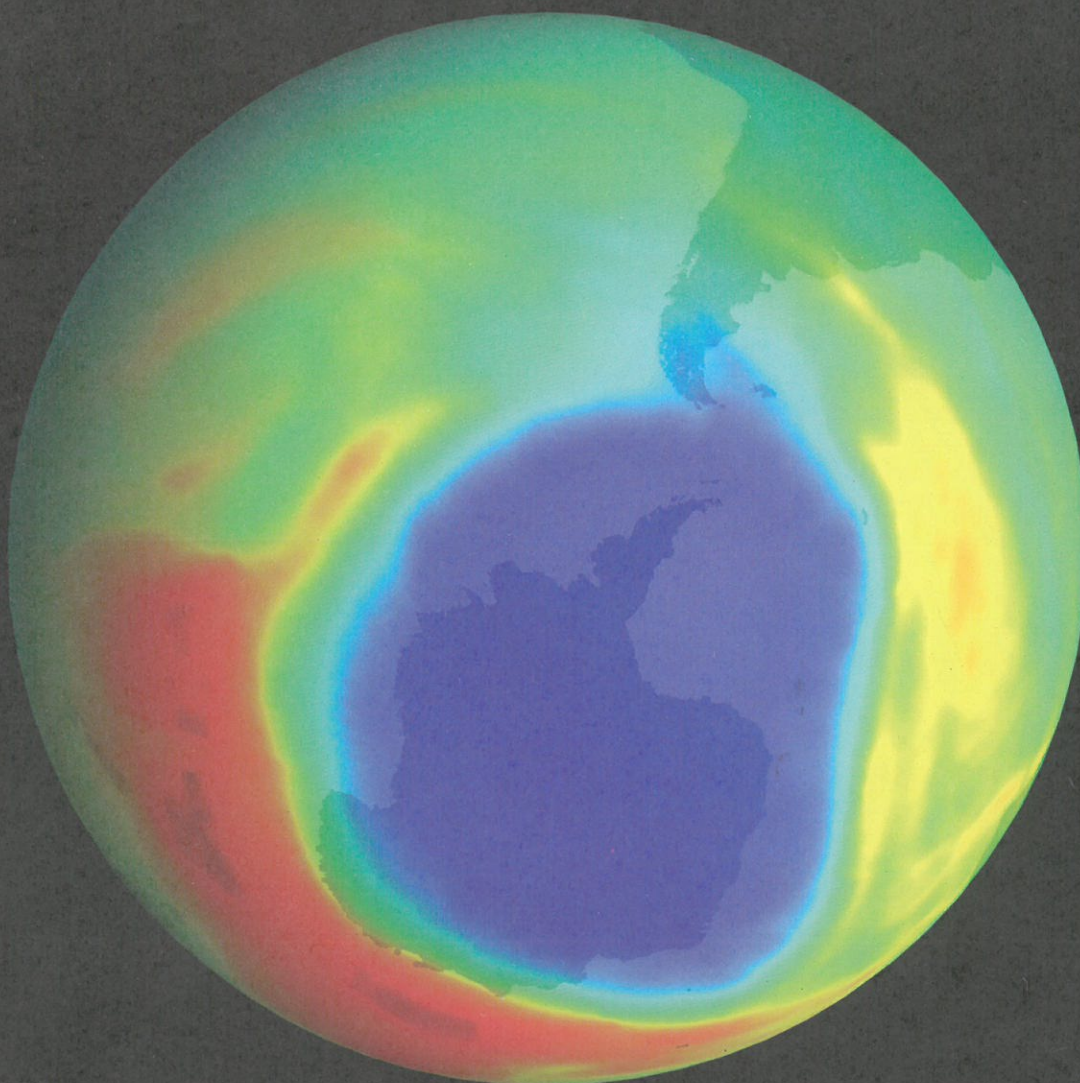




environmental investigation agency

A Crime Against Nature

**The Worldwide Illegal Trade
In Ozone-Depleting Substances**



A Second Report by the Environmental Investigation Agency

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Executive Summary

- The Antarctic ozone hole in September was the largest ever recorded at 27 million square kilometres, covering an area three times the size of Australia.
- Latest scientific research has uncovered a dangerous increase in halons in the atmosphere, and NASA scientists have revised the period of peak ozone depletion to 2010–19, up to 20 years later than expected.
- Illegal trade in ozone-depleting substances continues to undermine the achievements of the Montreal Protocol. Investigations by EIA have uncovered a network of active Chinese brokers supplying CFCs and halons to both North America and Europe.
- Large amounts of Chinese halon 1301 entered the US market in 1997, described as used material despite China's small recycling capacity. Final destinations included the US Department of Defense and British Petroleum. In the first half of 1998 over 200 tonnes of Chinese CFCs were allowed into the US, despite the lack of CFC recycling facilities in the country.
- Europe remains a target for ODS smugglers, with Inward Processing Relief Rules offering a convenient loophole. There is growing evidence that less-regulated HCFCs are being used as a cover for the illegal import of CFCs into Europe.
- From July 1999 developing countries must freeze their CFC production. Multilateral funding and technology transfer is vital to ensure such targets are met.
- Enforcement authorities must work together and utilise intelligence-led initiatives to combat the threat of ODS smuggling.
- Lessons from illegal trade in CFCs and halons must be applied as other ODS are phased out.
- As the ozone layer worsens and only 20% of the world's population have stopped using CFCs, greater effort is needed by governments to ensure that the Montreal Protocol's initial objectives are met.

A Crime Against Nature

Introduction

Investigations by the Environmental Investigation Agency (EIA) prove that the integrity, effectiveness and successes of the Montreal Protocol are seriously imperilled by the large scale illegal trade in ozone-depleting substances (ODS). The findings of these investigations show that without new and additional actions to combat this illegal trade the on-going depletion of the world's ozone layer will persist as a damning legacy of the 20th century.

EIA has uncovered a growing illegal market in CFCs (chlorofluorocarbons) and halons from developing countries—in particular China—to developed countries, including the USA, UK, France, Spain, Italy and Germany.

New scientific data on the impact of ODS on the ozone layer clearly defines the compelling need for action. In April of 1998, NASA scientists revised the predicted peak period for ozone layer depletion from 2000–2005 to around 2020 and noted the likely development of a severe Arctic ozone hole.

At the same time the largest recorded ozone hole over the Southern Hemisphere—three times the size of Australia—has been identified by scientists, leaving more than 27 million square kilometres of the planet temporarily unprotected from ultra-violet radiation.

Despite the international ban on the production and sales of halons in developed nations since 1 January 1994, the atmospheric abundance of these materials continues to increase substantially. This is particularly worrying as the bromine released from halons is around 40–60 times more efficient at depleting ozone than the chlorine found in CFCs. Consequently, increasing levels of halons in the atmosphere could outstrip the benefits of reduced chlorine loading over the next decade, further delaying recovery of the ozone layer.

As perhaps the world's most successful Multilateral Environmental Agreement (MEA), the importance of tackling the shortcomings in the Montreal Protocol is underscored by the function it serves as a role model for other MEAs. If the international community fails to ensure the effective enforcement of the Montreal Protocol what hope is there that we can collectively tackle other pressing threats to our common shared environment through such agreements?

The freeze on production of CFCs in developing countries due to take effect in July 1999, will mark a crucial milestone as the Montreal Protocol moves into the next phase of implementation. We have already learnt much about the threat to the Protocol from illegal trade during the phase-out

in developed countries and it is vital that we apply these lessons as the Protocol moves forward.

In recent months bold statements have been made by the world's wealthiest nations about environmental crime. In April this year the G7 (and Russia) issued a communique from Leeds Castle in the UK expressing "grave concern about the ever-growing evidence of the violations of international environmental agreements and particularly the involvement of international organised crime". The communique went on to say, "We believe that our governments must act now to protect existing agreements..." and that the G7 (plus Russia) will "continue to fight illegal trade in ozone depleting substances".

In Europe and the USA new regulations and controls are being considered and it is essential that they are not weakened as they pass through the various stages to adoption.

On World Ozone Day this year the United Nations Environment Programme's Executive Director, Klaus Topfer stated, "I would like to point out that, contrary to the popular impression, the protection of the ozone layer is far from assured at present. Only about 20% of the population of the world ... has given up their addiction to CFCs. The remaining 80% will have to start soon and complete their task if recovery of the ozone layer is to be assured."

Now is the time for action. A crime against nature is being perpetrated by traders in illegal ODS, while the Parties to the Protocol have several other pressing issues to address. The consequences of hesitation will be felt world-wide and well into our future as the ozone layer continues to thin and recovery is delayed, threatening human health and ecological security. It is imperative that the Parties to the Montreal Protocol act upon this knowledge and the simple truth that a law can only be as good as its enforcement.

Steve Trent
Campaigns Director
November 1998.



© Mark Edwards/Still Pictures

"Contrary to the popular impression, the protection of the ozone layer is far from assured at present."

*— Klaus Topfer,
UNEP Executive
Director.*

NASA also noted the likely development of a severe Arctic ozone hole, tripling the levels of UV radiation hitting northern countries.

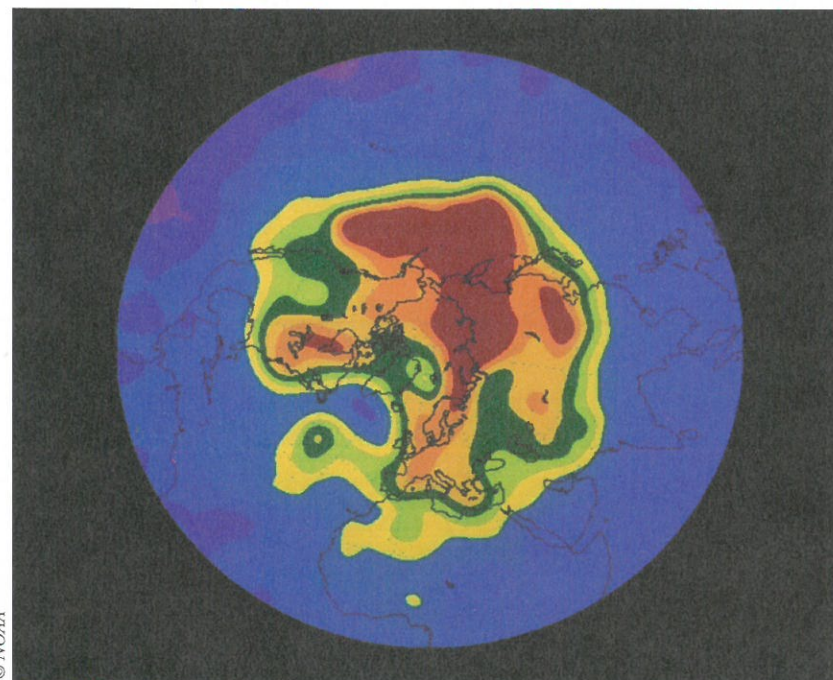
New Science Puts An End To Complacency

All life on Earth depends on the ozone layer. It is this thin layer of gas found largely in the upper atmosphere—the stratosphere—between 12–27 km above the ground, which protects the planet from the devastating consequences of ultra-violet radiation.

