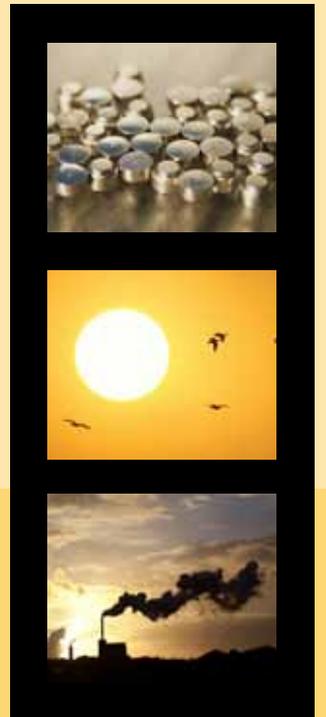




BASEL CONVENTION

TRAINING MANUAL ON ILLEGAL TRAFFIC

FOR CUSTOMS AND ENFORCEMENT AGENCIES



BASEL CONVENTION

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TRAINING MANUAL
ON ILLEGAL TRAFFIC

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What is the purpose of this manual?

This manual is designed to assist Customs and other enforcement agencies in understanding the provisions of the Basel Convention, and highlights the fundamental role they play in its implementation.

Each Party, having its own legislative structure, has taken its own approach in incorporating the Basel Convention provisions into its own legislation. This manual has been drafted in a way that allows Parties to insert their own requirements in it, in order to facilitate its use by Customs officers and enforcement agencies at the national level.

This manual deals with:

- what is important information for Customs to implement the Convention;
- what does any enforcement agency need to know about safety when dealing with hazardous waste shipments;
- what is illegal traffic, and how to detect it; and
- which are the important details to consider when investigating and prosecuting waste crimes.

For ease of reference, a glossary has been included to explain key terms and concepts under the Basel Convention which will be frequently referred to over the course of this manual.

Acknowledgements

The Secretariat expresses its sincere gratitude to the Parties of the Basel Convention, in particular the Governments of Canada and the Netherlands, and the EU IMPEL TFS Seaport project, for their kind cooperation in the development of this manual.

This manual has been produced with the financial support of the United Kingdom of Great Britain and Northern Ireland.

GLOSSARY

1 ENFORCEMENT AND THE BASEL CONVENTION

- **Conference of the Parties, COP**

The decision-making body of the Convention, and formulates and adopts the policies that will guide the implementation of the Convention.

- **Competent Authority**

The governmental body designated by a Party as responsible for dealing with notifications of a transboundary movement of hazardous wastes or other wastes.

- **Disposal**

Does not merely refer to final disposal, it also includes activities such as resource recovery, recycling, reclamation, direct re-use or alternative uses.

- **Disposer**

Any person to whom the wastes are shipped who will carry out the disposal of the wastes.

- **Environmentally Sound Management, ESM**

Taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against the adverse effect which may result from such wastes.

- **Exporter**

Any person who is under the jurisdiction of the State of export who arranges for hazardous wastes or other wastes to be exported.

- **Focal Point**

The entity designated by a Party as being responsible for submitting information to and receiving information from the Secretariat.

- **Generator**

Any person whose activity produces hazardous wastes or other wastes. If that person is unknown, the generator will be the person who is in possession and/or control of the wastes.

- **Movement Document**

A document which contains information about the wastes which should accompany a shipment of waste from the point at which the transboundary movement commences to the point of disposal. The table on page 15 details all the information which are required to be included in the Movement Document.

- **Notification**

The obligation on the State of export to provide, or require the generator or exporter to provide, information about a

proposed transboundary movement of hazardous wastes and other wastes to the States concerned. The table on page 13 details all the information which are required to be included in the Notification. Such notifications should be made in a language acceptable to the States of import.

- **Secretariat**

The entity which provides support to the Parties to help them implement the Convention. The Secretariat works under the supervision of, and under the instruction of the Conference of the Parties.

- **State of Export, Country of Export**

A Party from which a transboundary movement of hazardous wastes initiates.

- **State of Import, Country of Import**

A Party to whom a transboundary movement of hazardous wastes is destined for the purpose of disposing the waste in that country, or for loading the waste prior to disposal of the waste in another country.

- **State of Transit, Country of Transit**

Any State, other than a State of Import or State of Export, through which a transboundary movement of hazardous wastes or other wastes will take place. It is important to note however that the duty of the Notifier applies to all States of Transit, irrespective of whether they are a Party to the Convention or not.

- **States concerned, Countries concerned**

Parties which are States of export, or import to a transboundary movement of hazardous wastes, and States of transit to such a movement, irrespective of whether they are a Party or not.

1.1 What is the Basel Convention?

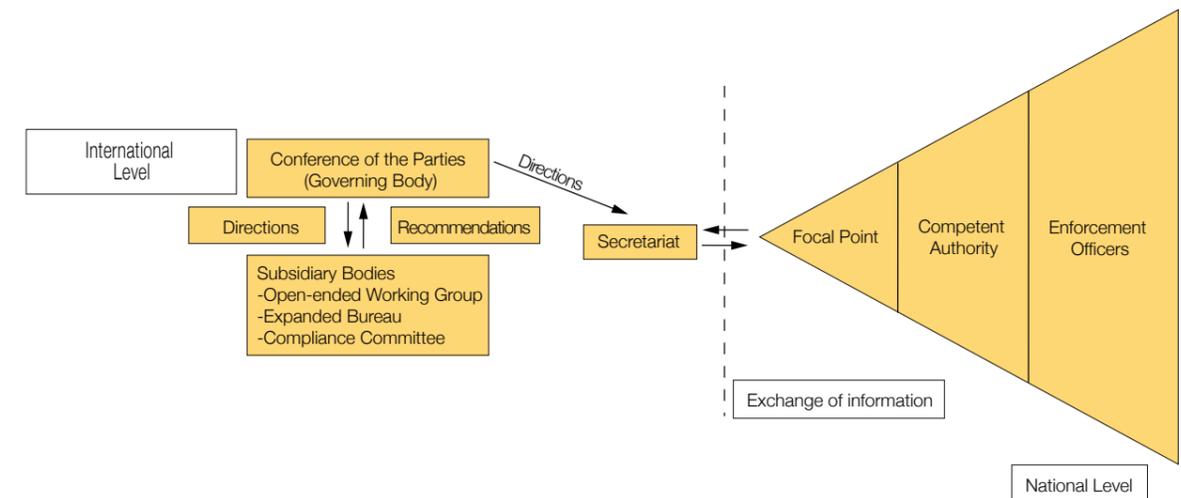
The Basel Convention was adopted on 22 March 1989 and entered into force on 5 May 1992. As at 8 February 2006, there were 167 **Parties** to the Basel Convention.

In order to protect human health and the environment against the adverse effects that may result from the generation and management of hazardous wastes and other wastes, the Basel Convention establishes a regulatory system based on the following:

- the requirement of prior informed consent of a **State of import** and **States of transit** before an export of waste can take place and, for this purpose, the establishment of a notification procedure;
- the requirement that all practicable steps are taken to ensure that such wastes are managed in a manner to protect human health and the environment from the adverse effects that could result from those wastes (referred to in the Convention as “environmentally sound management”);
- a restriction on exports to a country which is not Party to the Convention; and
- a duty on an exporting state to re-import where an export has not complied with the provisions of the Convention.

The effective implementation of the Basel Convention, an international treaty, requires the translation of rules and policies adopted at the international level into action, specifically, by enforcement of such international rules and policies at the national level. This relationship between the various bodies concerned in the operation of the Basel Convention is illustrated in the diagram opposite.

Information that is needed at the national level to ensure the implementation and enforcement of the Convention provisions is transmitted by the **Secretariat** to the national **Focal Points** for the Convention. Such information includes, for example, additional wastes to be regulated by the Convention and special procedures and legislation adopted by individual countries. The **Focal Points** must ensure that this information is circulated to all involved with enforcement and implementation at the national level. This would include the **Competent Authority**, which should know about every shipment of hazardous wastes leaving from, transiting through or entering a country, and what is regulated by the Basel Convention and by national legislation. The Focal Point and Competent Authority should ensure that all national enforcement agencies, including Customs, are kept appropriately informed.





MAKE SURE YOU KNOW HOW TO CONTACT YOUR COMPETENT AUTHORITY!!

The contact details of the Competent Authority in my Country is:

Name:

Address:

Telephone No.:

E-mail:

AND WHERE TO FIND THE CONTACT DETAILS OF THE COMPETENT AUTHORITY OF ANOTHER COUNTRY :

www.basel.int

1.2 The role of Customs in detecting and investigating traffic in hazardous wastes

Customs services are in a unique position to detect illegal trafficking in wastes at border crossings. However, with faster and freer trade and the widespread use of container shipments, there are fewer opportunities for meaningful



1. What do the Competent Authorities and Focal Points do under the Basel Convention?

2. Why should Customs be in regular contact with these entities?

3. What can Customs do to enforce the Basel Convention?



List the national legislation implementing the Basel Convention in your country:

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2

SCOPE OF THE CONVENTION

inspection of goods crossing national borders. At many ports and border crossings, it is estimated that less than two per cent of imported cargo is inspected and less than one per cent of outbound cargo. Moreover, Customs agencies are charged with enforcing dozens of laws relating to, among other matters, illegal narcotics, goods that produce revenue through tariffs, and security threats.

It is worth noting that awareness training for waste crimes at the border provides benefits for other priority concerns to Customs departments. In many parts of the world, one way to smuggle narcotics or illegal aliens is to hide them in shipments of garbage or waste materials because few inspectors want to search such shipments thoroughly.

Training for Customs services in how to recognise and response to illegal shipments of hazardous wastes is critical for the effective implementation of the Basel Convention and for the safety of inspectors and agents.

2.1 What to expect in this Chapter

This chapter explains the basic procedures established by the Basel Convention, those definitions in the Convention of most relevance to Customs, and the wastes covered by the Convention.

2.2 General principles of the Basel Convention

When a country has formally decided to endorse and fully implement the principles of the Basel Convention (by becoming a **Party** to the Basel Convention) it has, amongst other things, agreed to:

- Commit itself to introduce appropriate national legislation to regulate the transboundary movements of hazardous wastes;
- Consider that **illegal traffic** in hazardous wastes or other wastes is criminal; and
- Introduce legislation to prevent and punish **illegal traffic**.

The basic elements that should be included in national legislation to implement the Basel Convention are found in the text of the Convention. The provisions of the Convention have to be implemented strictly, in full, by each Party.

It is important to realise that the Convention also permits **Parties** to adopt stricter measures than those required by the Convention even to the extent of prohibiting exports or imports. As a consequence, the extent of regulation, on the transboundary movement of hazardous wastes may differ from country to country. You may, therefore find it useful to have copies of the relevant national legislation of your country to hand when reading this manual.



List the national legislation implementing the Basel Convention in your country:

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2.3 Regulation of Transboundary Movements

The foundation of the control system of the Basel Convention is based upon detailed procedures for information exchange. The complete procedure for the authorization of transboundary movements of hazardous wastes will be discussed in more detail in chapter 3.

2.4 Wastes

The foundation of the control system of the Basel Convention is based upon detailed procedures for information exchange. The complete procedure for the authorization of transboundary movements of hazardous wastes will be discussed in more detail in chapter 3.



Electrical waste

Source: Photo SBC

2.4.1 What wastes are subject to the Basel Convention?

The Annexes to the Convention contain the detailed description of the wastes covered by the Basel Convention. The Convention defines 'wastes' as substances or objects which are disposed of or are intended to be disposed of or are required to be

disposed of by the provisions of national law (Article 2, paragraph 1).

What is understood by the Convention as being a hazardous waste in accordance with the above definition is stated in Article 1 of the Convention, which provides:

- Wastes that belong to any category contained in Annex I of the Convention, unless they do not possess any of the characteristics contained in Annex III.

Annex I lists waste streams (wastes resulting from activities such as medical care, pharmaceutical industries, photographic industries, etc., coded Y1 – Y18) and wastes having specific components/constituents (e.g. cadmium, lead, arsenic, etc., coded Y19 – Y45). The wastes are given codes to assist identification, and should be used in documents that must accompany each shipment of waste across frontiers.

Annex III lists a number of hazardous characteristics that pose dangers because of the impact that such substance(s) or mixtures of substances may have. Such characteristics are, for example, explosiveness, flammability, production of inflammable or toxic gases, etc. and are coded H1 – H13. When the wastes listed in Annex I do not possess any of the characteristics referred to in Annex III, the wastes are NOT covered by the provisions of the Basel Convention BUT they may still be covered by paragraph (b) below.

Furthermore, paragraph 1(b) of Article 1 provides that “hazardous wastes” are also

- wastes that are not covered by paragraph (a) but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the Party of export, import or transit.

This applies to Countries of export, import AND transit, and the type of wastes defined as such must be included in the national legislation of the country concerned. Other Parties must be informed, through the Secretariat, of the wastes defined as, or considered to be, hazardous wastes by their domestic legislation. (See also below under ‘national definitions’). Once such information has been circulated to all Parties they are all required to respect the national definition.

