS is managed and, where evidence is available, by whom. Tracing and analysing the logistical trails of illegal chains of custody in the ODS black market helps to map the nodes associated with production and export, consumption and import and, where relevant, transshipment. It also sheds light on strategies for concealment and methods of transportation.

Sources of Illegal ODS

As the discussion earlier in this chapter indicates, the manufacturing of ODS has always been limited to a small number of companies and countries. In the early phases of black market activity, much of the ODS entering the black market was being diverted from legitimate production sources, particularly those that were licensed to export ODS for domestic use in article 5 (developing) countries or to produce ODS for essential uses as determined under the Montreal Protocol. This, for example, was one of the sources of virgin (new) CFCs smuggled into the USA once production for domestic consumption was banned after January 1996. ODS that were exported legitimately from the USA to Mexico, an article 5 country, were then smuggled back into the USA to avoid excise and to take advantage of price differentials between increasingly scarce domestic stockpiled CFCs and black market sources. The North American Free Trade Agreement (NAFTA) Commission for Environmental Cooperation also reported CFCs being sold to Venezuela and Guatemala and then smuggled back into Mexico (Commission for Environmental Cooperation n.d.). ODS for the illegal US market were also sourced from countries in which local companies, including those working in partnership with or as subsidiaries of global multinationals, were licensed to produce for domestic consumption needs in developing countries. Some reports suggest that by the mid-1990s much of the ODS smuggled into the USA was produced in India (Hanley 1996) and others show that CFCs were also being smuggled from Russia as well. In 1997, for example, UNEP estimated that Russia was producing 52,700 tonnes of CFC a year with seven factories the primary source of an estimated 30,000 tonnes on the black market (Land 1997).

The implementation over time of various phase-out schedules was accompanied by a shift in both production locations and in the chemicals produced and entering the black market. In its 2002 report for the Open-ended Working Group, the secretariat of the Montreal Protocol noted that of six developing countries with CFC production capacity, China was contributing 40% of global production and India 20% (Montreal Protocol 2002, p. 27). By the mid-2000s, India and the Republic of Korea had come to account for 70% of global production of CFCs (Liu Ning 2007, p. xi). If consumption patterns are taken into account as well, the Asia Pacific accounted for over 80% of the world’s CFC production and consumption by the early 2000s.

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12 Mexico was not the only point of entry into the USA. Some illegal goods came in from or through Canada. Others came into USA ports such as Miami, Houston, San Ysidro and New York.
As a consequence, the region had also become a major hub for smuggled ODS, particularly CFCs and halons. India and China were the most prominent producers, consumers and transit points (Brack et al. 2006, p. 6), overtaking Russia in that regard. In 2002, China accounted for 90% of developing country halon production (Montreal Protocol 2002, p. 27), and in 2012 it was reported as the source of more than half of the world’s supply of HCFC-22 (Rosenthal and Lehrman 2012). This also reflects the move from production of CFCs to production of HCFCs discussed above.14 This move has been made easier by what Liu Ning (2007, p. 7) refers to as ‘swing plants—facilities that can easily be converted’ to produce related chemicals.

The phasing out of global consumption in specific ODS under the Montreal Protocol, including developing country consumption for domestic needs, had at least two consequences for the black market. First, it meant that chemicals increasingly entered the black market from recycled or reclaimed sources rather than from virgin sources. This included the growing black market in ‘banked’ ODS mentioned above. This also became a device for concealing the original sources of ODS. Reports to the Montreal Protocol Secretariat, for example, show ODS being traded or smuggled from or through countries that have no production facilities and often very little reclaiming or recycling capacity. The second consequence of more rigorous phase-out schedules was an increase in illegal production more generally. Production capacity in countries such as China and Russia has been diverted to the illegal production of banned chemicals. Delays in achieving full compliance with production restrictions have also meant a continuing and reliable source of ODS for the illegal markets. The decommissioning of Russia’s production facilities, for example, was disrupted by political and economic turmoil. Evidence suggests that, following the closure of the last of six licensed CFC production facilities in China in 2007, at least some of that capacity, expertise and equipment was diverted into illegal production. At the end of 2014, China announced closure of five HCFC production lines. Yet this capacity constituted only a little over 15% of the country’s total HCFC production which will not be phased out completely until 2030 (see The World Bank 2014). There has also been a growing market in counterfeit ODS, first CFCs and more recently HCFCs. These are passed off as the product of companies such as DuPont, which still have legitimate production licences (for essential use for example). They are sometimes sold openly as ‘legal’ commodities and sometimes diverted entirely into black markets.15