Recent scientific research provides damning new information on the size and duration of the southern ozone hole and suggests that the effects of global climate change may exacerbate the impact of ODS on the ozone layer. Additionally, detection of a rising accumulation of halons releasing bromine into the atmosphere, casts serious doubts on the predictions for recovery of the ozone layer. At the same time the discovery of a new halon in the atmosphere not regulated by the Protocol and the emergence of other ODS which fall outside controls compounds scientific doubt over the future state of the ozone layer. Taken together these emerging trends mean that talk of ozone layer recovery is premature.

Crucially, irrespective of the potential impacts of global climate change or rising halon concentrations, the predictions for ozone recovery still assume full compliance with the Montreal Protocol, but such assumptions cannot be made until the Protocol is fully enforced and illegal trade and production of ODS are eliminated.

Below:
Ozone map of the Arctic, March 1998. Scientists are predicting an Arctic ozone hole in the next decade.



Revising The Predictions For Ozone Recovery

Under the Montreal Protocol regime a scenario of peak ozone depletion around the years 2000–2005 followed by full recovery by the middle of next century was envisaged. Latest research shows such a prediction to have been optimistic.

In April of 1998, scientists from the US National Aeronautical and Space Administration (NASA) suggested that although chlorine loading in the atmosphere is expected to peak around the year 2000, the depletion of Arctic ozone would not peak until around 2010–2019, between 10–20 years later than expected. Stating that the “recovery of the Earth’s ozone layer may take place later than is currently expected”¹, NASA also noted the likely development of a severe Arctic ozone hole, tripling the levels of UV radiation hitting northern countries, perhaps due to the impact of global climate change on the ozone layer.²

The report envisages localised losses of up to two-thirds of the Arctic ozone column during the worst years. The creation of an Arctic ozone hole has implications for the more densely-populated northern latitudes. The NASA report also predicts an increase in both the severity and duration of the Antarctic ozone hole.

While it is feared that global climate change and greenhouse gases may be worsening ozone depletion it is essential that the Parties to the Montreal Protocol remember that many of the

How Global Climate Change May Affect Ozone Recovery

The chemical reactions which cause stratospheric ozone depletion—the ozone “hole”—are extremely sensitive to temperature. As greenhouse gases warm the Earth’s surface they also cool the stratosphere radiatively, this in turn affects ozone depletion. Scientists are now suggesting that temperature and wind changes induced by increasing greenhouse gases may lead to significantly colder temperatures in the lower stratosphere. Cooler temperatures in this part of the atmosphere lead to increased ozone depletion. The severity and duration of both the Arctic and Antarctic polar ozone holes are predicted to increase because of greenhouse gas induced stratospheric cooling over coming years.³

replacements for CFCs, halons and other ODS are also dangerous global warming gases. In the face of current uncertainty there is a clear need for scientists working under the Montreal Protocol and the Kyoto Protocol on climate change to pool resources and knowledge.

The Largest Ever Antarctic Ozone Hole

This September the largest ozone hole to ever be recorded has been witnessed over the Southern Hemisphere. The size of the hole is staggering—at 27 million square kilometres it is larger than North America and three times the size of Australia—and leaves a vast area of the planet temporarily unprotected from ultra-violet radiation. The Antarctic hole this year is six million square kilometres larger than was seen in 1997, and comfortably beats the previous record hole of 24 million square kilometres seen in 1994.⁴

The sheer size of the hole led Dr Susan Solomon of the US National Oceanic and Atmospheric Association to comment: “Basically, we have loaded up the atmosphere with chlorine and now we are taking a roll of the dice. The ozone hole is not going to be going away for many decades to come.” She also said it was her “gut feeling” that the size of this year’s hole could be due to climate change.⁵

These shocking findings come soon after scientists in 1997 showed nearly complete destruction of ozone from below 14 to just over 20km over the South Pole, the largest vertical extent of total depletion ever observed.

Hello Halons, Goodbye Ozone

Despite the international ban on production and sales of halons in developed nations since 1st January 1994, the atmospheric concentration of these materials continues to substantially increase. This is especially worrying as the bromine contained in halons is 40–50 times more efficient at depleting ozone than the chlorine found in CFCs, and these gases have a long atmospheric lifetime. Of all the chemicals controlled by the Protocol, halon 1301 has the highest ozone depleting potential and an atmospheric lifetime of 110 years.

A report published this year by scientists from the US National Oceanic and Atmospheric Administration (NOAA) suggests that increasing levels of halons could outstrip the benefits of reduced chlorine loading within 10 years.⁶ The report states that: “Given the current atmospheric record and reported amount of halon produced before the ban on production,

emission of halon 1301 at the 1995–96 rate could continue for another 40 years, but halon 1211 would be depleted in 8–12 years. Exemptions on the ban on production may extend these periods.”⁷

It is apparent that large banking in developed countries and new production in China and Korea are exacerbating this problem. Between 1992–1994 China more than doubled its production of halons, and was responsible for 90 per cent of the world’s halon output in the latter year. China can continue to produce halon until 2010.

Steve Montzka, one of the authors of the NOAA report, states: “By the year 2005, if halons continue to increase in the atmosphere, the total amount of equivalent chlorine will no longer be decreasing as we observed a few years ago. We believe there is still a lot of halon out there waiting to be used.”⁸

This is at odds with the assumptions made by the World Meteorological Organisation (WMO) and United Nations Environment Programme (UNEP) prediction that stratospheric bromine will peak before the year 2000⁹, and casts doubt on the efficiency and effectiveness of present halon management plans.

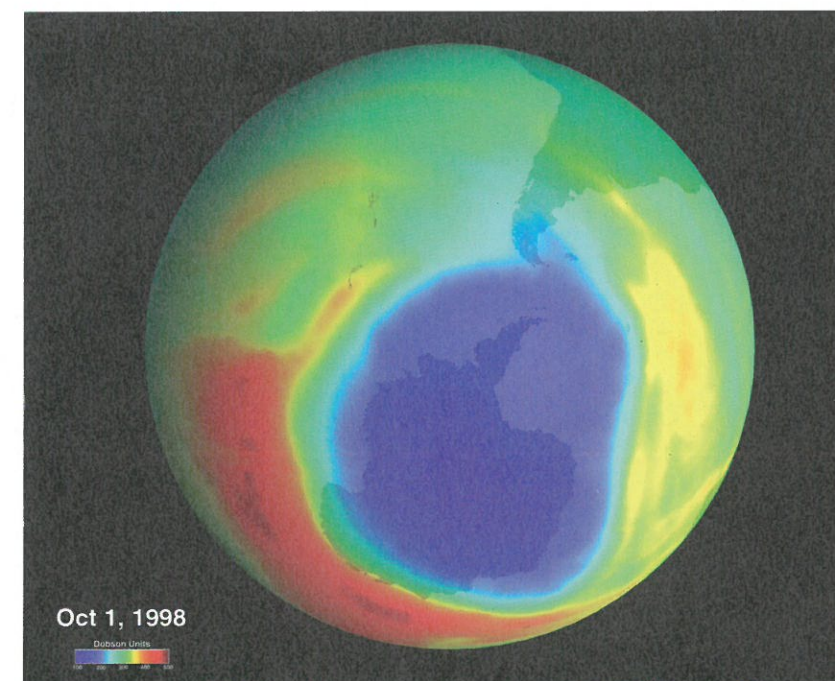
New Ozone Depleters

In August, 1998 the Australian based Commonwealth Scientific and Industrial Research Organisation (CSIRO) issued an intriguing announcement which casts further doubt over the assumptions of the WMO/UNEP (1998) predictions. CSIRO has

“Basically, we have loaded up the atmosphere with chlorine, and now we are taking a roll of the dice.”

— Dr Susan Solomon, NOAA.

Below:
The Antarctic ozone hole (shown in blue) on 1 October 1998, covering an area three times the size of Australia.



detected the presence of an ozone depleting substance, Halon 1202, which over the past two years has been increasing in atmospheric concentration at 17% per year. Unlike other halons this substance is not regulated by the Montreal Protocol.

While there is a great deal of debate about the nature of halon 1202, its increasing presence has caught everyone by surprise. Although it was known about at the time of the original Montreal Protocol negotiations, it was left off the list of controlled chemicals as experts thought it was no longer used. While its past uses have included fire suppression in fighter aircraft engines by the US Air Force, its toxicity renders it unusable in mist fire suppression systems. The recent increase may be attributable to accidental production as a by-product during the manufacture of halons in China and Korea.¹⁰

Below:
Malignant melanoma. 33 000 new cases of skin cancer each year are predicted in the US by 2050.

Bottom:
Sunbathers are being advised to cover up in the face of increased ultra-violet radiation.



Similarly, the development of other likely ODS—bromothene and n-propyl bromide—not under the Protocol have been identified by the Solvents Technical Options Committee (STOC) in their reports of April 1997 and 1998. STOC notes that both are being globally marketed.

Clearly, if the Protocol is to meet its targets for ozone recovery further action must be taken to restrict the release of halons, and new ODS must be brought under regulation and phased-out. The Parties to the Protocol must also consider not just the ozone depleting potential of substitutes for regulated substances, they must pay attention to their global warming potential.

A Silent Epidemic—The Human Costs

In 1997 the Canadian Government published a document estimating that the benefits of the Montreal Protocol for human health would, inter alia, include 19.1 million cases of non-melanoma skin cancer avoided by 2060; 1.5 million cases of melanoma skin cancer avoided and 333 500 cases of skin cancer deaths avoided.¹¹

Although this can rightly be hailed as a great achievement, it is important that we do not lose sight of the costs we have already incurred—and which will continue to grow.

Enforcement—A Price Worth Paying

The risk of malignant melanoma in the United States has now reached 1 in every 70 for Caucasians (1 in every 87 for the population as a whole), an increase of more than 1,800% since the 1930s.¹² The incidence of malignant cutaneous melanoma is reported to be increasing faster than any other cancer in Caucasians. Thus in the USA, mortality from melanomas (in Caucasians) is second only to that from lung cancer in terms of over-all cancer mortalities.¹³

Dramatic increases in all forms of skin cancer have been reported worldwide over recent decades¹⁴ and rates of non-melanomic skin cancers (NMSCs) have increased to the extent that it has been labelled “a quiet 20th Century epidemic”.¹⁵

By the year 2050 we can expect to see more than 33 000 new cases of skin cancer per year in US and 14 000 in Northwest Europe¹⁶—and this is without accounting for the impact of non-compliance with the Protocol and the illegal trade in ODS.