Article 3 of the Convention on national definitions of hazardous wastes requires any Party that considers or defines wastes, other than those included in Annexes I and II, as hazardous under its national legislation, must inform the Secretariat. The Secretariat then transmits this information to all the Focal Points of all other Parties to the Convention. The Parties are responsible for making available this information at the national level, for example to Customs and to exporters.

The Secretariat publishes the information received from the Parties in connection with national definitions on its web site at <http://www.basel.int/natdef/frsetmain.php>.

- Wastes that belong to any category contained in Annex II that are subject to a transboundary movement shall be ‘other wastes’ for the purposes of the Convention.

The Convention refers to ‘other wastes’. These ‘other wastes’ are defined in Annex II, and refer to wastes collected from households and to residues arising from the incineration of the latter (coded with Y46 and Y47 respectively).

2.4.2 Wastes not covered by the Basel Convention

Article 1 also provides that the following wastes are not covered by the Convention:

- Wastes which, as a result of being radioactive, are subject to other control systems, including international instruments, applying specifically to radioactive materials.

Most radioactive wastes are under the control of the IAEA and are not covered by the Basel Convention. However, there may be some radioactive wastes which are not subject to IAEA’s regulations (for example, because of their low level of radioactivity). These wastes would be subject to the Basel Convention provisions. These wastes could include, for example, medical wastes such as x-ray materials that are listed as Y 1 in Annex I to the Convention.

- Wastes which derive from the normal operations of a ship, the discharge of which is covered by another international instrument.

This is generally understood as referring to wastes generated in the course of the normal activities of a ship. Such wastes are regulated by the MARPOL Convention, 1973, as modified by the Protocol of 1978 (MARPOL 73/78).

2.4.3 The lists of wastes / Annexes

The Annexes that contain the lists of wastes were developed in two stages. When the Convention was adopted, Annexes I to III were included, listing those wastes which were to be controlled. In 1998, the COP adopted two more Annexes (Annexes VIII and IX) which provide more specific examples of what is and what is not covered by the Convention.¹ Annexes VIII and IX have been amended at subsequent meetings of the Conference of the Parties.

Annex VIII (list A) clarifies which specific wastes are covered by Annex I and are characterized as hazardous. As with Annex I, if Annex VIII wastes do not possess any of the characteristics described in Annex III (e.g.

explosive, corrosive, toxic, etc.) they are not hazardous, and will then not be subject to the Convention controls.

Annex IX (list B) contains wastes that are not hazardous unless they contain Annex I material to an extent that makes them exhibit an Annex III characteristic. In such cases, the wastes are covered by the Basel Convention.



Make sure that you look at the current Basel Convention list of wastes! Also remember that the list of wastes covered by your national legislation may include additional wastes and should also be consulted!

MAKE SURE YOU KNOW WHOM TO CONTACT FOR THIS INFORMATION!!!

You can find the current Basel Convention list of wastes on www.basel.int

2.5 Disposal

The Basel Convention does not merely regulate the transboundary movement of hazardous wastes, but it also deals with the disposal of such wastes. The method of **disposal** is not just a concern of the **Country of**

import, but it also has legal implications for the **Country of export** (where the generator is located). The Basel Convention seeks to ensure that such disposal is carried out in an **Environmentally Sound Manner**.

Disposal of wastes is defined in Article 2, paragraph 4, of the Convention as meaning any operation specified in Annex IV to this Convention.

The Annex IV lists two types of ‘disposal’:

- Section A lists 15 types of operations (coded D1 – D15) that do not lead to the possibility of resource recovery, recycling, re-use etc. Examples of these are land fill, incineration, permanent storage, etc.
- Section B lists 13 types of operations (coded R1 – R13) which may lead to resource recovery, recycling, reclamation, direct re-use etc. Examples of these are recycling/reclamation of metals and metal compounds, used oil re-refining etc.



1. Are all wastes covered by the Convention?

2. What if your national law considers a waste as hazardous while the Basel Convention does not? Do the Basel Convention provisions continue to apply?

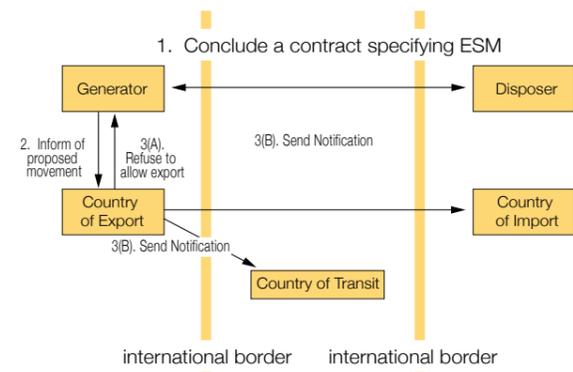
¹ This manner of amending the lists of hazardous wastes demonstrates the flexibility of the Convention to quickly respond to change. From a procedural point of view, changing the Annexes is relatively easy, as outlined in Article 18 of the Convention, and the changes enter into force relatively quickly.

3 BASEL RULES FROM START TO FINISH

3.1 The Basel Convention procedures

The procedures form the heart of the Basel Convention control system and are based on three key elements: **Notification, Consent** and the accompanying **Movement Document**. The procedure may be divided into four stages and illegal activities may occur at each of these stages. Thus, vigilance, verification and, in the case of non-compliance, prosecution and penalties are essential.

3.1.1 Stage 1: Notification



Upon conclusion of the contract, the **Generator** or **Exporter** should inform the **Competent Authority** of the **Country of Export** of this proposed movement. Already at this stage of the process, the **Competent Authority** of the **Country of Export** may refuse to even send a **notification**, for example, because it considers that the **Country of Import** or a **Country of Transit** will not consent to the transaction, or the **Competent Authority** has no confidence that the **exporter** and/or **disposer** will comply with the prescribed regulations. The decision by a **Competent Authority** to refuse to transmit a notification is perfectly in order with the spirit of the Convention.

If the **Competent Authority** has no objection to this export, it will transmit a **Notification Document** to the **Competent Authority** of the **Country of Import** and the **Competent Authorities** of all **Countries of Transit**.

The purpose of the notification is to provide the **Competent Authorities** of the **countries concerned** with detailed, accurate and complete information on the waste itself, on the proposed disposal operation, and other details relating to the proposed shipment.



Checklist of Information to be provided on Notification

- Reason for waste export
- Exporter of the waste (1)
- Generator(s) of the waste and site of generation (1)
- Disposer of the waste and actual site of disposal (1)
- Intended carrier(s) of the waste or their agents, if known (1)
- Country of export of the waste, Competent Authority (2)
- Expected countries of transit, Competent Authority (2)
- Country of import of the waste, Competent Authority (2)
- General or single notification
- Projected date(s) of shipment(s) and period of time over which waste is to be exported and proposed itinerary (including point of entry and exit) (3)
- Means of transport envisaged (road, rail, sea, air, inland waters)
- Information relating to insurance (4)
- Designation and physical description of the waste including Y number and UN number and its composition (5) and information on any special handling requirements including emergency provisions in case of accidents
- Type of packaging envisaged (e.g. bulk, drummed, tanker)
- Estimated quantity in weight/volume (6)
- Process by which the waste is generated (7)

A transboundary movement requires all competent authorities of countries concerned to be notified. A **notification** usually covers only one type of waste, and may cover only one shipment. However, the **notification** may cover several shipments of wastes over a maximum period of one year, provided that the wastes in each shipment has the same physical and chemical characteristics and will be regularly shipped to the same disposer via the same Customs offices for entry and exit.

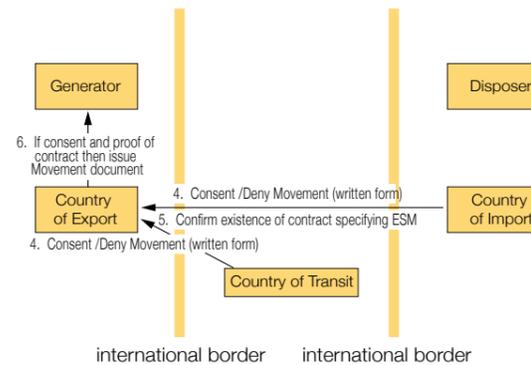
Before the shipment can be allowed to start, the **Generator** and the **Disposer** conclude a contract for the disposal of the wastes. Under the Basel Convention, this contract must ensure that the disposal is conducted in an **environmentally sound manner**. The parties to this contract must ensure that it complies with the requirements of the Basel Convention and relevant national legislation in the concerned countries. In general, these contracts should also confirm that the carriers, traders and disposal facilities are appropriately licenced in the countries in which they operate to conduct the activities provided for under the contract.



- For wastes listed in Annex 1, classifications from Annex III: hazardous characteristic, H number and UN class
- Method of disposal as per Annex IV
- Declaration by the generator and exporter that the information is correct
- Information transmitted (including technical description of the plant) to the exporter or generator from the disposer of the waste upon which the latter has based his assessment that there was no reason to believe that the wastes will not be managed in an environmentally sound manner in accordance with the laws and regulations of the country of import
- Information concerning the contract between the exporter and disposer.

- (1) Full name and address, telephone or telefax number and the name, address, telephone, telex or telefax number of the person to be contacted.
- (2) Full name and address, telephone, telex or telefax number.
- (3) In the case of a general notification covering several shipments, either the expected dates of each shipment or, if this is not known, the expected frequency of the shipments will be required.
- (4) Information to be provided on relevant insurance requirements and how they are met by exporter, carrier and disposer.
- (5) The nature and the concentration of the most hazardous components, in terms of toxicity and other dangers presented by the waste both in handling in relation to the proposed disposal method.
- (6) In the case of a general notification covering several shipments, both the estimated total quantity and the estimated quantities for each individual shipment will be required.
- (7) Insofar as this is necessary to assess the hazard and determine the appropriateness of the proposed disposal operation.

3.1.2 Stage 2: Consent and Issuance of Movement Document



Upon receipt of the **Notification Document**, the **Competent Authority** of the **Country of Import** must provide its written **consent** (the consent can be granted on the basis of certain conditions), or denial (after having asked for further clarifications, if necessary) to the notifier. Often it will send copies of its final response to the **Competent Authorities** of all **countries concerned**.

The **Competent Authority** of the **Country of Import** must also confirm the existence of a contract between the **exporter** and **disposer**. One of the most important conditions of the **notification procedure** is the verification of the existence of a legally binding contract

between the **generator** and the **disposer**, specifying the **environmentally sound management** of the waste in question.

The **Competent Authority** of any **Country of Transit** must acknowledge receipt of the **Notification document**, and provide its written **consent** to the **Country of Export** (with or without conditions), or denial, within a delay of 60 days. However, **Countries of Transit** may decide not to require prior written **consent**, in which case the **Country of Export** may allow the export to proceed if it does not receive any response from that **State of Transit** after the delay of 60 days. This procedure will, however, only apply if **Country of Transit** has informed all other **Parties**, through the **Secretariat**, that it will not require prior written **consent** for transit shipments.

Once the relevant **Competent Authorities** have established that all the requirements of the Convention have been met, and have agreed to the movement, the **Competent Authority** of the **Country of Export** can proceed with the issuance of the **Movement Document**, which contains detailed information about the shipment, and authorise the shipment to start. The **Movement Document** must accompany the consignment at all times from the time of departure from the waste generator to the arrival of the consignment at the disposer in another country.



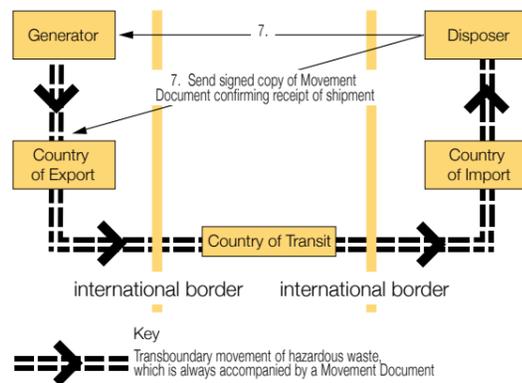
Checklist of Information to be provided on the Movement Document

- Exporter of the waste*
- Generator(s) of the waste and site of generation*
- Disposer of the waste and actual site of disposal*
- Carrier(s) of the waste*/or his agent(s)
- Subject of general or single notification
- The date the transboundary movement started and date(s) and signature on receipt by each person who takes charge of the waste
- Means of transport (road, rail, inland waterway, sea, air) including countries of export, transit and import, also point of entry and exit where these have been designated
- General description of the waste (physical state, proper UN shipping name and class, UN number, Y number and H number as applicable)
- Information on special handling requirements including emergency provision in cases of accidents
- Type and number of packages
- Quantity in weight/volume
- Declaration by the generator or exporter that the information is correct
- Declaration by the generator or exporter indicating no objection from the competent authorities of all States concerned which are Parties
- Certification by disposer of receipt at designated disposal facility and indication of method of disposal and of the approximate date of disposal

The information required on the movement document shall where possible be integrated in one document with that required under transport rules. Where this is not possible the information should complement rather than duplicate that required under transport rules. The movement document shall carry instructions as to who is to provide information and fill-out any form.