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14 Amendments to the Protocol in 2007 required developing countries to freeze HCFC production and consumption by 2013.
15 DuPont has taken action against producers in China and traders in the United Arab Emirates, the latter linked to counterfeit HCFC-22 stock found in Egypt, Saudi Arabia and Jordan; see DuPont (2012a, b).
Concealment and Smuggling Routes

Information gleaned from seizure and other investigative reports shows that methods used to move illegal ODS across borders have involved almost all forms of transportation. Some smuggling efforts involve small amounts of ODS and one or two individuals only. Others involve larger amounts and more people but are still relatively simple to coordinate. For example, seizures have been made of individuals carrying cylinders strapped to their backs or transported on rafts, across the Río Grande between Mexico and the USA, and across the Khong River between Lao PDR and Thailand, the latter possibly having come from China through Vietnam. Other intercepted shipments of individual smugglers transporting cylinders by cycle-rickshaw between Bangladesh and India (Liu Ning 2007, p. 20). Reports are also common of ODS concealed in cars, trucks or small boats that are often used for smuggling other goods as well. Polish authorities have found cylinders of CFC and HCFC smuggled by car from Ukraine on more than one occasion (UNEP 2008, p. 3). Similar interceptions have been made on the border between Serbia and Bulgaria. Uzbeki officials have reported regular confiscations of ODS from China (identified by markings) hidden in car boots: the goods appear to have been smuggled through Kyrgyzstan which shares a border with China. In April 2007, authorities in Kazakhstan found cylinders of R-22, R-409a and R-134a hidden in the ventilating shafts of a passenger train. Hurley (2011) reports activity in Southern Europe involving ‘up to 10 small ships a day … ferrying small consignments of HCFCs between ports bordering the EU … and ports within the EU’. The Montreal Protocol Secretariat reported that ‘tobacco boats’ in the Caribbean, so-called because that is what they were usually used to smuggle, were being seized and found full of CFC cylinders (Montreal Protocol 2002, p. 4).

The most common methods of illegal import and export involve false documentation and declarations—in effect, ODS are ‘hidden in plain sight’. Shipping documents can be falsified to claim that goods are in transit to a legal market in a third country or that they are being imported for destruction. However rather than being shipped on, or being destroyed, chemicals are diverted into domestic markets. False documentation can also be used to assert that ODS are from reclaimed or recycled sources even though the source (export) country has no such facilities. Other examples of fraudulent documentation include claims that containers are being returned empty to a source country when in fact they are full, or that they come from a single production source in cases where licensing authorities in the importing country have regulated against multisource imports. Diversionary practices have also included mislabelling of containers to confuse customs officers by claiming

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16 Virgin substances have sometimes been adulterated to make them look as if they are reclaimed.

17 One case in the USA, for example, involved sending large industrial refrigeration units to Venezuela to be refurbished before being returned. They were recharged with over 2500 pounds of CFC-12 even though they required only 3–4 pounds to work effectively.
that the contents are a non-ODS substance\textsuperscript{18}; tampering with cylinder markings; and falsifying customs codes and chemical names. One of the largest cases in the EU, for example, involved 365 tonnes of halon-13-1 and 630 tonnes of CFC-12, fraudulently labelled as the non-OD chemical HFC-227.

At the other end of the spectrum, some illicit ODS chains of custody involve not only significant consignments in size but also the use of complicated methods of concealment. Indeed, as governments implemented more stringent control processes, methods of concealing the chemicals themselves, as well as their origin, have become more sophisticated and complex. These efforts have involved hiding illegal containers in cylinders that have been designed to meet pressure and temperature tests that would mark them as a legal ODS. These strategies can be used with double layering—hiding the illegal containers behind a row or two of legitimate substances. The routes used to smuggle ODS have also become more complex, involving a robust degree of organisation and conspiracy, the latter a term used often by the US Department of Justice in describing this particular black market. A 2012 case prosecuted in the USA, for example, involved ODS sourced in China, transported first to Ireland, and then to the Dominican Republic before being imported into the USA with fake invoices and falsified shipping documents (Rosenthal and Lehren 2012). The Bahamas and the Mexican port of Veracruz offered routes into the USA for ODS from China and Europe. Mexican manufactured ODS was reported to be entering the USA not only over the land border but also through the Virgin Islands. Seizures within the Asia Pacific have tended to come from regional sources, but UNEP reports at least one known case of Mexican CFCs ending up in Thailand and another where the import was seized from Egypt (Liu Ning 2007, p. 38, 49).