Skin cancer, is only one potential manifestation of increased UV-R. Many other dangerous

effects have been identified or are implicated. A distinct negative impact on the human immune system is believed to occur and the occurrence of cataracts is well documented.¹⁷

Furthermore, the synergistic effects of ozone depletion and global climate change have yet to be quantified, although there are disturbing conclusions which may already be drawn.

The full effects on human health of ozone depletion (and global climate change) will arise from complex processes resulting from disturbances of natural global geochemical cycles and the scale of these effects on populations and communities¹⁸ can still only be estimated.

The Benefits Of The Montreal Protocol—Why It Is Worth Enforcing

Even if the most severe cost/benefit analysis is applied—counting all of the costs, but only some of the obvious benefits—the net saving to global society derived from the Protocol massively outstrip the costs. From this it is a simple step to acknowledge that relatively miniscule sums of money dedicated to improving the enforcement of the Protocol will reap massive dividends.

Montreal Protocol Benefits

Costs and benefits calculated from 1987 to 2060 assuming full implementation.

Reduced Fisheries Damage	US\$238 billion
Reduced Agricultural Damage	US\$191 billion
Reduced Damage to Materials	US\$30 billion
Costs*	US\$235 billion
Net Benefits†	US\$224 billion

* including all real resource costs, together with those of the Multi-lateral Fund of the Montreal Protocol

† NB this does not include human health benefits which are massive but cannot be calculated, such as 333,500 avoided cancer deaths

(All values are reported in US\$ at 1997 levels).

Source: Applied Research Consultants, 1997. For Environment Canada, published in Global Benefits and Costs of the Montreal Protocol on Substances that Deplete the Ozone Layer.

Courtesy of Environment Canada.

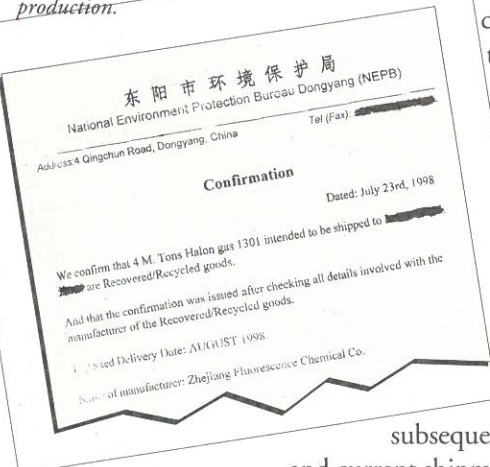
Halon 1202 has been increasing in atmospheric concentration at 17% per year.



Left:
Ozone monitoring in the Arctic.

A picture has emerged of an active ring of CFC and halon exporters in China, offering both virgin and unfeasibly large amounts of recycled ODS.

Below:
Certificate showing unlicensed halon production.



Below:
Hangzhou, Zhejiang province—centre of the Chinese halon 1301 trade.



The Bursco Investigation

In order to probe the secretive world of the illegal ODS trade, EIA established a front company, Bursco, to enter into dialogue with suppliers. Bursco was set up as an international trading firm with offices in the UK, Netherlands and the US, looking to source both refrigerant gases and halons for the European and North American markets.

Chinese firms were the main priority for the Bursco operation, with the purpose of penetrating the network of traders dealing in ODS and to gauge their experience of supplying the US and Europe. An impression of the extent to which China has overtaken the Russian Federation as the main source of illegal ODS was sought, as was further information about methods used to circumvent customs controls.

For a six-month period between May and November 1998, over 15 Chinese suppliers were contacted either by fax or electronic mail. The target list of companies was compiled using EIA's knowledge of illegal shipments, comprehensive searches of Asian trade bulletin boards¹, and suspicious solicitations obtained from industry contacts. Initially they were asked to state current prices and availability, and

subsequently queried about both past and current shipments to the US and Europe, and advice on licence requirements. For control purposes a selection of suppliers in both the Russian Federation and India were also contacted.

From these investigations a picture has emerged of an active ring of CFC and halon exporters in China, offering both virgin and unfeasibly large amounts of recycled ODS at extremely low prices. Many claimed successful exports to either Europe or the US and offered to falsely-label banned ODS as less harmful replacements such as HCFCs (hydrochlorofluorocarbons), and to provide counterfeit paperwork.

Several dealers spoke of sales trips to Europe and the US, and revealed how production facilities operate through a series of export corporations to ensure that substantial shipments of supposedly recycled material do not attract suspicion.² Unlicensed production of halon 1301 by at least one Chinese factory has also been uncovered.

The information gained through Bursco shows that China is now the predominant source of illicit ODS, abetted by a series of unscrupulous trading firms more than willing to break the rules for a quick profit.

The China Connection

Although chemicals brokers operate in many of China's provinces, those selling CFCs and halons are clustered in a few locations—notably Hangzhou and the port of Ningbo in Zhejiang province, and to a lesser extent Dalian port in northern China, and Tianjin in the south.

With one notable exception—the Zhejiang Chemical Industry Research Institute—the ODS production facilities do not have a trade division but sell through a number of shadowy import and export corporations.

Ningbo Material General Corporation was initially discovered advertising on the Internet. Boasting of annual exports worth over US\$15 million, the firm offers an eclectic range of goods from tourist products and surgical instruments to CFC12 and halon 1301.³ Offers to sell both refrigerants and halons were also posted by the company to The Import-Export Bulletin Board on the Internet.

Bursco's initial e-mail to Ningbo drew a response from Jack Zhang, assistant director of the export division. Although noting that there may be import restrictions on halons in Europe, he nevertheless quoted a price of US\$8.85 per kg for halon 1301. He also revealed continuing exports of CFC12 to Europe, stating: "We have regularly shipped refrigerant F12 to Rotterdam since 1995 and our buyer is an Italian company."

Zhang quoted a price of US\$2.5 per kg for CFC12, and offered to supply in either one

tonne tanks or 13.6kg cylinders. He also provided the name of his Italian client, known to EIA due to previous suspicious imports from China. Ningbo Material claims to have shipped five or six containers to its Italian customer every year since 1995—an annual amount of around 100 tonnes. Zhang told Bursco: "In the first transaction, as requested by the client, we exported the product in the name of Refrigerant 22, which has less or no customs control in European countries. But now we are exporting it in its true name. The last two shipments were in January and March this year, and so far our client has never had any problems with the local customs in Rotterdam."

The only legitimate explanation for such shipments would be for repackaging under the EU's Inward Processing Relief rules (IPR), but the fact that Ningbo Material has always shipped in 13.6kg cylinders to Europe rules this out, as IPR is intended for repacking from bulk into smaller cylinders.

In June 1998, EIA investigators travelled to Zhejiang province posing as Bursco representatives to follow up leads generated by the front company and to find out more about the network of suppliers concentrated in the province.

During an hour-long meeting with Jack Zhang in a Hangzhou hotel, a telling insight into the illicit supply of ODS emerged. He showed an undercover EIA investigator documents including a bill of lading to confirm shipments of CFC12 from Shanghai to Rotterdam, adding that the Italian buyer arranged collection of the chemicals from Rotterdam. He offered to supply an initial container of CFC12 which he would label on the outside and in documents as HCFC22.

Discussions concerning halon 1301 revealed for the first time clear evidence of unlicensed and unofficial production of halon 1301 in China. Zhang claimed to source both refrigerants and halon 1301 from the Zhejiang Fluorescence Chemical Company, based in Dongyang City, Zhejiang, and showed a sales brochure for the factory.

On the question of import controls of halon 1301 he said: "In China, the Chinese government will never care how much you export, but the government where the user is will care about this and may investigate where this is from. So manufacturers here making exports must produce statements saying this is recycled, stored or collected from somewhere else. So the quantity cannot be very much, or people will doubt this and it may cause suspicion. That is

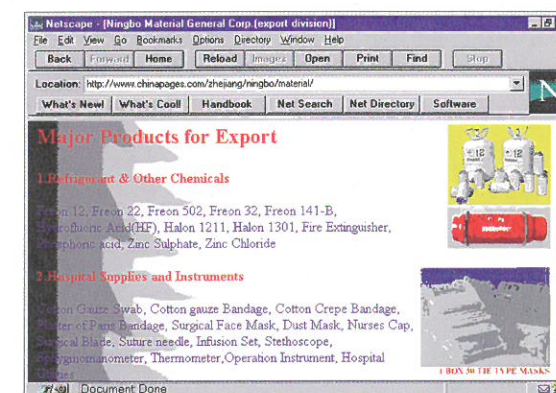
why manufacturers export through a number of foreign trade companies, so they do not export directly."

He added that the factory is able to secure the necessary papers from the local authorities, and later faxed Bursco a confirmation certificate from the National Environment Protection Bureau in Dongyang, dated 23 July and covering a shipment of four tonnes of halon 1301 to an undisclosed location. The letter states that the goods are recovered/recycled and manufactured by Zhejiang Fluorescence Chemical Co—a facility not officially allowed to produce or recycle 1301.

In the last message received from Zhang in early October he provides further advice for breaking the law: "In the worst case—i.e. when your local authorities approach you, they may ask where we (exporting company) obtained the recovered/recycled halon. Therefore, to provide against this, I shall send a statement written and signed by a relevant company testifying that the shipped halon are recycled and purchased from it."

"As this is sensitive goods, we shall most probably ship in the name of Zhejiang Grand Trading Company, which is also located in Ningbo."

Unlike the factory represented by Ningbo



"...as requested by the client, we exported the product in the name of Refrigerant 22, which has less or no customs control in European countries."
— Ningbo Material General Corp.

Left:
Ningbo Material General Corp internet advert, offering CFCs and halons.

Left:
Jack Zhang of Ningbo Material General Corp—supplies 100 tonnes of CFC12 annually to Europe.

**"I don't think
to get an
import licence
(for halon 1301)
is a big deal in
the UK"**
— ZHRSC Anti-
Fire America

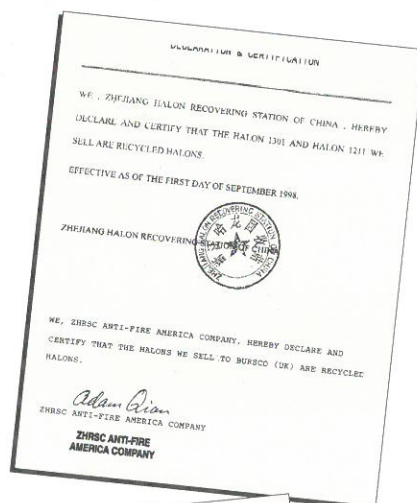
material, the Zhejiang Chemical Industry Research Institute is licensed to both manufacture and recycle halon 1301—the only such facility in China. Yet serious inconsistencies exist in the information given to Bursco by the different departments of ZCIRI.