* Full name and address, telephone or telefax number and the name, address, telephone, telex or telefax number of the person to be contacted in case of emergency.

3.1.3 Stage 3: Transboundary Movement of Hazardous Wastes

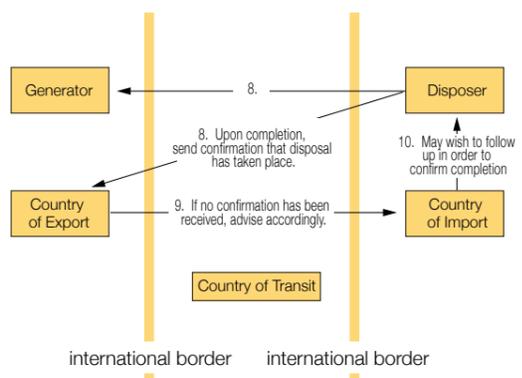


The **Movement Document** provides relevant information on a particular consignment, for example, on all the carriers of the consignment, which Customs offices it has to pass through, the type of waste and how it is packaged. It should also provide accurate information on the authorisations by the **Competent Authorities** for the proposed movement of waste. To ensure consistency between the information provided in the **Notification Document** and the **Movement Document** (and to reduce possible abuse), the **Conference of the Parties** has recommended that the duly completed **Notification** should always accompany the **Movement Document**.

Article 6, paragraph 9 of the Convention requires that, upon delivery of the waste at the **disposer's** premises, the latter signs the **Movement Document** and returns it to the **Competent Authority of the State of Export** and to the **generator** confirming the receipt of the hazardous waste in question.

Most countries accept a copy of the duly completed and fully authorised notification to be enclosed with the Movement Document. However, some countries require than an original notification, stamped and signed by the Competent Authority, shall always accompany the Movement Document. In the latter case, the generator will have to provide the Competent Authority with sufficient copies of the Notification for individual certification.

3.1.4 Stage 4: Confirmation of Disposal



Article 6, paragraph 9 of the Convention also requires a confirmation from the **disposer** when the **disposal** has taken place, according to the terms of the contract, as specified in the **Notification Document**.

If the **Competent Authority of the Country of Export** has not received the confirmation that **disposal** has been completed, it must inform the **Competent Authority of the Country of Import** accordingly.



Fridge recycling facility in Japan Source: Photo SBC

3.2 Verification at Customs

The figure opposite highlights the stages at which Customs can verify whether a transboundary movement of hazardous wastes is consistent with the Basel Convention, illustrating how the transboundary movement of hazardous wastes will proceed from Country to Country.

When all countries involved have provided their consent, the transboundary movement is authorised to proceed. When one of the countries denies permission of the movement, the transboundary movement is not authorised and should be stopped, as indicated by the red stop signs.

When a **Country of Transit** denies permission, but the **Country of Import** consents, the **Country of Export** must not allow the shipment to leave the **Country of Export** to the **Country of Transit**, even when the carrier can prove that the country of final destination has given its **consent** to the movement. In such cases, the exporter has to find another transit country willing to permit the movement to cross its **territory**.

Similarly, when the **Country of Transit** has **consented** to the movement, but the **Country of Import** has not, the **Country of Export** must not allow the shipment to leave until a **Country of Import** that **consents** to receive the shipment is found.

The documents accompanying the shipment are essential in helping Customs to determine whether the shipment is legal:



Find out which documents are required by your Country for the Import or Export of hazardous wastes

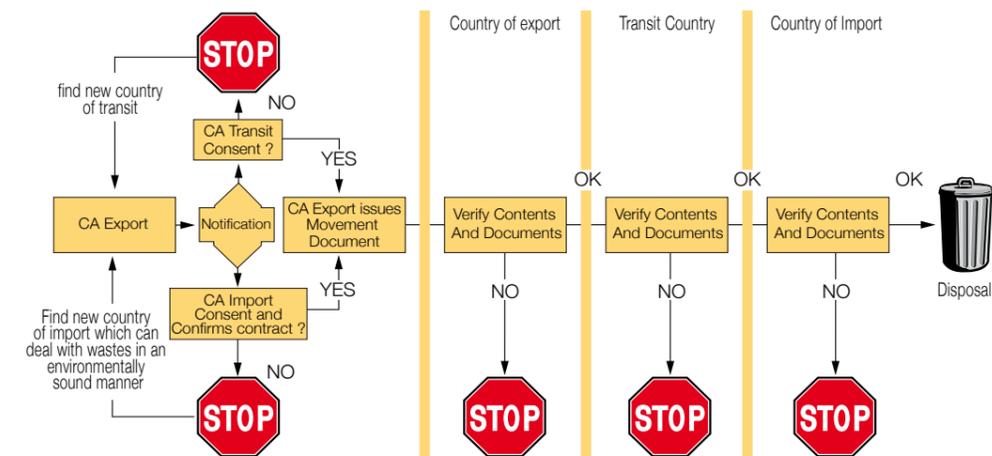
- | | |
|-------------------------------------------------------------|-------------------------------------------------------------|
| <i>Documents for Import</i> | <i>Documents for Export</i> |
| <input type="checkbox"/> Movement Document | <input type="checkbox"/> Movement Document |
| <input type="checkbox"/> Certified copy of Consent Document | <input type="checkbox"/> Certified copy of Consent Document |
| <input type="checkbox"/> Notification Form | <input type="checkbox"/> Notification Form |

Some Parties publish information relating to notifications on the website of the relevant Ministries or Environment Agencies. The information will assist Customs in determining whether shipments of hazardous wastes are legal or not.



The website on which I can find information on shipments of hazardous wastes approved by the Competent Authority of my country is:

http:// -----



3.3 Border Control Procedures

The following figures elaborate on the tasks and considerations of a Customs officer in the **Country of Export, Transit and Import** respectively.

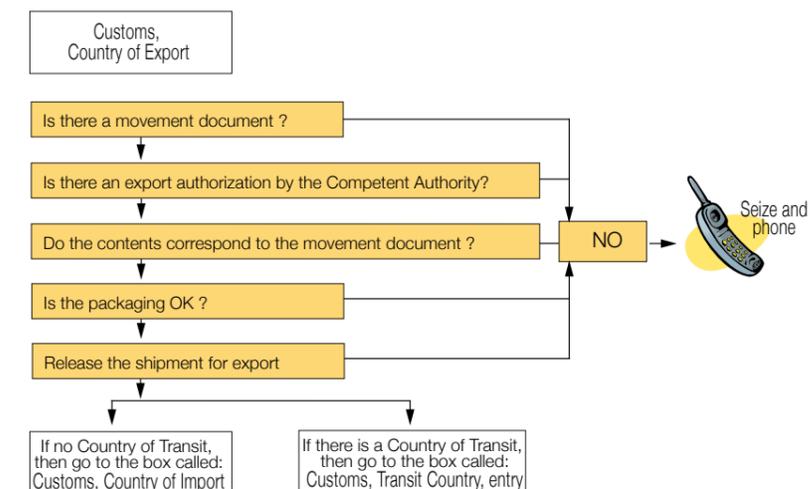


This arrow indicates that the shipment could be illegal for the purpose of the Basel Convention and you should hold the shipment and consult the Competent Authority.



This telephone symbol is used to indicate that the Customs have reason to believe that a said shipment may be illegal, and should consult and inform the Competent Authorities of the countries concerned to verify that the shipment is legal.

3.3.1 Export



As a Customs officer you first need to verify that all the documents required by your legislation are presented to you and correctly completed with all information required under the Convention. The next step is the physical inspection of the shipment:

- Verify if the truck and the containers are appropriately labelled, as prescribed the applicable transport legislation.
- Verify if the number of containers and their type corresponds to what is indicated on the **Movement Document**, and that their volume corresponds to the total indicated in the **Movement Document**.
- To the extent you are able, verify the contents of the containers to ensure that they correspond with the permitted substances.

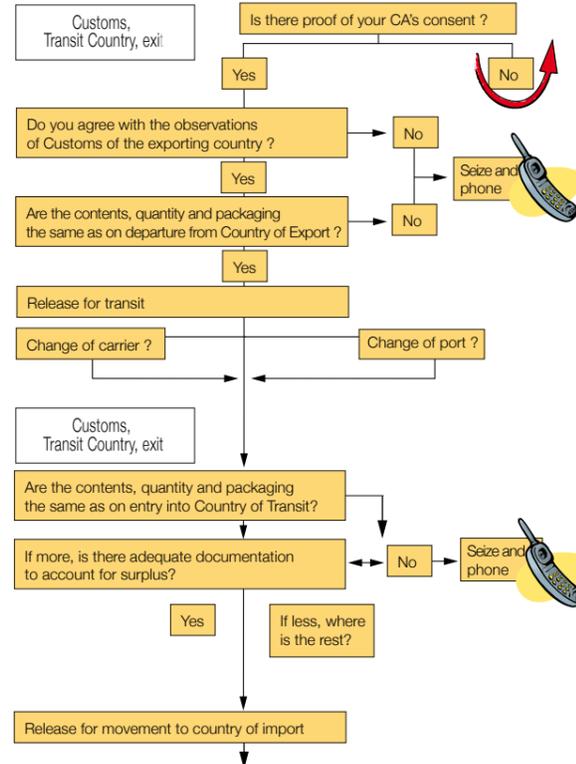
If the answer to any of the above questions is **NEGATIVE**, the shipment should **NOT** be released for export and the **Competent Authority** should be consulted. If all the answers to the questions above are **POSITIVE**, you can release the shipment for export.

3.3.2 Transit

The procedures for transit have been separated into two boxes below which deal separately with the procedures involved in the entry and exit of the shipment.

If the appropriate proof of **consent** is not provided and the **Competent Authority** of the **Country of Transit** confirms that consent to the said transit was given (or was not required, see page 22), this means that the **Competent Authority** of the **Country of Export** has not provided the information, or the carrier has forgotten it. In which case you might consider subjecting the shipment to greater scrutiny. You should request the **Competent Authority** to contact its counterpart in the **Country of Export** and seek clarification for the omission. After having passed through the **Country of Transit**, the shipment arrives at another border post in order to exit the **Country of Transit** where, again, Customs will have to make all the necessary verifications as described above.

If all provisions of the Convention and national legislation have been complied with, the shipment can be released to exit the country. If those conditions have not been met, the shipment should be seized and the relevant authorities should be informed to ensure that the shipment is returned to the **Country of Export**, as required under Article 9 of the Basel Convention.



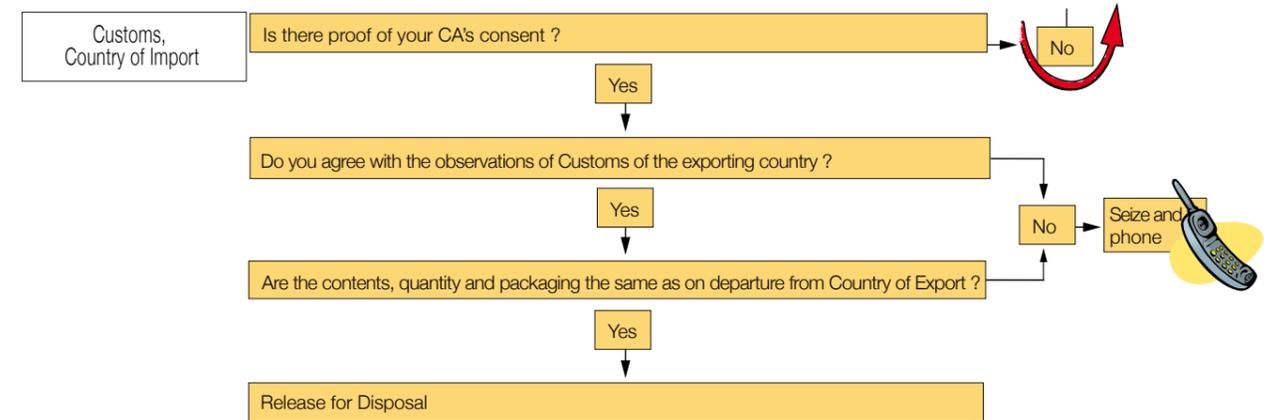
Two aspects require special attention:

1. Has there been a change of carrier? And is this adequately reflected with appropriate signatures on the **Movement Document**? If so, it is important the packaging has not been altered or tampered with in an attempt to remove, add or swap substances.
2. It may also be that other containers with hazardous wastes have been added which are destined for the same disposer. These additions should not be regarded as transit shipments, but as exports, that should be dealt with in the appropriate manner. Similarly, if the quantities are less than what entered originally, the shipment should be stopped and relevant authorities alerted, because this may mean that illegal disposal may have taken place in the **Country of Transit**.