Transhipment hubs have also become important in the development of more sophisticated and wide-reaching smuggling networks and illicit chains of custody. The two key locations identified by governments and NGOs alike are Dubai in the United Arab Emirates and Singapore in Southeast Asia. Both offer free trade ports in which few, if any, commodity consignments destined for other markets are inspected. As Clark (2003, p. 1) points out, the shipment of consignments through transit countries "confuse[s] the trail of the material and provides a jump-off point into illegal markets". Dubai has been a hub for ODS being transported to Pakistan and India as well as exported from illegal sources to other parts of the world. EIA reports have identified Singapore as a central node in illegal ODS markets where commodities are sometimes decanted and repackaged before being traded on to other destinations. Cambodia, Lao PDR and Vietnam have also become transit countries in Southeast Asia.

Other arrangements designed to facilitate all kinds of legal trade have facilitated illicit trade at the same time. For example, the port access agreements between Nepal and India have provided another convenient opportunity and route for smugglers. Those agreements guarantee the landlocked country of Nepal free access to

\textsuperscript{18} HCFC-22, for example, is often deliberately mislabelled as R-134a, a non-ODS hydrofluorocarbon that is used in new and retrofitted car air-conditioning systems.
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Indian ports such as Kolkata (Calcutta) for export and import purposes. ODS have been brought into Nepal from the EU under the provisions allowing for export to article 5 countries (though much in excess of Nepal's consumption quotas) and then smuggled back into India across land borders for use in refrigeration and air conditioning there.

Conclusion: Entrepreneurial Networks

As with the legal trade in ODS, and as the discussion in this chapter has revealed, illicit chains of custody can involve networks of manufacturers, processors, distributors and traders with 'several links in the chain between producer and end user' (Montreal Protocol 2002, p. 9). The market ranges across 'small-time entrepreneurs to sophisticated money-laundering conspiracies' (Baker 2000). Various reports on the illegal trade refer to 'extensive web[s] of middlemen and brokers' (Newman 2000, p. 3037), 'notorious smugglers' (EIA 2011b), 'dishonest brokers' (Clark 2003, p. 4), 'sophisticated white collar criminals' (Zagaris 1996) and the 'ozone mafia' (Jernelov 2005, p. 9). The fact that the illegal trade has continued over time with little apparent disruption suggests that knowledge about smuggling networks has been widely known among the relevant community and that those involved, whether new players to the market or not, were able to adjust quickly to adapt the various stages of chains of custody to new sources and new buyers. In this context, then, illicit ozone networks and chains of custody constitute what Passas (2002, p. 16) refers to as entrepreneurial structures through which criminal acts—in this case the various functions that support the trade in illegally sourced or produced ODS—are carried out.

In some cases, those entrepreneurial structures take the form of the kind of 'hub' (or star or wheel) network that Arquilla and Ronfeldt (2001) characterise as a form of cartel or franchise. In such networks, they suggest, actors are linked to a central (though not necessarily hierarchical) node through which coordination is managed (Arquilla and Ronfeldt 2001, p. 7). This seems to have been the pattern behind a number of cases in the USA where those organising the smuggling were often associated with or had links to legitimate companies and enterprise that could be used as a front for import or a distribution point for resale. The individuals at the hub of such networks were rarely working alone to coordinate illegal consignments. Importing companies—or their principals—have been found to be working closely with distributors and suppliers (see, for example, EPA 1999). Those who manage these networks and who arrange the purchase of illegal sources of ODS are known to have provided advice to importers, to express-mail fake invoices to exporters in other countries, to have used aliases and to have established front companies and offshore bank accounts in fictitious names.

Other illicit chains of custody in the ODS black market have taken a form that is more akin to a chain network, a flatter form of entrepreneurial structure in which people, goods, or information move along a line of separated contacts, and where
end-to-end communication must travel through the intermediate nodes (Arquilla and Ronfeldt 2001, p. 7). ODS smuggling of this kind is likely to reflect a clear division of labour between those who do the physical transportation and those who are the buyers and distributors, with middlemen or brokers involved so that there is no direct link between producers and distributors. The case of the Alghazoulis brothers in the USA, for example, shows that they bought from a number of ‘independent’ suppliers who were bringing small consignments in from Mexico on a weekly basis and who were probably smuggling for others as well (see McArdle 2011). Other reports show similar patterns, with Mexican smugglers confirming that they would transport consignments to Houston to a middleman who paid them in cash (Sheff 1997).

In sum, then, three conclusions can be drawn from the narrative and analysis in this chapter. First, ODS smuggling now has a global reach. Second, black markets in ODS blur the boundaries between legitimate industry on the one hand and white collar and corporate crime on the other. Third, network structures have made it possible for those involved to adjust their strategies for illegal transboundary activity in response to changing structures of demand and supply.

References


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