The ZCIRI Imp/Exp Corp, located in Liuxia, Hangzhou quoted Bursco a price of US\$8.95 per kg for recovered halon 1301, and US\$2.3 per kg for recovered CFC12, and claimed to have current customers in the US, France, Belgium and Holland. The amount of recovered halon available was put at 200–250 tonnes per year, with a higher amount for CFC12.

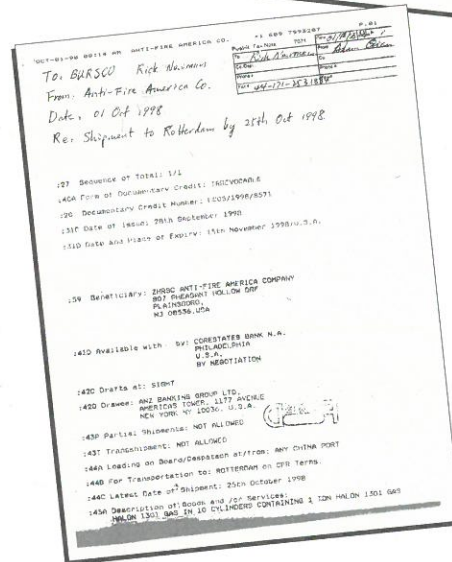
Regarding supplies of CFC12 and halon 1301 to Europe, Jianhui Sun informed Bursco: "Our customers in Europe haven't asked for any documents to us. I really don't know how they get the I/L (import licence)."

Bursco also entered into negotiations with the

Right:
Halon certificate from
ZHRSC Anti-Fire
America Co.



Right:
Bank document showing
planned export of
Chinese halons to
Rotterdam.



Far right:
Yiqian Lian of ZCIRI—
spoke of unlicensed halon
1301 production in
China.

ZCIRI Second Department, in the Beidaqiao area of Hangzhou. The company claimed four years experience exporting to Europe, adding that CFC12 is easier to ship than halon 1301. Prices quoted this time were US\$1.3 per kg for bulk CFC12 and just US\$7.5 per kg for recycled halon 1301. An annual capacity of 500 tonnes for recycled halon 1301 was claimed—a vast amount.

During its visit to Zhejiang the undercover EIA team met with Yiqian Lian of ZCIRI Second Department. He reiterated an annual availability of 500 tonnes for halon 1301, and also offered unlimited amounts of recycled CFC12. Despite claiming that all virgin halon 1301 stays in China, he later said that demand in China was low and put at only a couple of hundred tonnes per year.

He also explained how ZCIRI sells its halons to a number of exporting agents and admitted that other facilities may also be producing halon 1301: "Our 500 tonnes is allowed by the government, but there maybe other plants in China not officially allowed. They produce, not recycle, maybe on the roof."

Yiqian Lian also spoke of a French customer which sends isotanks to Hangzhou to be filled with recycled CFC12, despite EU claims that no permits are issued any more for the import of recycled material.

While both ZCIRI departments stressed the need for import permits, no such concerns were raised by another Ningbo-based trader—Joe Koman of Sino-Resource Imp. & Exp. Co. Despite being exposed by EIA last year for fraudulently offering virgin CFCs as recycled material⁴, Koman is still actively selling CFCs and halons, and even has an advert on a chemicals trading website which states: "Refrigerants – click here for hot deals".⁵

Sino-Resource is particularly active on the Internet, and Joe Koman's name has been logged



© EIA

on a number of bulletin boards and in one case seeking a sales agent for refrigerants and halons in Italy.

Boasting of being the biggest exporter of refrigerants in China, Koman quoted Bursco a price of US\$2.4 per kg for CFC12 and US\$9.5 for halon 1301. When asked about export regulations Koman was dismissive: "We have many experience in dealing in the PAPERWORK (original emphasis) which the US EPA requires."

"However in the European market, we do not supply the PAPERWORK because the customs and authorities in most European countries are not strict enough to check the goods. For example, many of our customers require us to print the name of R22 if the goods are R12. Thus the government regulation will be avoided. Anyway, you are taking the small risk to earn big profits."

In a later message Koman says: "Because halon earns very big profits, customers usually import only one or two times in a year to avoid the notice of customs. From my experience Rotterdam and Barcelona are easier to enter the said goods."

"There is few time left for dealing freons and halons as we both know. I guess in the year 2010 such business will disappear. If we can both catch the chance, we will get the benefits on a mutual basis."

During a meeting in a Paris hotel, Koman told an undercover EIA investigator how he has openly exported CFC12 to Europe for two years, and has a new customer lined up in Spain.

The lucrative market for both halons and CFCs in North America has led to some of the more enterprising Chinese brokers setting up offices there. One such operation is ZHRSC Anti-Fire America Company, with business addresses in Plainsboro, New Jersey and Lewisburg, Pennsylvania.

Bursco contacted ZHRSC Anti-Fire requesting supplies of halon 1301 for the European market. In his reply Adam Qian said he represented the Zhejiang Halon Recovering Station of China, located near Shanghai. He claimed two major corporate clients in the US, adding that one of the firms had actually supplied the core part of the recycling system. This contradicts statements made by both the ZCIRI departments, which claimed that the recycling equipment is Chinese-made.

Qian offered to supply Bursco with 120 tonnes of halon 1301 annually, adding: "A lot of paperwork needs to be done but it is a good business." He stated that the parent company in China had a client in the UK and that "I don't think to get an import licence is a big deal in the

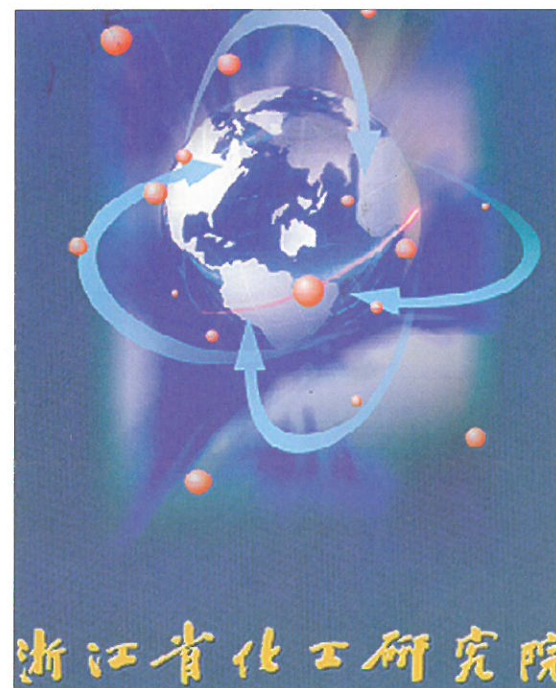
UK."

Although the UK client was being charged US\$13 per kg, Qian offered Bursco a special price of US\$9.9 per kg. He provided a sample recycling certificate stamped by the Zhejiang Halon Recovering Station of China, a state-owned company, and a bank document showing a further export of halon 1301 from China to Rotterdam during October 1998.⁶

Qian's claim to be supplying a UK customer is at odds with the EU's official policy on halon imports, for which a zero quota has existed for at least the last two years.⁷

T-Chemi Company, a Hangzhou-based chemicals broker, offered CFC12 at US\$1.75 per kg, and halon 1301 at US\$8.1 per kg. The amount of recycled halon 1301 available was put at 100 tonnes. The company had no experience of the US market, but when asked about European shipments replied: "We export our material to Spain. My customer found a way to get the import licence from their government."

T-Chemi supplied Bursco with a shipping bill to prove past exports to Spain. The bill, dated 16 April 1998, showed the shipment of 20 tonnes of recycled halon 1301 from Shanghai to Barcelona. Although the name of the Spanish client was blacked out, the exporter was listed as the Shanghai Automobile Import and Export Corp, and the document was stamped by the China Council for the Promotion of International Trade (Shanghai).⁸ Once again such a shipment directly contradicts the EU's zero quota for halon imports.



**"Our 500
tonnes is
allowed by the
government,
but there
maybe other
others plants in
China not
officially
allowed. They
produce, not
recycle, maybe
on the roof."**

— Zhejiang
Chemical
Industry
Research
Institute

Left:
Zhejiang Chemical
Industry Research
Institute brochure—the
only official halon 1301
plant in China.

"Regarding R12, due to the same packing as R22, we can issue a full set of shipping docs in the name of R22, the legal commodity"

**— China
MinMetals**

China National Metals and Minerals Import/Export Corp in Xiamen is a division of one of the largest trading firms in China. Offers were made at US\$2.4 per kg for CFC12 and US\$8.7 per kg for halon 1301. Janet Zhang of MinMetals also claimed to be supplying the Spanish market.

The origin of the recycled halon was the Zhejiang Halon Recovering Station again, and annual availability was put at 175 tonnes. When asked if the CFC12 was recycled as well, Zhang replied that her company would arrange to ship the refrigerant under a different guise: "Regarding R12, due to the same packing as R22, we can issue a full set of shipping docs in the name of R22, the legal commodity."

TT International Co in Dalian, supplier of over 800 tonnes of illegal ODS to Europe during 1996 and 1997⁴, offered both recycled CFC12 and halon 1301. The broker claimed to represent two factories—the Zhejiang Refrigerants Co and Ningbo Xintai Fire Fighting Equipment Co, providing further evidence of unlicensed halon 1301 production.

Joseph Qiao of the Hangzhou-based firm Zhejiang Materials Group, offered to supply recycled halon 1301 obtained from the Zhejiang Halon Alternatives and Fluorochemical Factory. Qiao said he could provide Bursco with at least 200 tonnes annually at US\$8.23 per kg, with the possibility of more if a bigger order was placed.

Zhechem, also located in Hangzhou, quoted US\$7.9 per kg for halon 1301 and US\$1.88 for CFC12. Xu Min of Zhechem offered to supply over 100 tonnes of recycled halon from The Experimental Factory of ZCIRI, adding that his firm had shipped to Germany and Italy before 1997 and now supplied the US.

Xu Min also stated that the CFC12 was recycled, despite a message to a different EIA front company in October 1997 saying: "Frankly speaking you must be aware of it too that almost all R11/R12 from China are not recycled."

Other producing nations

Bursco also entered into dialogue with a selection of Russian and Indian firms to ascertain if substantial illicit shipments are coming from either of these producing countries. The list of firms was compiled by extensive Internet searches.

These investigations go some way to show that the efforts of the Protocol and Multi-lateral Fund have, to an extent, worked in Russia. However, it is clear that the market for illegal production has simply moved house to China.

In Russia the Moscow-based broker Hrast Ltd specified that its CFC12 was new material and as such could not be exported to Europe or the US. The Vocco factory in Volgograd, formerly the source of substantial quantities of black market CFCs, replied that all exports are now controlled by compulsory licences and can only be supplied to eligible countries. Vocco revealed that while it used to export its CFCs via Estonia to the US, its main export market is now Romania.