3.3.3 Import

Customs in a **Country of Import** should be even more alert with respect to shipments of hazardous wastes, because the wastes will be disposed of in their country.

Control procedures are similar to those explained above for Export or for Transit. If Customs is satisfied with the validity of the shipment, it may proceed to release the shipment for disposal.



Customs should always carefully check shipments of hazardous wastes and other wastes, and be very alert for any possible illegal traffic. Knowing whom to contact for necessary information and advice is essential.

MAKE SURE YOU KNOW WHOM TO CONTACT IF SOMETHING SEEMS WRONG!!!



1. What does **Notification** entail?
2. Should a **Country of Transit** be consulted before a transboundary movement of hazardous waste passes through its territory?
3. What documents are required for a transboundary movement of hazardous waste to commence under the Basel Convention?

4 ILLEGAL TRAFFIC

4.1 Definition of Illegal Traffic

The Basel Convention seeks to prevent any **illegal traffic** in such waste. Article 4, paragraph 3, of the text of the Basel Convention provides:

The Parties consider that illegal traffic in hazardous wastes or other wastes is criminal.

Paragraph 4 of the same Article stresses the need for adequate national legislation:

Each Party shall take appropriate measures to implement and enforce the provisions of this Convention, including measures to prevent and punish conduct in contravention of the Convention.

For the purpose of the Convention, any transboundary movement of hazardous wastes or other wastes shall be deemed to be **illegal traffic** when it is:

- (a) without **notification** pursuant to the provisions of this Convention to all States concerned; or
- (b) without the **consent** pursuant to the provisions of this Convention of a State concerned; or
- (c) with **consent** obtained from States concerned through falsification, misrepresentation or fraud; or
- (d) that does not conform in a material way with the documents; or
- (e) that results in deliberate disposal (e.g. dumping) of hazardous wastes or other wastes in contravention of this Convention and of general principles of international law.

The following activities reflect some of the ways in which **illegal traffic**, as defined by the Convention, may manifest itself:

1. Omitting important information from, or making a false statement in a **Movement Document** or other compliance document, or using incorrect labels;
2. Transporting wastes without a Movement Document;
3. Adding or replacing waste in a shipment when changing carrier so that it no longer matches the Movement Document;
4. Transporting wastes to a facility not designated in the contract, which lacks technical capacity to deal with the waste in question;
5. Disposing of hazardous wastes in such a way that another person or persons are placed in imminent danger for their health;
6. Storing or disposing of wastes in violation of the conditions stipulated in the **Notification**.

4.2 Detecting Illegal Traffic

Under the Basel Convention, **illegal traffic** in hazardous wastes should be regarded as a criminal offence, and **Parties** should put in place adequate implementing legislation to that effect. In detecting **illegal traffic**, recourse to the relevant national legislation is essential.

Article 9(5) of the Convention provides that "Each Party shall introduce appropriate national/domestic legislation to prevent and punish illegal traffic. The Parties shall co-operate with a view to achieving the objects of this Article".



What is the relevant criminal legislation to prevent and punish illegal traffic in hazardous wastes?

What are the penalties for illegal traffic under that legislation?

Which government agency will be responsible for prosecution of this crime?

Customs should be familiar with the basic legal requirements to ensure that they proceed appropriately when verifying shipments. If inspections are not conducted properly, this may jeopardize future prosecution!

4.2.1 Where to look

Whilst the Convention deals with the transboundary movement of these wastes, enforcement does not occur exclusively at the borders. The example provided by the IMPEL-TFS Seaport project shows how one could proceed with an inspection of a shipment before it is off-loaded.

IMPEL-TFS Seaport Project

Preparation

Before initiating a comprehensive inspection operation, even if it is for only a limited amount of time, it is important to adequately prepare for it.

- Inform relevant authorities (like police, customs, traffic inspectorate and/or port authorities) about the proposed traffic inspection, and agree with them on:
 - the location for the inspection, the date and the time period;
 - the number of people involved and equipment required, as well as the necessary safety measures and the inspection scenario (e.g. focus on ultimate destinations, or types of waste);
 - the responsibilities of each agency during the inspection;
 - which assistance and knowledge is required in addition when samples need to be taken;
 - who is responsible for the follow-up in case of non-compliance with the rules;
 - who will handle any contacts with the press

- To increase the chances of discovering a transboundary waste shipment, it is recommended to locate the inspection near a custom checkpoint or at the gate of a terminal. This will facilitate a quick check on the documents and if necessary selection or temporary blocking of a container for further investigation.

Inspection

- Stopping the vehicle; generally there are two options:

- Using a road block allows one to choose an appropriate location (preferably a parking place) to guide the vehicles to, and to inspect them without disturbance to the regular traffic flow. This will often involve cooperation with police or customs to guide and stop the vehicles. The advantage of this method is that you will always have all facilities (e.g. safety and sampling equipment) available at this location.
- Another possibility is to stop a vehicle while patrolling selected roads or highways. This method requires the inspector's vehicle to be clearly recognizable as such. The disadvantage of this method is that one cannot have all necessary facilities available at once. The advantage is that one can be more flexible in selecting vehicles for inspection.

- During a traffic inspection it is possible to select the type of transport:

- Closed containers (mostly for shipment over sea);
- Tank containers (for inspection of tank containers a specific knowledge is needed);
- Trailers (products often in small batches, for handling with small lifting equipment);
- Open top containers (often with heavy material).

Since one does not want to stop unloaded vehicles, it might be useful to also look for load indications:

- The presence of special plates or labels with codes indicating hazardous or other waste goods;
- Depression of tyres and shock breakers (one would not want to stop an empty truck);
- Seals on the container doors (these seals can be

company seals as well as customs seals);

- Verification of documents;

Various types of documents need to be verified and compared for possible clues of illegal transport (any change on the document should be treated with suspicion). These verifications not only concern the Basel documents (Movement document, Notification document and/or Consent document) but any other type of documents, such as Customs transit documents; truck weighing receipts, invoices; customs documents, safety data sheets etc.;

Also interview the lorry driver (and co-driver). He/she may have more information about the origin of the load (change of carrier!), the final destination, route of the transport, etc.

- Important points of attention (if the information is available):

- Check if the accompanying Movement Document and the documents of the lorry driver match;
- Compare the quantity of waste and its description (including the packaging) as included in the Movement Document with the weight receipt and/or with invoices, or other documentation. If there is a difference (amount of difference to be determined by the inspector) between what is indicated in the documents and the actual load, take further action;
- Compare the actual route with the route as mentioned on the Movement Document (check the tachometer!);
- Check the actual date(s) of shipping/transport for plausibility;
- Check (if applicable) whether the information on a Customs Transit Document corresponds with the other documents;
- If no Movement Document is available (because the shipment is apparently not intended for export, or has been declared as containing substances not subject to the Basel Convention), other documents such as Customs documents, invoices or safety data sheets can help you to identify the waste. The declarations by the lorry driver can also provide you with the information you need.

- Physical inspection of the load.

To verify if the composition of the goods in the truck load corresponds with the information on the documents, it is preferable to perform a physical inspection of the load.

- A first inspection can be done visually, taking (digital) pictures at the same time. This is not only for documenting the inspection process, but will also assist in consulting specialists by email.

A visual inspection will allow you to verify:

- if the load is waste or not;
- when the load is waste, whether the composition of the waste matches with the documents; and
- whether it is necessary to make further verifications, or even proceed to unloading and detailed sampling of the shipment.

4.2.1.1 Placarding and Labelling

Shipments of hazardous materials and wastes must be shipped in trucks with appropriate placards indicating the type of hazardous substance being shipped. The Customs officer should verify that the placards are appropriate for the type of substance being shipped and that they correspond to the shipping and movement documents. The absence of placards is illegal. Torn or mutilated placards or labels may indicate that the container has been changed or tampered with.



Do you know where to get information on placards and labels?

Selected United Nations Packaging Symbols

The United Nations Economic and Social Council's Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonised System of Classification and Labelling of Chemicals has been charged with developing a single, harmonised system to address classification of chemicals, labels and safety data sheets. Below are some selected packaging symbols, you may find more information on these symbols and others at <http://www.unece.org/trans/danger/danger.htm>



Danger, Explosive



Danger, may cause fire or explosion



Warning, very toxic to aquatic life



Danger, Flammable



Warning, contains gas under pressure



Danger, toxic

4.2.1.2 Drums and containers

Tankers, drums, storage tanks and compressed gas containers are all capable of containing hazardous substances. A Customs officer approaching any of these should assume that the containers may contain a hazardous substance. Drums for hazardous wastes normally look like drums for chemical products or they may be oversized in order to hold a regular sized drum within that may be leaking. Illegal shipments of hazardous waste residues can be found in drums that are corroded or almost empty and even in five-gallon pails or laboratory and medical packaging. Hazardous waste can also be mixed in with waste paper, scrap metal or chemicals intended for recycling. Products shipped from the factory generally have their seals intact. If the seals are broken, the contents are suspect.

Hazardous materials must be packaged in appropriate containers. For example, if the **Movement Document** states the material is corrosive, the container should be plastic. If the material is a solvent, the container should be metal. The Customs officer should review the shipping and **Movement Documents** to be sure the container is appropriate. Leaking containers could indicate an illegal shipment. Transportation regulations require that hazardous substances be packaged in sealed containers for safety. The Customs officer should verify that containers have no leaks or visible spills.

Dented or mishandled containers can also be indicative of illegally transported hazardous waste, as products must be kept in a good condition in order to be acceptable to a lawful consignee. The same applies for recently painted drums (it is important to look at all sides of the drum to determine whether the paint covers old labels or marking). If a drum is bulging this could indicate the possibility of a chemical reaction creating pressure in the container. An inspecting officer should be careful not to open such a container without proper protective gear as pressurized drums could be dangerous if opened without appropriate precautions.

An Australian Example

On 1 September 1997, a shipment of approximately 60 tonnes of waste, mainly computer scrap, was exported from Sydney, Australia, bound for Hong Kong. On 22 September 1997, the Hong Kong authorities, after being notified by Greenpeace Australia of the hazardous nature of the goods, refused to allow the scrap entry. The containers were subsequently returned to Sydney, together with another two containers, also consigned to Hong Kong, that were removed from another vessel before it left Brisbane, Australia, on 1 October 1997.

The shipments contravened Articles 6.1 and 6.3 of the Basel Convention because the requirements for notification and consent were not observed. The export also contravened section 40 of the Australian Hazardous Waste (Regulation of Exports and Imports) Act 1989 ('Act'), which prohibits the export of hazardous waste without a permit. The suspected contravention of the Act was the subject of a joint investigation by the Australian Federal Police (AFP) and the Department of the Environment and Heritage.

The investigation found that the computer scrap had been collected by an Australian company concerned with the collection and re-sale of most kinds of metal and electrical scrap. In August 1997, the Australian company sold the scrap to a foreign company for AUD26,693. The Australian company then stuffed the containers and transported them to the docks. During the process of stuffing the containers, Greenpeace Australia became aware of the possible hazardous nature of the goods.

The problem during the investigation centred upon which company was responsible for the illegal export of the goods. The investigation found that the terms of the contract between the Australian company and the foreign company were Free on Board (FOB) and under commercial law this in effect made the foreign company the owner and exporter of the waste. However, there was no basis for criminal proceedings against the foreign company because an offence against section 40 of the Act can only be committed by a person who acts knowingly or recklessly. It could not be shown that anyone associated with the foreign company knew or ought to have known that the containers contained hazardous waste.

It could be argued that the Australian company was the exporter of the scrap for the purposes of section 40, having sold the scrap and packed it into the containers knowing that it was to be shipped to Hong Kong. Nevertheless, the investigation found that the prospects for a successful prosecution were not good, partly because the only individual who clearly knew precisely what was in the containers had died during the investigation, and partly because it was uncertain whether a company could be an exporter for the purpose of section 40 unless it was also the exporter for the purpose of commercial law. The Australian company was wound up while the investigation proceeded.

The Hazardous Waste Act is currently being amended to close this loophole by making it illegal for Australian companies to sell hazardous waste to foreign companies unless an export permit is in place.

The hazardous waste was disposed of in Australia, under Australian law, at the expense of the Australian Federal Government and at a total cost of AUD94,426. There are provisions in the Act under which the Government may seek to recover these costs from a foreign company.

Excerpt from the Guidance Elements for Detection, Prevention and Control of Illegal Traffic in Hazardous Wastes, pages 112

An example from the United Kingdom

In December 1999 an employee of a solvent recovery company in the United Kingdom informed the Environment Agency of the presence of suspicious load which was not accompanied by all the necessary paperwork. Inspection of the site revealed the presence of 45-gallon drums filled with wastes. The waste was inspected by Agency officers and some of the drums were found to be damaged, with a strong smell of solvents coming from the drums and wood and rags visible in a number of drums without lids. The load was poorly secured and was not clearly labelled. Further examination of the load revealed rags, overalls, gloves and liquid solvents. Inspection of the paperwork allowed to trace a further load (again in 45-gallon drums) at a nearby port. These drums were crudely packaged in shrink-wrapped polythene, without any waste description or hazard warning labels. Chemical evaluation revealed that the waste contained various concentrations of acetone and waste clothes contaminated with resins and polymers, potentially forming an explosive cocktail. Only a small amount would have been suitable for solvent recovery, the majority of the waste would have required final disposal.

The company was fined GBP 1,500 for illegal shipment and the payment of GB 4594.80 of costs to the Environment Agency.

Excerpt from the Guidance Elements for Detection, Prevention and Control of Illegal Traffic in Hazardous Wastes, pages 114-117



1. Give three examples of transboundary movements of wastes that are deemed illegal under the Basel Convention.
2. What national laws exist in your country to punish illegal traffic?
3. List three possible indicators of illegal traffic in hazardous wastes.

5 COOPERATION

5.1 National cooperation – hazardous waste task forces

The task force approach is an effective and efficient method for targeting and investigating suspected criminal activity in a specific geographical area, region or border crossing. Hazardous waste task force members may represent countries, provinces and local jurisdictions where hazardous waste is generated, transported, disposed of, or abandoned. Generally, a task force is composed of a team of people from different agencies with a common goal. The strategy is to coordinate the activities of several agencies having relevant information, expertise and jurisdiction.

A hazardous waste task force may be composed of representatives from Customs (agents, inspectors, trade information specialists), environmental agencies, police agencies at national, regional and local levels, persons with hazardous waste regulatory and prosecution backgrounds, and others with relevant information on or authority over waste shipments. If possible, specialists in electronic surveillance, forensics, tax, computer and data processing should be included in special task force operations and investigations.

The structure of the task force should be simple, composed of at least one member representing each agency and a task force leader. Because each agency involved expects some benefit from the work of the task force, it is the leader's responsibility to be familiar with the needs and interests of all the agencies. The task force members may be appointed by their respective agencies while the members or their agencies normally choose the task force leader. The entire task force should meet, with an agenda, at least once a month.

The objectives identified here ought to be included in the objectives of any hazardous waste task force as well as others dictated by circumstances. They should be attainable and supported by all stakeholders represented in the task force.

The principal objective of a hazardous waste task force is to develop and share information among agencies, leading to the detection and investigation of more cases of **illegal trafficking** than any one agency could manage alone as the task force collectively has far more resources, jurisdiction, capacity and personnel. This is especially important for countries or regions where there are scarce resources for environmental investigations.

Task forces detect **illegal trafficking** by compiling and collating information and intelligence from Customs and

comparing that with information from environmental agencies, police, fire departments and others. They identify enforcement targets and prioritize according to the seriousness of offences, frequency of occurrence and needs of stakeholders. They may develop a database of commercial information and intelligence regarding known generators, transporters and disposal sites, as well as cases of illegal trafficking and other hazardous waste crimes.

In this way, task forces can document trends in illegal activity, determine patterns of trafficking, share information on common schemes employed by **illegal traffickers** and effectively train other agencies in the collaborative detection, investigation and prevention of hazardous waste trafficking. They should also ensure that their members collaborate in the investigation of identified cases of **illegal trafficking**, the execution of search warrants and the prosecution of the individuals and corporations responsible.



Do you have a hazardous waste task force? List the contact details. If you don't, who do you think could (1) take steps to establish one, and (2) participate in such a hazardous waste task force?

5.2 International Cooperation for Detection

The international cooperation for the detection and prevention of **illegal traffic** in hazardous and other wastes is a very important aspect of the implementation of the Basel Convention. **Competent authorities of Countries of import and export** that are trade partners in the sense of the movement of wastes should establish adequate lines of communications, not only for the compliance with notification and consent procedures as established by the Basel Convention, but also with regard to detected or potential **illegal traffic**. With regard to the latter, such responsibilities should be transferred to the relevant enforcement agencies.

In 2000, the **World Customs Organization (WCO)** initiated a network called Customs Enforcement Network (CEN). The aim of this network is to link all Customs administrations for enforcement purposes and

provide them with a common database and reference system. Any national Customs administration should be connected to CEN through its WCO National Contact and, equally important, should contribute to the further development of CEN. Your Regional Intelligence Liaison Office (RICO) will also provide a valuable tool for international cooperation.

For more information on WCO mechanisms see www.wcoomd.org. This site also has links to national customs websites.

Interpol provides another mechanism for international cooperation through its National Central Bureaus. This type of connection is particularly important for detailed investigations involving prosecution of individuals and companies domiciled in different countries.

For more information on Interpol networks see www.interpol.int. This site also has links to national law enforcement sites, including Customs.

5.3 Multi-agency task force focused on international trafficking in hazardous wastes

The most important asset of any multi-agency task force is the convergence of diverse expertise in one operational unit whose members are drawn from both sides of a national border. Intelligence gathering from multiple jurisdictions is especially beneficial in a multi-agency border task force dealing with transboundary movements of hazardous wastes. The ability to comprehend, coordinate and enforce waste laws across borders is critical to the successful detection and prosecution of traffickers.

Illegal traffickers tend to exploit the usual absence of regular communication between agencies across borders. Intelligence and information exchange, coupled with operations and investigations, can tip the scales to the advantage of the law enforcement agencies and expose violators to prosecutions on both sides of a border or between ports that are thousands of miles apart.

The example of Exodus Asia

In recent years, several international task forces focused on waste shipments were formed in response to cases of illegal trafficking. For example, the Chinese authorities prosecuted an individual for illegal import of hazardous wastes mixed with waste paper from the United States of America that was intended for recycling in China. The United States' environmental law enforcement authorities cooperated in the investigation of this individual, who was a United States citizen and his business, which was based in California. Much of the communication between the Chinese and United States law enforcement authorities

proceeded through Interpol, using its channels for police to police communication between States. Information was also shared directly between national and local law enforcement agencies. The individual was prosecuted by the Chinese authorities and received a sentence of ten years in prison while the 238 metric tons of waste, falsely labelled as scrap paper, was returned to California. The international publicity surrounding this case and the criminal sanctions, served as a deterrent. Traders in waste paper took additional measures to ensure that their shipments complied with environmental protection laws. The Chinese authorities reported that, after this prosecution, less than one per cent of foreign waste imported into China failed to meet standards, based on random inspection by customs agents.

Furthermore, as a result of this case, authorities in the United States recognized the need to better coordinate the state, local and federal agencies involved in the enforcement of laws governing the export of waste for recycling, particularly those wastes destined for China and other parts of Asia. The United States established a task force named Exodus Asia comprising customs agents, inspectors and information specialists, Environmental Protection Agency criminal investigators, state and local waste regulatory authorities and inspectors, linked to law enforcement and customs agencies at ports in Asia.

There are many other examples of successful international hazardous waste task forces around the world, many of which are focused on border crossings and common trade routes for wastes and other contraband substances.



1. Identify the national agencies that do, or should, form part of your national hazardous waste task force.

2. What international networks exist which may help you to detect and prosecute illegal traffic?

6 RESPONSES TO A SUSPECT HAZARDOUS WASTE SHIPMENT

6.1 Steps to follow for investigations

Should an illegal shipment of hazardous wastes be suspected, four essential steps should be followed:

- (a) Assess the situation;
- (b) Identify the hazardous substance;
- (c) Secure the scene;
- (d) Report the incident to relevant health, safety and regulatory personnel.

Officers are taught in awareness training not to approach a scene involving hazardous materials, but to stop and assess the situation, particularly before entering a confined space. This is difficult to teach because the first response of most law enforcement personnel is to respond immediately and take whatever action is necessary. At a scene involving a hazardous substance, however, the correct action may be to take no immediate action at all. Officers need to assess the situation and restrain themselves from entering a dangerous situation. Officers have been killed in the line of duty by entering scenes containing hazardous materials without taking appropriate precautions. Additional safety awareness issues are set forth in subsequent chapters.



Write down the names of your colleagues and their area of expertise should you need assistance or advice on handling a suspect hazardous waste shipment!

6.1.1 Confined spaces and recommended actions

A confined space is any space with limited openings for entry and exit and unfavourable natural ventilation which could contain or produce dangerous air contaminants. Examples of confined spaces include trailers, holds of ships, storage tanks, process vessels, all of which may be encountered by Customs officers, particularly when investigating an illegal shipment of hazardous materials or wastes.

Officers can keep themselves and others safe at a scene if they follow and do not exceed the limits of their training. Injuries and damage may have already occurred prior to the officers' arrival. It is the officers' responsibility to

prevent further injuries or damage by keeping themselves and others safe and waiting for assistance.

Under no circumstances should an officer without proper training and equipment enter a confined space. When arriving at a suspected hazardous waste crime scene, the officer should approach from an upwind direction and remain at a distance from a potential release. The officer should stabilize the situation until someone with the relevant training arrives and then follow their instructions.

Those who have not been trained to handle hazardous substances are warned that improper action may have devastating health effects and compromise the investigation. They are advised to take note of the following precautions:

- (a) Do not open trailer doors of trucks suspected of containing hazardous substances;
- (b) Do not open tanks, drums, or other containers that may contain hazardous substances;
- (c) Do not presume that what is marked on a label, drum or container is what is inside since illegal traffickers often mix hazardous wastes with other materials;
- (d) Do not enter confined spaces that may contain hazardous substances.

6.1.2 Investigations of trailers



Source: Photo SBC

The proper investigation of hazardous wastes contained in trailers or other confined spaces requires time, patience and planning on the part of the investigator. If there is no immediate danger to people or the environment, it may be in the best interests of the investigation to secure, seal and store the trailer until the necessary resources and off-loading facilities can be obtained.

6.1.2.1 Trailer exterior

The investigator should examine the trailer exterior, including the undercarriage. All obvious identifiers should be noted and traced. A careful examination of the trailer for fingerprints is essential. Close attention should be paid to natural gripping areas such as the exterior and interior door surfaces, roof and sides, air line and electrical line connection points and tyre rims.

Any soil found in the treads of the tyres should be collected as evidence. If the trailer has been abandoned, this may assist in determining where the trailer was located prior to being abandoned. A search should be made for any vehicle identification number. If none can be located, the trailer's manufacturer should be immediately contacted so that the exact location of the identification number can be found.

6.1.2.2 Off-loading operation

A safe and efficient method for the removal and examination of chemical waste drums from a trailer must be established. There are several different techniques which may be utilized when off-loading hazardous waste containers from a trailer.

One technique involves the use of a dual loading bay and an empty trailer. By placing the empty trailer in the bay next to the trailer containing the hazardous wastes, the investigator will be able to examine and sample each container as it is brought out. A drum dolly or a specially fitted forklift may be used to remove the hazardous waste containers. After examination and sampling for chemical evidence, the hazardous waste containers may be placed on the empty trailer. Another method is to remove the containers, examine and sample them, prior to placing them in a secure hazardous wastes storage area.

Regardless of the method used, it is essential that all safety regulations, including confined space regulations, be followed carefully. This type of operation will require continuous air monitoring of the trailer's interior atmosphere. The air should be monitored for any increase in the presence of volatile and semi-volatile chemical compounds, flammable gases and oxygen depletion. Once the trailer has been completely unloaded, the interior should be carefully examined for fingerprints, discarded tools, documents, rubbish and any other physical evidence.

6.1.3 Investigations of hazardous waste tankers

When a tanker truck is suspected of having been used for illegal trafficking, several measures should be taken before any chemical evidence is removed from the tanker or before the cab of the vehicle is searched for evidence. The investigative steps which are important in gathering evidence of illegal trafficking include:

6.1.3.1 Driver interview

This is the best source of information regarding the

activities for which the tanker truck was used. The driver may be cooperative and may supply information regarding the material in the tanker and the source of the hazardous wastes or point of generation.

6.1.3.2 Movement document and permits

If the driver cannot or will not produce a proper hazardous wastes transportation permit or a hazardous waste **Movement Document**, the investigator should note this and include this information in the report.

6.1.3.3 Placards

Transportation departments normally require that vehicles transporting hazardous wastes bear placards. The lack of placards on a tanker or the presence of the wrong placards based upon field tests may be seen as evidence of an effort to mislead law enforcement or regulatory agency officials as to the tanker's contents. Lack of proper placards on the tanker should be noted by the investigator and should be used to support a request for a search warrant.

6.1.3.4 Field tests

In many jurisdictions, the results of the field tests used to protect the safety of the investigative team may also be used as evidence of illegal trafficking. Meter readings for flammable vapours, radiological meter readings and pH tests can all be conducted without removing a chemical sample from the tanker. These safety tests can be conducted on exterior surfaces, ports, exposed hoses or on any leaks or ground discharges. While the primary purpose of such field tests is to protect the health and safety of those at the crime scene, the results may indicate the presence of some form of hazardous waste.