Sooraj Dhawan of Super Trade Enterprises in New Delhi, India, spotted advertising to ship "halons and freons anywhere in the world", told Bursco that his supplies were from China and that import licences were required.

Left
Shipping document from
T-Chemi showing the
export of recycled halon
1301 to Spain in April
1998

Smuggling Continues In The European Union

Four years have passed since the European Union banned production of CFCs and halons for domestic use and implemented stringent controls on the importation of ODS. Yet initial projections which envisaged the gradual drying up of CFC supplies and the uptake of replacement chemicals have been defied, indicating an active black market in lucrative ODS such as CFC12 and halon 1301.

Further confirmation of this came in September 1998, when Dutch enforcement authorities at the port of Rotterdam intercepted a container of Chinese CFC12 destined for Italy.

The different market dynamics of refrigerant R502 and CFC12 in the EU are telling. While R502 has followed the predicted path of growing shortages and rising prices, CFC12 is still freely available in many member states at relatively low prices.¹ While R502 contains CFC115, a complex chemical which was manufactured mainly in industrialised nations, CFC12 is being produced in large quantities in China, India, and the Russian Federation.

There is still a considerable amount of refrigeration and air-conditioning equipment across the EU relying on CFC12, and easy availability of this chemical is hindering the take-up of replacements.

While assessment of the scale of the black market is hampered by the fact that there has never been an EU-wide audit of stockpiles and the monitoring of use, sale and shipment remains vague and irregular, industry analysts estimate the scale of the illegal trade to be between 6,500 and 10 000 tonnes each year.^{2,3} Industry sources point to the fact that most producers at the time of the ban only had storage facilities equivalent to two weeks of their sales—yet four years on CFCs are freely available.⁴

The Strange Economics of IPR

Inward Processing Relief (IPR) has long provided a convenient loophole for unscrupulous ODS traders. Under IPR rules EU firms are allowed to import bulk containers of CFCs for repackaging into smaller cylinders desired by end-users. The material is supposed to be returned to either the country of origin or shipped to an Article 5 country but considerable amounts of the material has found its way onto the domestic market.

It was the IPR rules which allowed the UK to

be used as a conduit for large quantities of Russian CFCs which ended up on the black market in the US during the mid-1990s.⁷ Although the quantities being shipped under IPR are diminishing, material packaged in disposable bottles intended for Article 5 countries continue to surface on the EU market.

During 1996 the European Commission granted IPR licences for over 4 500 ODP (ozone-depleting potential) tonnes of CFCs, imported from countries including Russia, China, India, Mexico and the US. By 1997 the amount had dropped to 2 355 ODP-tonnes from Russia, China, US, Switzerland and the Ascension Islands.⁸

The economics of IPR are puzzling. It is difficult to see where the profit is in importing bulk containers of CFCs, which can sell for as low as US\$2 per kg, from distant countries like China, repackaging the material and then sending it out to Article 5 countries where the price is virtually the same. Material clearly intended for export has turned up in a number of EU markets, especially Spain and Italy. An undercover EIA investigator was offered substantial quantities of CFC12 in disposable cylinders by the Madrid-based broker Polar Cool in August 1997.⁹ Sources have reported seeing CFCs on sale in Italy packaged in white disposable cylinders with the serial number painted over to disguise the intended destination of the material.¹⁰

The Gulf state of Dubai has emerged as a hub for the transshipment of CFCs. Obviously material intended for Article 5 countries will produce far greater profits if it can be turned around in Dubai and shipped back to the EU. Pure Helium Gulf Ltd has reportedly shipped

**CFC12 is still
freely available
in many
member states
at relatively low
prices.**

Below:
Refrigerated van—lots of
equipment across Europe
still depends on CFCs.



© David Brown/EIA

Material clearly intended for export has turned up in a number of EU markets, especially Spain and Italy.

Chinese CFCs into the Italian market.¹¹ This broker also supplied CFCs which were illegally sold in Greece during 1995.¹²

Policing IPR imports is further complicated by incomplete paperwork, making it difficult to check if the material has been re-exported, and the fact that the importing party can sell the material on to a different firm for re-export.

CFC Production in the EU

Evidence exists that material produced in the EU for export to Article 5 countries also can find its way on to the domestic market. Despite the ban on production for domestic use, the EU continues to churn out 35 000 tonnes of CFCs every year¹³, for export to Article 5 countries and essential uses such as Metered Dose Inhalers (MDIs), used by asthma sufferers.

The remaining production facilities are located in five member states: Rhodia in the UK, Elf-Atochem in Spain, Allied Signal in the Netherlands, Ausimont in Italy, and SICNG in Greece. For industry it is the supplies to the pharmaceutical industry which make continued production profitable rather than sales to Article



© Matthew Smead/EIA

Right and below: Rhodia in Avonmouth, Bristol is one of a handful of companies still legally manufacturing CFCs in Europe for essential uses and export to developing countries.



© Matthew Smead/EIA

5 states, although the latter sales account for 80 per cent of production volume compared with 20 per cent for MDIs at the UK facility.¹⁴

This substantial production is permitted through a derogation in the Montreal Protocol which allows production up to 15 per cent of the 1986 base line figure. Technically the EU can legally produce up to 140 000 tonnes each year.

While the EU production facilities are perfectly legal, it is not surprising that unscrupulous brokers, buying the material from the producers for export, attempt to divert it on to the more lucrative domestic markets, and a system of transshipment is used to evade detection.

One method is to utilise far-flung outposts of the EU still under colonial rule, such as the Caribbean, Canary Islands or French Pacific territories. A distributor buys CFCs from an EU production facility ostensibly for export to an Article 5 country and ships it to a distant EU territory. It is then delivered to a local broker and simply returned to the EU. French customs on the island of Reunion—which is more than 6,500 kms from western Europe—have intercepted a shipment of CFCs about to be illegally returned to the EU.¹⁵

Another shipment of CFCs produced in northern Europe and intended for the South American market, unaccountably stopped off in Spain. Further investigations revealed that the importing company in South America did not exist.¹⁶

As Article 5 countries must freeze CFC production by July 1999, continued EU production for these markets is a nonsense and a strong incentive to smugglers. Failure to shut the remaining EU plants down could create the contradictory situation of multilateral funding being provided to Article 5 countries to reduce CFC output, while at the same time allowing the import of these chemicals from the EU—clearly a self-defeating exercise.

HCFCs—A Convenient Cover

The false-labelling of CFCs and halons as legal replacements persists as smugglers seek to evade customs controls. Illegal imports from China during 1996 and 1997 were disguised as HFC227, and more recently a consignment of mis-labelled halons was seized by customs officers in the Netherlands.¹⁷

As HCFCs are subject to a less restrictive import regime than CFCs or halons, there is considerable evidence that these chemicals are being used as a cover for shipments of banned ODS.

During an exhaustive investigation into Chinese suppliers, an EIA front company was offered the option of having imports of CFCs labelled as HCFC22 on three separate occasions. Sino-Resource and China National Minerals and Metals both offered to provide shipping documents and letters of credit in the name of HCFC22 rather than CFC12. Jack Zhang of Ningbo Material General Corporation revealed how past shipments of CFC12 sent via Rotterdam to an Italian buyer were labelled as HCFC22.

EIA's investigations have tracked the use of HCFCs as a cover for fraudulent shipments as far back as 1995. In September of that year a consignment of Russian CFC12 left Moscow bound for the UK port of Felixstowe. The container was sent on to Houston, Texas and then returned to Felixstowe at the customer's request. By the time the shipment was cleared at Felixstowe customs it had been mysteriously transformed into HCFC22, and was covered by an EU licence for HCFCs awarded to a Belgian shipping agent on behalf of a Dutch consignee. Once the goods were cleared the container was delivered to a company in West Yorkshire, England where the chemicals disappeared.¹⁸

The fact that Chinese brokers were so willing to disguise CFCs as HCFC22 casts doubt on the legitimacy of at least some of the imports entering the EU from China. Import statistics show recent shipments of Chinese HCFCs to the UK, Spain, France, Italy and the Netherlands.¹⁹ Suspicions over these imports related to the motive for buying from China when legal production is still allowed in the EU, and the fact that China only makes 1 000 tonnes of HCFCs—equivalent to its annual consumption.¹³ It is also instructive that the Spanish firm Polar Cool, source of dubious CFC offers in the past, is believed to have obtained a licence to import 200 tonnes of Chinese HCFCs.²⁰

In Poland, where HCFC22 is more widely used than CFC12 in refrigeration an illegal trade in HCFCs has been reported.²¹ As HCFC22 has the potential to be used in more applications than CFC12, some sections of industry are predicting an equally lucrative black market in this chemical as it is phased out.²² If the revised EU regulation is adopted in its current form, weak reporting requirements could leave the way open in the future for a substantial illicit trade in HCFC22.

REFRIGERANT IDENTIFIER

Model no: 9552



© N-Ton

An EIA front company was offered the option of having imports of CFCs labelled as HCFC22 on three separate occasions.

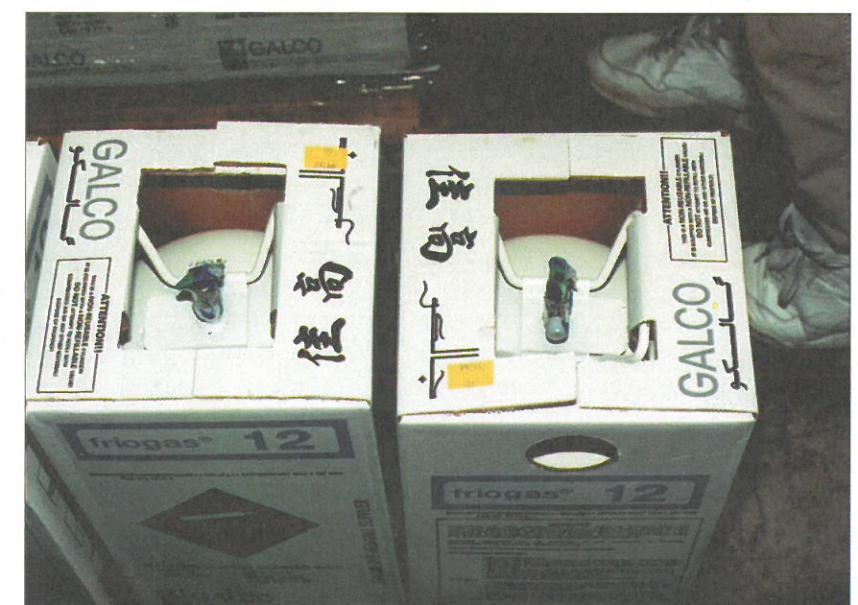
The Taifun Network

In July 1997, the EU's largest ODS fraud was uncovered when a shipment of Chinese CFCs was intercepted in Rotterdam. It transpired that over a two year period a network of smugglers had illegally imported over 800 tonnes of CFCs and halons. At the centre of the fraud was the German firm Taifun, and its director George Gudemann was quickly arrested.

Over a year later the prosecution has stalled. Despite the fact that the sophisticated fraud involved a series of middle-men operating in several different EU states, a cross-border approach to exposing the individuals and firms involved has been lacking. To date Gudemann is the only person facing charges, despite evidence pointing to a wider conspiracy.

Above left: Refrigerant identifiers are used by US customs to detect CFCs, but not in Europe

Below: CFCs seized in the US have in many cases passed through Europe.



© US Customs

Over a two-year period a network of smugglers had illegally imported over 800 tonnes of CFCs and halons.

The Chinese material permeated the markets of France, Belgium, the UK, Italy, Greece, Austria and the US.²³ In the UK the illegal material ended up with five companies, although there is no suggestion these firms knew the material was illegal. The London-based Pyram, a broker also operating under a second company name of Auttec, bought halon 1301, as did fire protection company Meridian. Chemical giant ICI bought over 50 tonnes of CFC12 from Taifun. A company called Rabtherm, based in Walsall, West Midlands also purchased CFC12

via a company called Northstream. Interestingly, Rabtherm was the source of over 200 tonnes of CFCs which ended up on the US black market in the mid-1990s.²⁴

The lack of cross-border co-operation in pursuing those involved in the Taifun fraud illustrates how the ODS smuggling issue is accorded a low priority in some EU states. In the face of such indifference the proposed sales ban and real political backing for the harmonisation of enforcement efforts is urgently needed to crack-down on the illegal trade in the EU.



© Bruce McCoubrey/EIA

Right: Taifun's illegal ODS ended up with several companies around Europe including Meridian in the UK.

Defeating the Black Market Dealers—The Need For A New European Union Regulation On ODS

Faced with undeniable evidence of an extensive illegal trade in Europe and the failure of early projections of the decline of CFCs to be met, the European Commission has taken bold steps in the development of a proposed new Regulation on ODS.⁵ Several of the provisions in the new Regulation go beyond the obligations of the Montreal Protocol and will put the EU at the forefront of international efforts to protect the ozone layer.

But, so far the proposed Regulation is only a promise of a realistic approach to controlling ozone depletion—governments and European industry must now fulfil this promise and ensure the passage of the Regulation without any dilution of its controls. Failure to do this will cast wealthy EU countries and industry in a damning light.

EIA commends the efforts by the European Commission to develop a new Regulation that will outwit the black marketeers and help crack-down on the illegal European trade in ODS. In particular the ban on sales and use of CFCs and halons will, at a stroke wipe out much of the illegal market in these substances.

However, even with such a ban, the Union must step up its enforcement efforts and improve co-operation between agencies in different member states. Measures to counter the illicit ODS trade in the EU have been seriously inadequate. While the US has fashioned an extremely effective inter-agency task force, enforcement agencies and officers within the EU remain without the resources or political backing they need to effectively prevent illegal trade. In the largest case to date, a

German importer was able to bring in over 800 tonnes of CFCs and halons during a two year period before the fraud was revealed.⁶ Support must be given for modern intelligence-led methods of enforcement.

With relatively little effort EIA continues to uncover evidence of illegal shipments into the EU, with China taking over from Russia as the main source. Banned ODS are being shipped disguised as legal replacement chemicals, material imported under Inward Processing Relief rules for re-packaging are diverted onto domestic markets, and CFCs produced in the EU for export to Article 5 states are not reaching their final destination.

Customs officials, police and other agencies cannot be expected to track this trade without the necessary legal framework and financial and political support.

The Halon Trade—Hot Profits

Extensive investigations by EIA have revealed information which raises serious doubts about the true nature of many recent halon imports into the developed world, particularly the US, with inconsistencies in the information supplied by several of the firms involved in halon shipments, in both the exporting and importing countries.

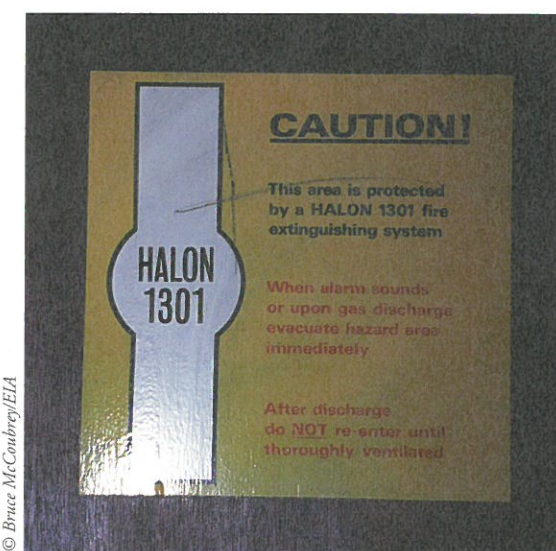
The production ban on halons in non-Article 5 countries coupled with the continuing essential use exemptions has created a profitable and well-organised legitimate reclamation industry and an international trade in used halon 1301. A number of firms have invested in the capital-intensive task of reclaiming halons, including Chubb Fire in the UK, Bergensomradets Intercommunale Renovasjonsselskap in Norway, Pacific Scientific in the US and Control Fire Systems in Canada. These operations gather halon 1301 from businesses which are de-commissioning their existing halon systems and process the chemicals back to the original specification by removing impurities such as nitrogen and water. The reclaimed gas is then sold to essential users on the international market.

With its large aerospace industry, sprawling military sector and hazardous oil exploration in Alaska, the US is the premier market for reclaimed halon 1301, although a substantial demand remains in Europe.

Many Article 2 countries have developed halon banking systems to match supply with demand, such as the Halon Users' National Consortium in the UK, and the Halon Recycling Corporation in the US.

The US Halon Market

Until the beginning of 1997 imports of halon 1301 into the lucrative US market were limited by the imposition of a tax based on ODP, resulting in the highest tax of US\$60 per pound for halon 1301. This was revoked in January 1997 after a number of companies raised



© Bruce McCoubrey/EIA

Of all the chemical groups controlled under the Montreal Protocol, halons have the highest ozone-depletion potential (ODP).

Left: Production of halon 1301 has been banned in industrialised countries since 1994.

Halons—Fanning The Flames

Of all the chemical groups controlled under the Montreal Protocol, halons have the highest ozone-depletion potential (ODP). Used mainly for fire suppression, halons contain bromine which is 40-60 times more effective at destroying ozone than the chlorine found in CFCs.

Halon 1211 (bromochlorodifluoromethane) is used in portable fire extinguishers where a spray is directed at a distinct and isolated fire source. It has an ODP of 3 (CFC11 has an ODP of 1) and an atmospheric lifetime of 25 years. Halon 1301 (bromotrifluoromethane) is used in fixed fire suppression systems as a gas. It has an atmospheric lifetime of 110 years, and with an ODP of 10 is by far the most ozone-damaging chemical. Halon 2402, the least used of the three, has an atmospheric lifetime of 28 years and an ODP of 6.¹

Because of the inherent danger posed by halons, the chemicals were the first group to be

controlled under the Montreal Protocol, with a ban on use and importation in Article 2 countries coming into force at the start of 1994.² Yet production in Article 5 parties, now mainly limited to China and Korea, can continue until 2010.³

Recent scientific research by the US National Oceanic and Atmospheric Administration has highlighted increasing concentrations of halons in the atmosphere, despite the production ban in non-Article 5 parties being in place for almost five years.⁴

While replacements exist for practically all halon 1211, for halon 1301 there are still a number of essential use exemptions. As this gas is an effective fire suppressant and replacements are often needed in greater volumes to do the same job, halon 1301 is still widely used in the military, aerospace, shipping and, to a lesser extent, the oil and gas industries.⁵

concerns about the ability of domestic supplies to meet essential use requirements.⁶

At a stroke the dynamics of the US halon 1301 market were drastically altered, and a flood of imports took place during 1997 which dramatically undermined domestic reclamation operations. The destination of material reclaimed by BIR in Norway is illustrative of the general trend—in 1996 the facility reclaimed 70 tonnes of halon 1301, sending 56 tonnes to the UK, and 14 tonnes to the US. In 1997 the total processed amount of 84 tonnes was all sent to the US market.⁷

Bureau of Census statistics, which group all three halons together, show a total import of over 670 tonnes of halons into the US during 1997. Source countries included: 235 tonnes from China, 68 tonnes from Germany, 70 tonnes from Italy, 116 tonnes from Norway, 76 tonnes from the UK, and 84 tonnes from Canada.⁸ The fact that the vast majority of this material was 1301 is confirmed by the granting of import petitions for over 675 tonnes of halon 1301 by the US Environmental Protection Agency during 1997.⁶

By 1998 it appears that the US market demand for halon 1301 has been satiated following the vast influx which took place the previous year. During the first half of 1998 only 50 tonnes of halons had been imported into the US, with half coming from Canada, and the rest from Norway, the UK and Bermuda.⁹ All the halon 1301 imported during 1997 was permitted on the grounds that the material was used and not virgin.

Extensive investigations by EIA have revealed information which raises serious doubts about the true nature of many of these imports, and reveals inconsistencies in the information

supplied by several of the firms involved.

Although 70 tonnes of halons were allowed into the US from Italy during 1997, such shipments contravene the stated policy of the Italian government. According to the Italian environment ministry: "Our leg-

islation does not allow to export any kind of halon (recycled or virgin) except to those countries categorised as operating under Article 5 paragraph 1 of the Montreal Protocol."¹⁰

Halons shipped from Germany are tainted by the fraud perpetrated by the Frankfurt-based firm Taifun. This company illegally sold over 300 tonnes of virgin Chinese halons, some of which were falsely-labelled as HFC227.¹¹ By claiming that the halon 1301 was ex-NATO (North Atlantic Treaty Organisation) stock, Taifun was able to sell the material to customers in the UK, France and the US. When the fraud was uncovered in July 1997 and the director of Taifun arrested, supplies of German halon 1301 quickly dried-up.

FRC International, based in Holland, Ohio, successfully petitioned the EPA to bring in 48 tonnes of Taifun's halon 1301, after being told it was used material from the NATO stockpile. FRC was supplied with documents stating that the material was reclaimed by Chemical Reverser Betriebs GmbH, which is now under investigation by the German authorities for its part in the Taifun fraud.¹²

Interrogation of the Port Import Export Research Database reveals further shipments of halons from Germany to the US during 1997.¹³ In April 1997 a consignment of 18 tonnes of 1301 was shipped from Bremerhaven in Germany to Baltimore in the US. Records show the container was destined for a halon broker based on the East coast.

A further shipment of 15 tonnes of halon 1301 arrived in New York from Bremerhaven in early May 1997, destined for the same broker.