6.1.3.5 Tanker discharges

It is vital that the position of any switches or valves be noted. Many tanker trucks have the dual ability to vacuum as well as to discharge material. By noting the position of all switches and valves, the investigator may be able to prove that the tanker was discharging material illegally. In addition, the tanker's manufacturer will be able to supply the investigator with information regarding the tanker's discharge capabilities, for example, the number of gallons per minute. This information, combined with the known length of discharge time, will help to determine the actual amount of material discharged from the tanker.

6.1.4 Tracing techniques

When tracing hazardous waste drums, the investigator has four areas of inquiry to pursue in an attempt to identify the suspects and these are outlined below.

6.1.4.1 Person or persons

As with any other type of crime, the persons committing the environmental crime may have left behind physical evidence which could lead the environmental investigator to their eventual identification. One of the

most valuable identifiers are fingerprints left behind by the suspects. Particular attention should be paid to the edges and bottoms of containers, as these are the areas where hands are naturally placed when moving or lifting containers. Often, fingerprints may also be found on discarded empty cans, bottles, tools, cellophane wrappers and the interior of chemical gloves utilized by the suspects. In addition, any footprints left behind by the suspects, indicating shoe size and type of shoe, will assist the environmental investigator in the identification process.

6.1.4.2 Other physical evidence

When hazardous waste drums are shipped, perpetrators have a tendency to abandon other items along with the waste. Items such as cash register receipts, shopping bags, computer printouts, invoices, hand tools and old pumps may also be found at the scene. Any of these items might supply information useful in identifying the suspects. It should also be noted that many of these items could be found in the interior of the drums and, accordingly, the interior of drums with removable tops should be inspected. Any documents found inside drums should be carefully packaged for future examination and clearly marked so that document examiners are aware of the possibility of hazardous waste contamination.



Field of used lead-acid batteries in Cambodia Source: Photo SBC

6.1.4.3 Container

Information found on the exterior of the drums, such as labels, writing on the drums and regulatory information can assist the environmental investigator in locating the suspected traffickers.

(a) Labels

Labels should be recorded, photographed and removed whenever possible. Information regarding the original manufacturer, lot numbers and the type of product may be listed on the label. If this information is present, the manufacturer should be contacted and a list of customers obtained. These consumers can then be checked for previous hazardous waste shipments and past regulatory agency inspections.

If the only information remaining on the label is the product name, a chemical buyers directory will

supply the investigator with a list of companies that manufacture that particular product. Each company is likely to use a different label and, accordingly, by supplying these companies with photographs of the labels recovered at the environmental crime scene, the actual chemical supplier may be identified and a customer list obtained.

(b) Writing on the drums

Handwritten information on drums may be of great value to the environmental investigator. Similar number codes and word patterns found at different crime scenes may link those crime scenes. In addition, a handwritten sequential numbering system found on the drums may be indicative of a prior environmental survey. If the exporter retained a private environmental company to inventory and classify the wastes, it would be a standard industry practice for the company to number the drums sequentially for chemical sample identification purposes and to provide the exporter with the results of the sample analysis, which could be valuable evidence for the Customs officer.

6.1.4.4 Department of transportation information

Departments of transportation often require the manufacturers of drums to place certain data on the drums prior to their being filled with a hazardous material.

The following designations are illustrative of the type of information on such drums:

- UN = United Nations;
- 1A2 = 1 (drum), A (steel), 2 (open head);
- Y = Packaging for group II and III tests;
- 1.2 = Specific gravity or mass for package design;
- 100 = Pressure test in kilo pacals (hydrostatic test);
- 5/96 = Month and year of drum manufacture;
- US = Country of origin;
- M4709 = Code for name and address or symbol of drum manufacturer.

The two most important pieces of information listed above are the month and year of the drum's manufacture and the code that lists the name and address of the drum manufacturer. These two items alone may assist the investigator in both isolating and eliminating suspects.

The month and year of the drum's manufacture is vital because of the simple fact that it eliminates suspects. When the original chemical supplier and chemical name is known, the environmental investigator may limit his or her list of suspects to those companies that purchased that particular chemical product after the date found on the container. As a result, any company that purchased that particular chemical product prior to the date is eliminated as a suspect.

The code listing of the drum manufacturer's name and address can also assist. Many drums are manufactured with particular colour schemes (for example, blue drums with yellow tops). A chemical manufacturer may order only one drum colour scheme from the drum manufacturer. Once the drum manufacturer has been located, they should be shown a photograph of the drum containing the suspected hazardous waste. If there are any distinguishing features on the drum, the drum manufacturer may be able to identify the chemical product manufacturer that purchased the drum.

You can find the UN Recommendations on the Transport of Dangerous Goods, Model Regulations at <http://www.unece.org/trans/danger/danger.htm>



1. What are the four essential steps which should be followed when investigating a suspected illegal shipment of hazardous wastes?

7 MODEL INVESTIGATION INTO ILLEGAL TRAFFIC OF HAZARDOUS WASTES

7.1 Multidisciplinary approach to hazardous waste investigations

Successful investigation and prosecution of illegal traffickers in hazardous wastes require the application of several different disciplines. Environmental investigators must have basic police skills such as interviewing and interrogation, surveillance and experience in the proper handling of evidence. In addition, they must bring a team trained and equipped to gather physical evidence at an environmental crime scene. This requires expertise in the handling of hazardous materials and an understanding of the appropriate environmental laws, supporting regulations and hazardous waste sampling and analysis protocols. Officers must approach all potential hazardous waste sites with caution. Individuals without proper training in dealing with hazardous wastes should not enter the site. The safe, effective and proper investigation of this type of case requires the commitment of specially trained individuals.

The crime scene investigation team should include, at a minimum, two environmental investigators, two individuals trained in obtaining chemical evidence samples, a crime scene safety officer, an emergency backup safety team, and a science officer. For safety reasons, the so-called "buddy system" should be utilized whenever an approach to hazardous wastes is made, for instance, environmental investigators and sampling team. The science officer should be an individual with a strong chemistry background such as a forensic chemist. This type of team formulation brings together the analytical, sampling, safety and science disciplines that are required to properly conduct an investigation into criminal hazardous waste abandonment.

7.2 Standard operating procedures

It is recommended that standard operating procedures be established to ensure the health and safety of the environmental investigators working in areas which may contain hazardous wastes. These procedures should comprise the organizational work plan, site evaluation, site control, monitoring, personal protective equipment, and communications and decontamination procedures. In addition, it is recommended that standard evidence gathering procedures be incorporated into the operating procedures, including note taking, removal of fingerprints, tyre track and footprint castings, the crime scene sketch, crime scene photography and evidence chain-of-custody procedures.²

² "Chain of custody" refers to tracing of an item of evidence from the point at which it was collected to presentation of the evidence (or the results of tests on the evidence) at a criminal trial. It is a process used to maintain and document the chronological history of the specimen, recording each person who takes custody of a specimen, and the date of each transfer of custody. This is necessary to defend against allegations of tampering or misconduct that may be used by the defence.

There are typically two stages to the search of the crime scene, the first being traditional evidence gathering by the criminal investigation team and the second chemical evidence gathering by the sampling team. These procedures are described below.

7.3 Locating and using resources

One of the most difficult challenges facing the environmental investigator is locating and utilizing the resources necessary to effectively gather evidence at an environmental crime scene.

(a) Safety resources

Whenever the presence of hazardous substances is suspected at an environmental crime scene, a qualified safety officer, a backup team and decontamination facilities are needed. The first step in locating safety resources is the identification of a local hazardous material response team. In some jurisdictions, this team may fall under the control of the local fire department, while in others it may be a function of the local police department. There is a mutual benefit in having trained investigators and hazardous materials team emergency responders working and training together. Most hazardous materials teams are designed to mitigate dangerous situations involving the release or potential release of hazardous chemicals, but are normally not trained in the criminal investigation techniques necessary to secure a prosecution.

(b) Sampling resources

The proper gathering of chemical evidence is crucial to the success of any criminal environmental investigation. The personnel utilized for this procedure must be highly trained in safety, hazardous waste sampling and the handling of criminal evidence. Sometimes, local and state regulatory agencies have such individuals available to assist the investigator.

7.4 Arrival at the hazardous waste crime scene

Upon arrival at the crime scene, the environmental investigator should locate the individual in charge (usually

the incident coordinator, who may be a fire chief, police officer, or a representative from a regulatory agency) to obtain information regarding the initial reporting of the incident, names of possible witnesses and a listing of those first on the scene who may have had physical contact with the crime scene. These individuals may have inadvertently contaminated the crime scene and it may become necessary to obtain samples of their footprints, fingerprints or vehicle tyre tracks. These samples can then be compared to any physical evidence left behind by the suspects. Any evidence identified as belonging to those first on the scene can then be eliminated.

Those persons may have conducted initial field tests on the chemical evidence (for example, pH, L.E.L or lower explosive limit, radiological). If any such tests have been completed prior to the arrival of the investigator, the results and methods must be obtained as these may help determine the types of analysis that will need to be conducted on the chemical evidence. In addition, the investigator must determine if the initial field testing methods caused any possible cross-contamination of the chemical evidence.

7.4.1 Crime scene coordinator

The crime scene coordinator is the primary environmental investigator assigned to the criminal investigation and responsible for the crime scene until the search is closed. The responsibilities of the crime scene coordinator at each stage of an investigation are identified in the following paragraphs.

7.4.2 Safety officer

A safety officer must be present during any search or chemical evidence gathering operation involving hazardous wastes. All issues regarding personnel safety are the responsibility of the safety officer. A hazardous materials team, the medical team and the decontamination team should report directly to the safety officer. This individual will also determine the level of personal protective equipment to be worn by those entering any designated hot zone and the decontamination procedures to be followed. The collection of chemical evidence should not begin without the safety officer's knowledge and approval. It is essential that the safety officer and crime scene coordinator be in continuous communication with each other throughout all evidence gathering activities.

7.4.3 Hazardous materials team

The hazardous materials team acts as support and emergency rescue for the investigative team and the sampling team working within the designated hot zone or confined space. The number of support personnel present should equal the number of personnel in the investigative or sampling team within a hot zone or confined space.



Make sure you know whom to contact when you are faced with a crime scene!!

7.4.4 Decontamination

Scenes of crime where hazardous waste has been abandoned may involve chemical, biological or radiological hazards. The decontamination procedure to be followed by individuals exiting a designated hot zone will be determined by the safety officer based upon the hazards involved. This procedure may include simply removing and bagging contaminated clothing. However, it may be necessary for all personnel exiting the hot zone to go through a multiple wash-down procedure. This procedure may produce contaminated wastewater which should be pumped into a recovery drum, sampled and disposed of.

7.4.5 Emergency medical assistance

Whether or not to have a hazardous materials-certified medical team at a hazardous waste crime scene will depend on several factors such as an evaluation of the hazard involved, the location of the nearest medical facility, and the weather conditions. If the chemical hazards present at the crime scene require the use of fully encapsulated chemical suits (Level A), it is recommended that the hazardous materials medical team be present while evidence is being gathered.



Do you have the contact details for the medical facilities in your country equipped to address medical problems resulting from contacts with hazardous substances?

7.4.6 Sampling team

Sampling is the most difficult and dangerous activity conducted at any scene of crime where hazardous waste has been abandoned. The proper gathering of chemical evidence goes far beyond collecting liquid or solid samples and placing them in containers. Those doing sampling must be concerned with such issues as personal safety, evidence cross-contamination, proper sampling methodology and maintaining the chain of custody for the chemical evidence. The sampling team should be fully briefed by the scene of crime coordinator as to which hazardous waste containers are to be sampled and what types of analyses will be conducted on the chemical evidence.

7.4.7 Science officer and the laboratory team

Many jurisdictions may lack the resources necessary to enable a laboratory team to respond to a scene of crime where hazardous waste has been abandoned and the environmental investigator may need to rely on the expertise of the sampling team when dealing with such issues as equipment sterilization and the proper recording of sampling methodologies. However, if a laboratory team is available, it should include at least one qualified forensic chemist and the members of the team must be trained in the handling of criminal evidence and hazardous materials. Each piece of equipment used to collect chemical evidence must be thoroughly inspected and sterilized by the laboratory team prior to

being utilized at the crime scene and a full record of the sterilization procedure should be maintained.

Once at the crime scene, the laboratory team will maintain a record of the samples that have been taken, what scientific field tests have been conducted and the results of these tests. In addition, they will maintain a log of the sampling methodology utilized by the sampling team. The laboratory team follow procedures that will rule out any possibility of cross-contamination or outside contamination of the chemical evidence to maintain the integrity of the evidence. At the closure of the crime scene the laboratory team will take custody of the chemical evidence and transport it to a laboratory or chemical evidence storage area.

It is recommended that a qualified individual be appointed the site science officer at the crime scene. This individual may assist the investigator in the identification of various chemical waste products and in determining the proper sampling and analytical methodologies required based upon field test results.

7.5 Traditional evidence gathering in the hot zone

7.5.1 Equipment

Most successful criminal investigations, be they burglaries, arsons or homicides, depend upon the investigator's ability to examine and gather physical evidence. Even in situations where evidence technicians are gathering the physical evidence, this is normally done under the direct supervision of the criminal investigator. This same basic investigative principle also applies to criminal environmental investigations. The criminal environmental investigator must be equipped with the proper crime scene, safety and field monitoring equipment for a safe and proper examination of any physical evidence found at an environmental crime scene.

Once all the personnel at the crime scene has been fully briefed and the safety protocols established, the crime scene coordinator and his or her partner will enter the hot zone and commence the evidence gathering operation. To safely and efficiently complete this task, the investigators must have the proper equipment with them when entering the hot zone. The type and scope of the chemical hazards will dictate the equipment requirements for the crime scene investigation team.

There are many basic forensic investigative tools that will be used at most environmental crime scenes. It is essential that this equipment be properly inventoried and tested prior to entry into the hot zone. This equipment should include a complete battery change for all portable electronic equipment including field test devices, cameras, camera flash units, video cameras and communications equipment. Field testing devices should be calibrated and tested prior to entry into the trailer. All safety equipment should be examined carefully. If respirators are going to be used, the cartridges should

be new and designed for respiratory protection based upon the hazard present. If self-contained breathing apparatus is to be used, all air tanks should be completely filled. There should be enough safety and sampling gloves available to allow for a three layer system. This will allow for the outer layer to be changed after handling contaminated evidence inside the trailer, to avoid cross contamination that may skew future analytical results and affect the overall quality of the chemical evidence collection and analytical process.

Each individual piece of equipment should be laid out on a large tarpaulin. This will assist in protecting the equipment from dirt and ground moisture. These preparation procedures are essential due to the simple fact that any non-functional or missing piece of equipment must be replaced. This will, in all likelihood, require the entire crime scene investigation team to exit the crime scene and receive a full decontamination, costing time, energy and valuable resources.

Sampling placards may be numbered prior to the entry into the crime scene. Extra blank placards may be taken into the crime scene; however a permanent marker should not be used in the presence of chemical evidence. This is due to the chemical makeup of permanent marking pens. Many of these marking instruments contain volatile organic compounds (for example, 2-ethoxyethanol: CAS# 110-80-5, 2-methoxyethano: CAS#109-86-4) which may, inadvertently, act as an interferent during the sampling and analytical process. For a typical hazardous waste abandonment crime scene involving abandoned drums, the investigating team's equipment should include:

- *Appropriate chemical clothing (Fully encapsulating suit) based upon the suspected chemical hazard.*
 - *Steel-toed, chemical-proof boots.*
 - *Appropriate chemical gloves based upon the suspected chemical hazard.*
-
- *Several pairs of surgical gloves.*
 - *A self-contained breathing apparatus with a full 60 minute air bottle and a spare 60 minute air bottle.*
 - *An aluminium (non-sparking) clipboard.*
-
- *A pen for crime scene notes.*
 - *A bold marker for filling in sample point identification information on the sampling placards.*
 - *Several pre-printed placards for sample point identification.*
-
- *Duct Tape, magnetic clips or suction cup clips for attaching sampling placards to the hazardous waste containers.*
 - *An L.E.L./O₂ meter for atmosphere flammability readings.*
 - *A radiological meter capable of determining the presence of alpha particles, beta particles or gamma rays (geiger counter).*
-
- *pH paper and pH chart.*
 - *A waterproof auto-focus camera with sealed electronic flash.*

- *Evidence bags of assorted sizes.*
-
- *A beryllium (spark proof) bung wrench which is capable of opening various types of hazardous waste containers.*
 - *A knife capable of cutting tape. This item should be taped to the calf of the environmental investigator and may be used under emergency conditions to cut away and remove a severely contaminated chemical suit.*
 - *A fingerprint kit equipped with various dusting powders, brushes and fingerprint lifting tape.*
-
- *A stethoscope for the audio monitoring of any container which appears to be swollen.*
 - *Communication equipment which will allow for hands-free operation and direct communication with the safety officer and other individuals working within the hot zone.*
 - *Goggles*
-
- *Binoculars*
 - *Flashlight*
 - *First Aid Kit*
-
- *Measuring tape*
 - *Trash bags*
 - *Compass*
-
- *Emergency response book*
 - *Cartridge Respirator*
 - *Dosimeter*
-
- *Chemical dictionary*
 - *Sterilized sample bottles*

7.5.2 Tasks

The main tasks of the crime scene investigation team are to identify and collect traditional evidence and the placarding of those containers that are to be sampled. The actual number of containers that will be sampled will depend upon a variety of factors, including budgetary limitations and statutory requirements.

The investigation team should not enter the hot zone until all equipment and safety protocols have been satisfied. A safety backup team should be standing by to assist them in case of an emergency.

While inside the hot zone, the investigative team should attempt to complete the following evidence gathering tasks:

- *Photograph the entire undisturbed crime scene from all angles.*
- *Complete a radiological survey of the entire crime scene. The radiological survey should begin at the outermost perimeter, with continuous readings being made up to the surface areas of all hazardous waste containers.*
- *Complete a meter reading to determine if any potentially flammable gases are present.*

Determine if the material has been spilled or is leaking from the hazardous waste containers.

Determine if any of the hazardous waste containers appear to be swollen. This is an indication that the material inside the containers may be under extreme pressure.

Determine if any of the hazardous waste containers are making noise. Such noises may be pings or pops. These sounds may be spaced several seconds apart. If they become more rapid, the hot zone should be evacuated immediately. This may be an indication that the metal container is stretching due to extreme interior pressure and that the container may be on the verge of catastrophic failure. This audio examination may be accomplished through the use of a stethoscope. Any interior container noise should be reported to the safety officer immediately.

Determine if there are any signs of waste crystallization. This may be indicative of explosive peroxides or sodium cyanide. Any signs of product crystallization should be reported to the safety officer immediately.

Note, photograph and cast, any footprints or tyre tracks present.

Note, photograph and lift any fingerprints on the hazardous waste containers. Special attention should be paid to bottom surfaces of any drums or cans. These are the natural gripping areas used to lift these types of containers. If the suspects lifted the containers without gloves, the bottom surfaces will be the most likely areas in which fingerprints may be found.

Photograph and record any Department of Transportation information, all label information and other markings on the containers. If the label is legible and can be removed intact, it should be recovered and placed in an evidence bag. Many labels may have illegible, yet potentially valuable, information on them. If they cannot be removed intact, the metal area surrounding the label should be carefully cut out after the chemical evidence has been removed. This procedure will require that the hazardous waste be transferred to a recovery drum. It may also require numerous rinses which will produce contaminated waste water, which should be contained and disposed of properly. This type of evidence recovery is difficult and should be done only under the supervision of qualified chemists and hazardous material trained personnel. In addition, every effort should be made to identify the chemical waste and its characteristics prior to attempting this type of evidence recovery. At the completion of this operation, the cut piece of metal and the attached illegible label should be sent to the documents department of a crime laboratory. Information on faded labels may be raised using document enhancement techniques, such as infrared and infrared fluorescence.

Carefully search the surrounding ground area for any other form of physical evidence. Any closed hazardous waste containers should be lifted or tilted so that their undersides and the ground area underneath the containers may be examined for possible physical evidence.

A sketch should be made of the entire crime scene including the position and location of each hazardous waste container, and the location of any other physical evidence recovered.

Open each drum and undertake the L.E.L. and radiological tests. The L.E.L. reading should be taken directly over the exposed hazardous wastes. This will assist in determining if any flammable vapours are being produced by the hazardous wastes. A radiological reading should be taken directly over the exposed hazardous wastes. Radioactive alpha and beta particles may be shielded by the plastic or metal which makes up the hazardous waste container's construction.

If the hazardous waste containers have removable lids, remove the lids and examine the interiors of the containers. The interiors of these containers may contain other physical evidence, such as trash and smaller containers.

Conduct a field pH test on the hazardous waste to assist in determining the types of chemical analysis which will be needed to further the investigation.

Physically examine the hazardous wastes using a Coliwasa Tube. This will supply a visual perspective of the waste column and may assist in determining analytical needs.

Placard and photograph each hazardous waste container that has been selected for sampling. The sampling placard should contain, at a minimum, agency information, the current date and the field sample number. Tape, magnets and suction cup devices can be used to secure the placards in place. The simple act of securing the sample placards in their positions can be a difficult, time consuming and frustrating task when faced with a stiff draft or greasy surface. However, the placing and securing of these placards at each sample point will assist the sample team in locating the exact location of each sample point.

Once at the crime scene, a communications check should be made to ensure that the members of the investigation team have direct radio communication with each other and any safety personnel. A large impervious tarpaulin should be spread out on a flat surface area near the entrance to the hot zone. This will serve as a temporary equipment storage area for the crime scene equipment that will be used during the course of the environmental investigation. Immediately following this, the environmental investigators must conduct a complete radiological survey of the entire crime scene. The survey instrument must be capable, at a minimum, of detecting alpha, beta and gamma radiation. The radiological survey should begin outside the crime scene, with continuous readings being made up to the surface areas of the hazardous waste containers or to the point at which a 2mr (millirem) reading is obtained. Each container should be opened and a survey probe should then be placed near or at the opening of each container. The reason for this is that alpha and

beta particles may be shielded from detection by the container's composition. A simple mailing envelope will shield alpha particles and a metal container may shield beta particles. Each drum should be resealed prior to the opening of another drum for examination. The survey instrument's readings, including negative readings, must be recorded and maintained. It is an acceptable practice to transmit this type of information to another individual located outside the contaminated area. He or she can then make the appropriate entries in the crime scene records thereby reducing the number of tasks required by the crime scene investigation team.

An L.E.L./O₂ reading should also be conducted within the hot zone. This will determine if any potentially flammable gases are present. As with the radiological readings, the probe or sensor unit on the L.E.L. meter should be placed at or near the opening of any suspected containers. An oxygen (O₂) measurement should be conducted immediately after the L.E.L. reading. The O₂ meter should be kept on at all times and the automatic audible alarms should be set for both high and low readings. A high oxygen reading (>21%) may pose a significant fire hazard. A low oxygen reading may be an indication that an unknown chemical substance has displaced the oxygen. The results of the initial L.E.L./O₂ monitoring event, including any negative results, should be recorded in the crime scene record.

The next step in the investigative process is to obtain overall photographs and videotape footage of the crime scene. The photographs and videotapes will depict the crime scene as it was when entered by the crime scene investigation team. They will not, in all likelihood, depict an undisturbed crime scene. This is due to the fact that emergency response personnel may have previously entered the crime scene. The purpose of still photography and videotaping is to record the crime scene and any evidence it may contain. It is not done to record the activities of a crime scene investigation team or sampling team. Under no circumstances should the actions of these groups be recorded on film. The written record contained in the crime scene notes should accurately recreate the actions of the crime scene investigation team and sampling teams.

At this point in the environmental investigation, traditional evidence should be searched for, photographed and collected. This may include footprints, fingerprints, rubbish and any other item determined to be of evidentiary value. If footprints are found within the trailer, it may be difficult to differentiate between those of the suspects and those of the emergency personnel. One method of dealing with this issue is to identify the emergency personnel who had previously entered the trailer. Investigative law enforcement personnel should make every effort to locate those persons before they leave the scene. Footprint impressions of their footwear should be taken and photographed. They can later be compared to all footprint evidence found near or inside the trailer. Should it be decided that footprint or tyre track castings are to be taken, every effort must be made to protect these items from the elements and accidental destruction.

Each hazardous waste container should be examined for metal stress. A visual inspection may indicate that the top or sides of the container are swollen. This is indicative of a chemical reaction occurring inside the container. The build-up of internal gasses will normally force an expansion of the top or sides of a metal drum. This type of container is extremely dangerous and remote opening options should be explored. A metal container which indicates an expansion on the top and bottom areas is indicative of a prior freezing of the container's contents. This observation may be very valuable in determining the history of these types of containers.

Locating and lifting fingerprints while wearing the required safety equipment can be an extremely difficult task. This is especially true when wearing level A protective equipment. Due to the reduced visibility and dexterity associated with the wearing of PPE, there is a very good chance that fingerprints may be destroyed during the lifting process. It is essential that any fingerprints found within the trailer be photographed with a 1 to 1 camera prior to their removal. The collection of fingerprint evidence is just one of the many disciplines involved in environmental forensics that must be continually practiced by investigative law enforcement personnel.

Other forms of traditional evidence, such as soft drink cans, empty cigarette packs, or documentation may be contaminated from spills or leaks inside the crime scene. These items should be photographed and placed in a three layer evidence containment system. The crime scene sketch should clearly indicate where each of the items was found. There are specific surface areas on hazardous waste containers, such as 55 gallon drums that are normally used for gripping, lifting and moving (for example, near the top and bottom rims). These areas must be searched thoroughly for fingerprints. Each container should also be searched for any numbers that may identify the container's manufacturer. This information, along with any other labels or markings, may be critical to the investigation and must be recorded in the crime scene record and photographed. If a legible label is found it should be removed and placed in an evidence bag. Most labels are affixed to the container with some type of glue. Applying heat to the label may soften the glue thereby making the label easier to remove. Heat may be applied through the use of an intrinsically safe, portable hair dryer. However, this technique should not be used if the chemical evidence inside the containers is thermal reactive or if the chemicals are producing flammable vapours. The location of the labels removed and any container manufacturer information should be placed on the sketch of the container. Each container should be lifted and tilted and the underside examined for possible physical evidence.