The source for all the virgin halon 1301 illegally distributed by Taifun was the Chinese company TT International, based in the northern port of Dalian. As some of the material was falsely-labelled at source as HFC227, the Chinese supplier was clearly party to the fraud. Yet earlier this year TT International was accepted for membership of the Halon Alternatives Research Corporation, a US-industry body.¹⁴

The Chinese Connection

China was by far the largest country of origin for the halon 1301 entering the US last year. Petitions were granted for the imports of 235 tonnes based on the material being used and not virgin—but the sheer volume makes such an assertion questionable.

According to official sources, such as the World Bank, a single plant is licensed to produce

and reclaim halon 1301 in China and produced 750 tonnes in 1995.¹⁵ A US\$62 million multilateral project to phase-out halons in China implicitly recognises the need to build halon recycling capacity in China, and even adds a provision urging China to halt exports of recovered or reclaimed halon to developed countries when recycling capacity grows.

The sole official halon 1301 plant in China is run by the Zhejiang Chemical Industry Research Institute, based in Hangzhou, Zhejiang province. One of ZCIRI's associated organisations is the Halon Recovering Zhejiang Station, which it states is operated by the Chinese Ministry of Public Security.¹⁶ This is consistent with the Sector Plan for Halon Phase-out in China, which says: "The Ministry of Public Security is responsible for overall planning and management of fire protection equipment, including research and development and production activities."¹⁵

According to the World Bank the Hangzhou facility is a swing plant and can produce both 1301 and 1211. It has an annual capacity of 1 200 tonnes a year, and typically spends nine months of the year making 1301 and three months for 1211. The plant is said to have a single reclamation line for both 1211 and 1301, consisting of two distillation units for the separation of contaminants.¹⁷

The existence of a single 1301 plant is supported by experts on the Halons Technical Options Committee of the Montreal Protocol, the Chinese delegate to which is reported to have said that there are little or no halon 1301 recycling facilities in China.¹⁸

However, the volume of supposedly used material coming out of ZCIRI last year is not credible. Modern recycling plants like Chubb and BIR can only process between 60 and 70 tonnes per year—and this is in non-Article 5 countries where a real economic incentive for reclaiming halon 1301 exists.

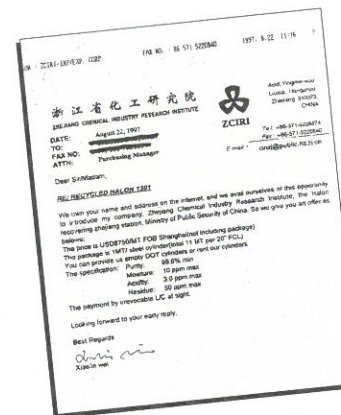
The quantities of halon in individual shipments are also suspicious. Import records show shipments of up to almost 80 tonnes, which would require a huge storage area and is unheard of among halon recyclers in Europe and the US.¹³

Price is also a useful indicator. The cost of reclaiming one kg of halon 1301 in China is put at US\$3, yet quotes received by an EIA front company for allegedly reclaimed material have been the same or lower than the market price for new Chinese halon. For instance, the Halon Sector Phaseout Plan puts the 1997 market price for new Chinese 1301 at US\$8.5 per kg, while ZCIRI has made offers as low as US\$7.5 per kg

for recycled 1301.

Investigations by EIA have also revealed two further plants in China claiming to make halon 1301—the Zhejiang Fluorescence Chemical Co. in Dongyang City,

and the Ningbo Xintai Fire Fighting Equipment Co., indicating unlicensed and uncontrolled production. This has clear implications for the phase-out of halon production in China.



Conversations between an EIA

investigator posing as a chemicals dealer and brokers in China have revealed how the halon fraud operated. Jack Zhang of Ningbo General Material Corporation described how factories in China operate through a number of export companies to ensure that the quantities of halon being shipped are divided up to avoid attracting suspicion.²⁵ Joe Koman of Ningbo Sino-Resource claimed to have shipped 30 tonnes of halon 1301 to a client in the US, half of which was recycled while the rest was virgin material.²⁶

Soon after the US import tax on 1301 was revoked, the halon industry in both North

Inset:

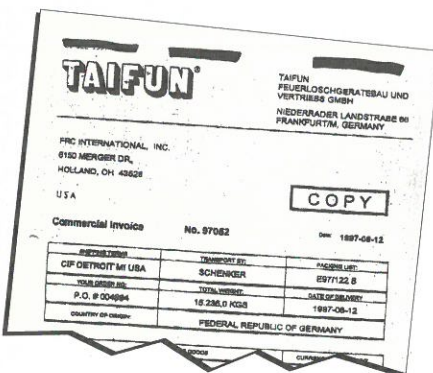
Fax from ZCIRI claiming links with the Ministry of Public Security.

Below:

F-16 fighter—the military sector is the largest user of halon 1301 in the US.

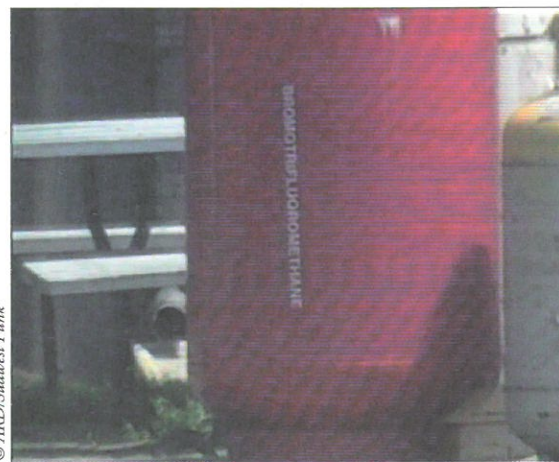


© Jamie Hunter and Geoff Lee



Above: Shipping bill showing delivery of halon 1301 from Taifun to FRC international.

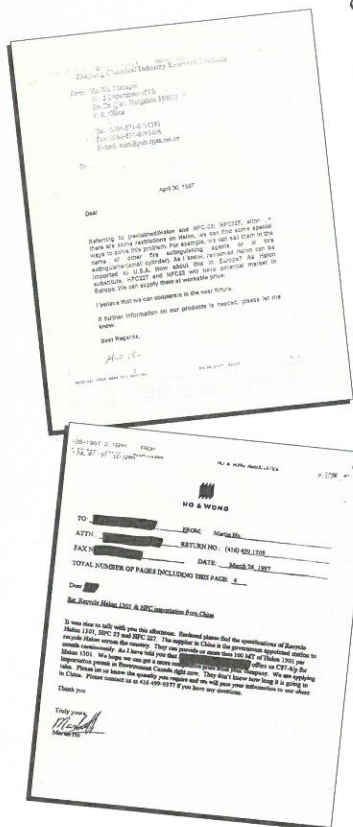
Below: Halon 1301 is used as a fire suppressant in fixed systems.



© ARD/Stüwest Funk

**Investigations
by EIA have
also revealed
two further
plants in China
claiming to
make halon
1301.**

Below:
Fax from ZCIRI offering special ways to solve halon restrictions.



Above:
Solicitation from Ho & Wong offering 100 tonnes of recycled halon 1301 every month.

Below:
Headquarters of FRC International—importers of over 200 tonnes of Chinese halon 1301 in two months.



America and Europe was inundated with offers from Chinese brokers, offering fantastic amounts of supposedly recycled 1301 at cheap prices via faxes and phone calls.

In April 1997 Hui Xu of ZCIRI's Second Department sent a solicitation to a European firm which said: "Although there are some special restrictions on halon, we can find some special ways to solve this problem. For example we can sell them in the name of other fire extinguishing agents or in fire extinguishers (small cylinder). As I know, reclaimed halon can be imported to USA. How about this in Europe?"²⁰

By October Hui Xu had surfaced in the US, and called a fire protection company offering over 50 tonnes of halon, at a price of US\$8.2 per kg, and said he could provide both virgin and used.²¹ Subsequent enquiries revealed that Hui Xu had left ZCIRI in August 1997 to "pursue his studies in the US".²²

In March 1997 Ho & Wong Associates, of North York in Ontario, Canada, sent out a fax stating: "Re: recycle halon 1301 ... the supplier in China is the government appointed station to recycle halon across the country. They can provide us more than 100 MT (metric tonnes) of halon 1301 per month continuously. Please let us know the quantity you require and we will pass your information to our client in China."²³ An annual availability of 1 200 tonnes of recycled halon 1301 from China is not credible and is far greater than the amount of new 1301 made each year in China.

ZHRSC Anti-Fire America Company, based in Lewisburg, Pennsylvania, also tried to get its share of the halon rush. In a fax dated June 1997, the company's manager Adam Qian said: "I am writing this letter to let you know that we can offer cheap recycled halons. Our home company in China has recycling instalment for used halons and everything has gone well for over three years."²⁴

Others brokers making solicitations for halon 1301 at that time include China National Metals and Minerals in Xiamen, China, and TT International from Dalian.

The cut-price Chinese halon

entering the US market was distributed via a network of brokers and middlemen to major end users including the US Department of Defense (DoD) and the oil giant British Petroleum.

BP Exploration (Alaska) Inc. uses halon 1301 for its potentially dangerous oil extraction activities on the North Slope of Alaska. In the second half of 1997 BP took delivery of halon 1301 under a supply contract awarded to Facility Services Incorporated, a broker based in Alpharetta, Georgia, with offices in Anchorage and Seattle.

FSI in turn obtained the halon from the Canadian firm Vipond. Shipping records reveal a consignment of 189 925 lbs (86 tonnes) of Chinese halons arriving in the port of Seattle from Shanghai on 31 July. The containers were destined for Mississauga, in Ontario, which is also the headquarters of Vipond.¹³ On the shipping bill the commodity was listed as reclaimed halon. A Vipond employee has been logged by EIA responding to an Internet advert for halon 1301 placed by a Chinese broker.²⁷ Although the EPA granted Vipond's petition for this shipment, BP has since altered its contracts to ensure it does not purchase Chinese halons again.

FRC International received several shipments of Chinese halons, labelled as recycled, which subsequently ended up in the US Department of Defense's halon bank. FRC won a major contract in 1995 to supply the DoD with 1.5 million pounds of 1301 (675 tonnes) at a time when the US import tax was still in place.

Once the tax was revoked FRC was able to source halon 1301 on the international market to fulfil its contract obligations with the DoD. In addition to Germany, FRC also obtained halons from Chubb Fire in the UK and the associated BIR operation in Norway. The supply channel from Norway was closed in April 1997 when the Norwegian environment ministry refused to issue any more export permits for the military sector unless the end use was specified, information the DoD was unwilling to divulge.⁷ With a shortfall and time running out to meet its contractual obligations FRC turned to China to obtain halon 1301. When the contract with BIR ended, FRC asked the Norwegians to ship its empty cylinders to China to be filled with Chinese halon.⁵

It was not long before FRC was receiving huge shipments of Chinese halon. Shipping records show three major consignments of halon 1301 during July and August 1997 moving from Shanghai to Long Beach, California and then to Monroe and FRC. On 23 July, 78 tonnes of material arrived in Long Beach, described as

recycled halon 1301 shipped to FRC. On 6 August a further 63 tonnes arrived, followed by 61 tonnes on 13 August, both labelled as recycled. In just two months FRC imported over 200 tonnes of Chinese halon 1301 into the US.

So substantial was this business for FRC that staff members even had Chinese characters added to their business cards. Although petitions were granted for these imports, the fact that the final destination was the DoD stockpile raises a number of issues—principally the ethics of the US military purchasing the most dangerous of all ozone-destroying substances from China, where halons are the responsibility of the Ministry of Public Security. Legally it also contravenes the DoD's own procurement rules.

The Ministry of Public Security is not the only branch of the Chinese state apparatus involved in the halon trade. The China Jing An Import and Export Co offers a range of goods on its Internet site, from dagger pistols, tear gas launchers and other instruments of repression to halon 1301. Jing An claims to have supplied 1301 to both Europe and the US, and has an office in California. The company is believed to be owned by the paramilitary People's Armed Police in China.²⁸

Although the EPA has been refusing petitions to import Chinese halons since last Autumn, the damage has been done. The influx of cheap material has caused a gross distortion of the halon market in North America and legitimate recycling operations have seen their prices massively undercut by the Chinese halons. For instance the usual market price for reclaimed halon 1301 in North America is over US\$20 per kg, while the Chinese material can be obtained for US\$8.5 per kg. It is clear that those brokers bringing in Chinese halon 1301 had a very profitable 1997.

CFC Trade—Cold Gold

The US task force established to counter the illegal trade in CFCs continues to expose smugglers. In February the Department of Justice announced charges in five new smuggling cases, including the Medina Forwarding Corporation for illegally importing CFC12 from Russia. The batch of indictments also included the first case arising from halon 1301 smuggling, with Gretchen Reynolds of Reynolds Services charged with falsifying papers relating to the importation of five tonnes of halon.²⁹

Smugglers are particularly active in the southern state of Texas, where enforcement officers report seizing material from Venezuela, Mexico,

Russia, India and China.³⁰

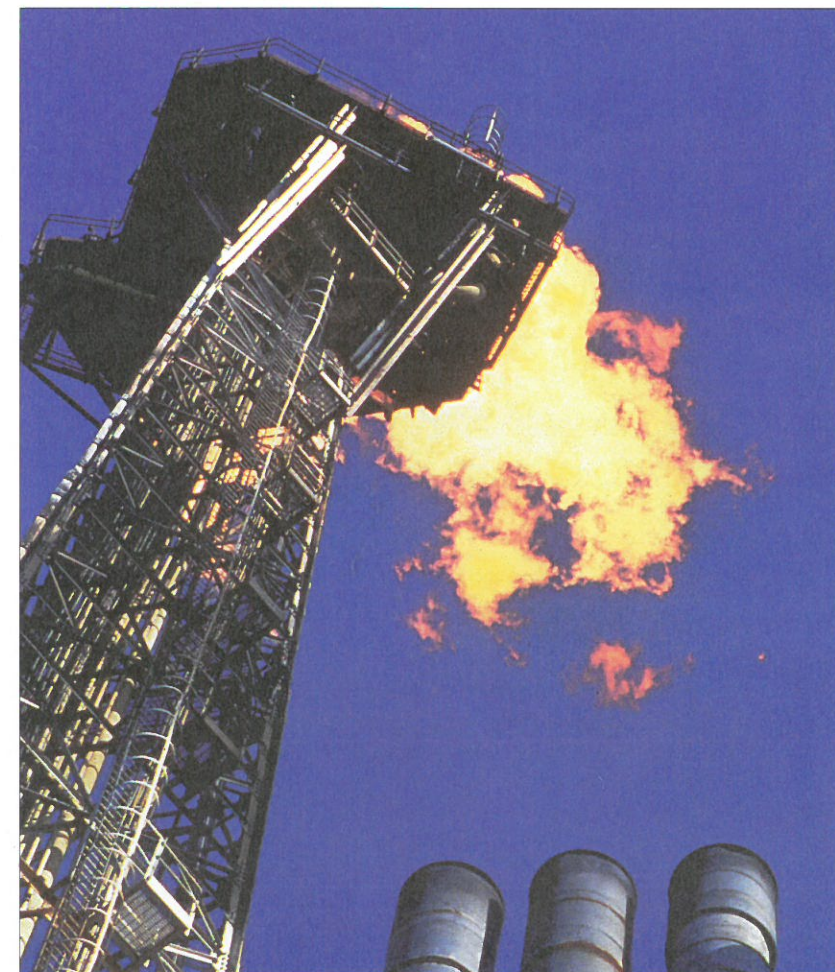
Although petitions for Chinese halon are now being refused, it appears that large quantities of CFCs from China are entering the US on the grounds that the material is used. During 1997 over 200 tonnes of Chinese CFC12 entered the US market—this amount has been equalled in the first six months alone of 1998.³¹

Many Chinese brokers contacted by EIA's front company have stated that the CFCs on offer are virgin as the country has little recycling capacity for CFC12. As the production sector plan for China has yet to be agreed by the executive committee of the Montreal Protocol, multi-lateral funding for CFC recycling has been limited to a few demonstration projects. One official at the United Nations Development Programme's Montreal Protocol unit has described China's CFC recycling capacity as "minimal at best".³² Yet Chinese CFCs continue to be allowed into the US market in increasing quantities.

The US EPA is in the process of revising its petitions procedure, which for the first time will place the onus on importers to check the veracity of information supplied. Such a move should open up the import of CFCs to greater scrutiny.

**During 1997
over 200
tonnes of
Chinese CFC12
entered the US
market.**

Below:
Halon 1301 is used by the oil industry in hazardous areas, such as Alaska's North Slope.



Finishing The Phase-out

July 1999 marks a crucial phase on the road to ridding the world of ozone-depleting chemicals. For the first time production in Article 5 countries will be subject to controls under the Montreal Protocol, with an initial requirement to freeze production of CFCs at a base level of 1995 to 1997 average output.

Since the production ban in Article 2 countries, a small number of developing nations have rapidly increased their output of ODS. Between 1986 and 1994 China's production of CFCs soared from 12 000 tonnes to 54 000 tonnes, while India's grew from 2 300 to 17 700 tonnes during the same period.¹

Despite the looming deadline for the freeze to begin and the continued deterioration of the ozone layer, programmes to tackle the burgeoning production of CFCs in India and China have yet to be approved. Time is running out for these countries to meet the freeze and greater efforts are needed to rein in CFC production and to promote alternative chemicals and recycling projects. Substantial and equitable technology transfer is also paramount.

According to the World Bank there were 36 plants in China manufacturing CFCs in 1997. The Bank's report notes that China has no effective mechanism for controlling the import and export of CFCs.²

As long as production of ODS continues, an allied black market will exist—only when supplies run dry will the ozone layer be left to fully recover.

Looking towards the future, it is clear that the economic incentives behind smuggling will continue to undermine the Protocol as more ODS are phased out. Some industry analysts are already predicting an equally lucrative trade in HCFC22. We must learn from these lessons and close the opportunities for the illegal trade—before it happens.

This report's message to governments is simple—much more must be done if the Montreal Protocol is to effectively tackle illegal trade.

Governments must rise to the challenges of the devastating consequences of continuing ozone depletion and effectively tackle this crime against nature.

Recommendations For Action

Multilateral Actions

1. Funding

- Increased funding should be given to Article 5 countries and in particular China and India, to assist with the accelerated phase-out of ODS production and consumption. Funding must be linked to an assessment of the implementation and enforcement of phase-out.

2. Technology Transfer

- Article 2 countries must step up efforts, through bilateral assistance and the multilateral fund, to ensure the transfer of the latest technologies for the production of alternatives to ODS. Alternatives must not include those with significant global warming potential.

3. New Ozone Depleting Substances

- All Parties to the Montreal Protocol must ensure a complete prohibition on the development, marketing or sale and use of new substances with an ODP.

4. Enhanced International Co-operation

- Parties should establish an Enforcement Task Force or Working Group (possibly under the Implementation Committee) to provide advice to Parties and recommendations for action under the Protocol—such as a “cradle to grave” documentation system like that used by the International Coffee Organisation.

5. Reporting on Illegal Trade

- Parties should be strongly urged to submit reports to the Secretariat outlining their efforts to suppress illegal trade. Comparative analysis could then be carried out to assist in the identification of best practice.

6. Ban On Sale And Use Of CFCs In Article 2 Countries

- All Article 2 Parties that have not already phased out the sale and use of CFCs and halons (except where essential use exemption apply) should urgently consider legislative means to do so, following the example of the EU.

7. Nomination of Ports of Entry

- A strictly limited number of ports of entry to handle all Group A, B and C ODS transactions should be nominated and enforcement activities concentrated at these points.

The United States

1. Recycled ODS

- The US must institute an effective petitioning and screening process for the importation of all such material and, in the absence of certainty, refuse entry to any suspect material. The import of recycled materials into the United States is enabling illegal trade in CFCs and halons. Despite the best efforts of US enforcement agencies, the current procedures for the import of this material are clearly inadequate.

The European Union (EU)

1. A Sales Ban

- The EU must ensure the swift passage and implementation of the proposed new EU Regulation on ODS and in particular the final and comprehensive phase-out of CFC and halon use in Europe, including recycled, reclaimed and re-used material.

2. Registration Of CFC And Halon Stockpiles

- Existing stockpiles of CFCs and halons must be registered by each Member State.

3. Abolition Of IPR

- Abolish Inward Processing Relief.

4. Enhanced And Intelligence-led Enforcement And Co-ordination Of Controls

- Enforcement agencies must be given adequate resources and training to tackle the illegal trade in ODS.
- Emphasis must be given to intelligence-led enforcement and the EU wide co-ordination of enforcement efforts through, inter alia, the establishment of a central database of illegal trade and improved exchange of information between national agencies.

- Efforts should be made to harmonise national legislation within the EU and co-ordinate procedure for the management of ODS within the EU

5. European CFC Production

- The EU must ensure the rapid phase-out of all CFC production

6. CFC Banking And Destruction

- Establish centralised CFC collection and destruction banks to facilitate the safe phase-out and removal of all CFCs and halons on the market, after the introduction of the ban on sale and use enters into force.

China and India

1. Registration And Audit Of All Production Facilities

- The Government of China should take action against illegal ODS exporters and provide all available assistance to ensure that the planned audit of ODS production facilities is fully comprehensive.
- The Governments of China and India should introduce a comprehensive licensing system for all ODS production facilities with a requirement to report to central government on all aspects of operation including substances and volume under production, exports and known end-use.

Below and opposite: Chinese CFCs smuggled into Taiwan in false jackets labelled as HFCs—a legal replacement.





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