Fifty-five gallon containers will normally have one or two small entry ports on the top of the container, commonly referred to as a bung hole. Some containers may also have lids that are completely removable. Should a container have a removable lid, it should be removed

and the interior of the container searched for physical evidence. The search must include any areas below any existing liquid surface, and this can be accomplished through the use of a probe. However, the probe may only be used on one container and must not be reused; the reuse of a probe will cause cross contamination of the chemical evidence. The crime scene investigation team can visually examine the chemical waste in these types of containers. This can be accomplished through the use of a composite liquid waste sampling tube (for example, coliwasa tube). This device will allow for a visual inspection of the chemical layering that may occur in these types of containers. The results of this visual inspection should be recorded in the crime scene record and should be discussed with the sampling team.

In addition to the visual examination of the actual waste, two other methods should be employed to help in determining which containers should be sampled. An examination of any hazard labels (for example, flammable or corrosive, may assist in determining the characteristics of the chemical waste. However, a label such as this is indicative of the type of chemical that was originally in the container and may not have any bearing on the type of chemical that is currently present. To better characterize the waste, field testing instruments may be used (for a description of the field tests, see section 7.9 below).

After the crime scene investigation team has collected all of the traditional evidence, placarded the appropriate containers for sampling, and photographed the entire crime scene, they should exit the crime scene area and proceed to the decontamination area. When working with a limited air supply (for example, when using a self-contained breathing apparatus), the investigators may find that several entries into the crime scene are required to complete all of the investigative tasks described above. Investigative law enforcement personnel must avoid any policy that allows a single team to complete the traditional evidence collection and collect chemical evidence samples. The multitude of investigative tasks, the complexity of sampling, and the inherent hazards associated with hazardous chemical evidence collection activities clearly makes this a poor policy.

After completing the appropriate decontamination protocol, the investigation team should confirm that all evidence removed from the crime scene has been properly labelled and secured, including any sketches, film, digital media or video recordings. After this, the crime scene investigation team should conduct a post-search briefing.

7.6 Post-search briefing

The post-search briefing is a crucial element of the crime scene investigation. The safety officer, science officer, safety team and the sampling team should attend the briefing. This will allow the entire investigative law enforcement team to be brought together in an effort to establish specific team assignments and to prepare a

plan of action that will ensure that the chemical evidence is collected in a safe, efficient, and legally acceptable manner. The briefing also provides the opportunity for the investigation team to relay to the others their observations during the initial search and allow others to review any sketches, photographs, videotapes, or data from any field tests results.

The post-search briefing will assist the safety officer in establishing the appropriate safety plan before the sample team begins the sampling operation. The safety plan must address such issues as emergency evacuation procedures, emergency medical care, communications, PPE requirements, allowable working times, specialized safety equipment (for example, in a confined space), expected weather conditions and decontamination requirements.

The post-search briefing will also serve to establish the sampling team. This should include the identification of the lead sampler and the assistant sampler. Additionally, the sampling team must be advised as to the location and description (such as location, matrix or volume) of each sample point so that the appropriate sample plan can be created.

The review of the information obtained during the initial crime scene investigation, when combined with the safety and sample plans, will form the basis of the operations plan that will be utilized during the next critical stage of the crime scene investigation.

7.7 Hazardous waste and chemical evidence gathering: the sampling operation

This is the most critical part of the evidence gathering at a crime scene of hazardous waste abandonment. Normally, at the conclusion of the search, a licenced hazardous waste transporter removes the hazardous waste. It is then taken to a facility for safe treatment or eventual disposal. Due to the limited amount of time that the chemical evidence is available, it is essential that the proper analytical requirements be determined at the crime scene. All of the available information must be evaluated in making the determination as to what types of analyses will be required to further the investigation and meet the requirements of any criminal legislation.

Due to the complexities involved with chemical evidence gathering, the potential for error is high. The crime scene coordinator, safety officer and science officer should, if possible, witness the sampling operation from outside the hot zone. Through the use of radio communication, simple reminders and corrections can be relayed to the sampling team if necessary. In addition, the sampling team may identify evidence overlooked by the investigative team and may determine that additional analytical parameters are required.

The sampling team should also determine the volume of material present in each hazardous waste container sampled. Each measurement should correspond to

a particular sample point (for instance, field sample # 1SD 3/21/97 = 27 inches of liquid). A full description of the hazardous waste containers and a record of any hazardous waste measurements made by the sampling team should be maintained by the crime scene coordinator.

At the completion of all evidence gathering activities, the chemical evidence should be properly sealed, stored and transported to a laboratory or chemical evidence holding area. A proper chain of custody must be maintained at all times.

(a) The sampling plan

The collection of samples at environmental crime scenes requires preparation and planning. The proper selection and preparation of sampling equipment, methods of sample collection, types of analyses required, site contamination control, chain of custody and storage of evidence are critical to a successful investigation and prosecution. The environmental investigator has a responsibility to ensure that the chemical evidence is collected and maintained properly. To fulfil this responsibility one must have adequate knowledge of accepted sampling protocols and analytical methods approved by local, state or national agencies.

The primary objective of a sampling plan for a hazardous waste, is to collect samples that will allow measurements of the chemical properties of the waste that are both accurate and precise. In order to ensure that sampling objectives are met, the environmental investigator must develop a sampling plan that will provide the evidence necessary to further the investigation and, at the same time, satisfy the sample collection criteria of the approved analytical method to be used. The sampling plan will normally indicate the types of chemical analysis required (based upon prior knowledge of the waste stream or information developed during the search by the investigation team), sample point location, sampling equipment requirements, cross-contamination and outside contamination control samples, chain of custody procedures, personal protective equipment and other safety issues.

The sampling plan should be based upon the current and expected environmental conditions like the weather and the type of substance to be sampled, such as liquid chemical waste. Other factors, such as safety equipment degradation and permeation rates, sample point location and expected lighting conditions must be considered when prioritizing the sample collection order. Whenever possible, the most difficult samples should be scheduled to be collected first. Samples such as these may require the wearing of level A protective suits or require the use of remote sampling devices due to the suspected toxicity or reactivity of the chemical waste.

The sampling plan must also address the various types of sampling tools, sampling media and

sampling containers that are going to be utilized during the chemical forensic evidence collection process. The proper preparation and selection of these items is critical. In most instances, sampling equipment will have been sterilized, sealed and stored in emergency response vehicles prior to going to an environmental crime scene. It is essential that a record be maintained about the equipment preparation protocol. Careful attention must be given to the selection of the sampling equipment. Choosing the wrong item for a sampling task will have a major impact upon the quality and reliability of any future chemical forensic analysis. This is especially true when choosing sampling containers. Should the chemical waste sampled (for example, volatile and semi-volatile compounds) be placed in a plastic sampling container, there exists the possibility of a chemical reaction between the sample and the hydrocarbons within the plastic.

The sampling plan must address the issue of sample documentation. Proper sample sheets must be prepared and maintained throughout the course of the sampling event. These sample sheets will travel with the samples throughout the analytical process. When triple sample containment is utilized for packaging and transportation purposes, the sample sheets may be placed between the second and third containment barriers. The sample sheets must contain at a minimum, the sample number (which must match the sampling placard) date, time, ambient temperature, location of the sample, description of the sample (for example, matrix, colour and volume), sampling equipment and media used and the names of the lead and assistant samplers. The sample sheets may also contain chain of custody information. The sampling plan must also assign responsibility for record keeping. This should include the proper labelling of all sample containers. The sample plan must also address the procedures that will be used for sample container labelling. Sample container labelling should be completed prior to entry into the crime scene. A sampling container label should contain the sample number, date and name of the lead sampler. Caution should be exhibited when labelling sampling containers to be used in cases involving hazardous waste products. In cases such as these, permanent markers should not be used. As stated earlier, permanent markers are known to contain various volatile organic compounds (VOCs). Exposing a chemical sampling container to VOCs may impact upon the analytical process and jeopardize the integrity of the chemical evidence.

Other items that must be addressed in the sampling plan are the preparation and use of trip blanks (field blanks) and equipment blanks. The trip blank is required to prove that no outside contamination has affected the chemical evidence. The types and number of trip blanks will depend upon the type of substance being sampled, its matrix and the number of samples expected to be collected. The trip blanks should be prepared outside the crime scene and there should be at least two trip blanks prepared for

every ten samples expected to be collected. The trip blanks should be labelled as samples and should accompany the sampling containers into the crime scene. Separate sample sheets should be prepared for each trip blank.

The use of equipment blanks may become necessary during the course of the chemical evidence collection process. It may become necessary to reuse a contaminated sampling tool during the evidence collection process. Should this situation occur, the sampling plan should provide the necessary procedure for this type of activity. In most cases, the contaminated item should be cleaned and rinsed several times. At the end of this cleaning process, distilled water will be run over the sampling item. This liquid rinse should then be collected as an equipment blank. This sample should be labelled and sealed in the same manner as the samples described above. An analysis of the equipment blank will prove that the reused sampling item was free of contamination at the time of its use.

The sampling plan must also consider such items as waste management, sample carrying trays and non-reusable surface barriers such as an impervious black plastic sheet that must be utilized to protect the sampling equipment from ground and surface contamination. The plan must also address chemical evidence preservation.

The sampling plan should also include the maintaining of a sample log. This log should be maintained throughout the sampling event. The heading in the sample log must indicate the exact crime scene location, the current date, weather conditions, and names of the designated lead and assistant samplers. Each hazardous waste drum sampled and any supporting information must be recorded. The supporting information must include the time of day for each sample collected, field test data, descriptions of sampling equipment used, descriptions of sample containers used, description of each container and potential analytical parameters.

The sampling plan should be thoroughly reviewed by the entire crime scene investigation team. Once this has been completed the sampling team may begin to prepare themselves to enter the crime scene. With the proper safety and sampling protocols in place, the sampling team may begin the processes of chemical evidence collection.

(b) Sampling bottle identification and preparation

There are numerous types of sample collection containers available today. The sample containers listed below are those commonly used for the collection of chemical evidence at environmental crime scenes but it is by no means an all inclusive list.

Each sampling container, regardless of its intended use, will require some form of preparation prior to

utilization. The investigator must ensure that the proper preparation procedures have been followed and that documentation exists which clearly indicates the name of the individual who prepared the sampling containers, the methodology used and the date on which they were prepared. Court challenges based on possible sample contamination due to pre-existing container contamination will be prevented by utilizing and documenting the proper preparation procedures.

Volatile organic compound bottle: The sampling containers used for volatile organic compound collection are standard 40 ml glass, screw-cap bottles with Teflon-lined silicon septa. These sampling containers may be used for both liquids and solids. The vials and septa should be washed with a detergent, rinsed with tap and distilled water and dried in an oven for 1 hour at 105°C before use.

Semi-volatile organic compound bottle: The sampling containers used for collecting semi-volatile organic compounds (including herbicides and pesticides) should be composed of glass or Teflon and have screw-caps with Teflon-lined septa. The vials should be washed with detergent, rinsed with tap water, rinsed with distilled water and then rinsed with methanol (or isopropanol).

Inorganic compound bottle: The sampling containers used for inorganic compounds (including total metals and T.C.L.P metals) should be composed of linear polyethylene, polypropylene, borosilicate glass or Teflon. The containers should be prepared using the following steps: detergent wash, tap water rinse, 1:1 nitric acid rinse, tap water rinse, 1:1 hydrochloric acid rinse, tap water rinse and a metal-free water rinse.

Ignitability bottle: The sampling containers used for the determination of ignitability should be standard glass, screw-cap bottles, with Teflon-lined silicon septa. These sample containers may be used for both liquids and solids. The vials and septa should be washed with a detergent, rinsed with tap water and distilled water and dried in an oven for 1 hour at 105°C before use.

Cyanide bottle: Cyanide samples may be collected in glass or plastic bottles, which should be cleaned and rinsed thoroughly.

Oil and grease or total petroleum hydrocarbons bottle: These sample collection containers should be made of glass, approximately 1 litre in size, with a PTFE-lined screw-cap. The sampling containers should be prepared by using a detergent wash, tap water rinse and baked at 200–250°C for a minimum of 1 hour. After cooling, the mouth of the bottle should be covered with aluminium foil and a screw-cap placed on the bottle. A solvent wash may be used in place of baking.

Phenols and polychlorinated biphenyl bottle: Sampling containers used for determining phenols and polychlorinated biphenyls should be standard glass, screw-cap bottles, with Teflon-lined silicon septa. The vials and septa should be washed with a detergent,

rinsed with distilled or de-ionised water and dried in an oven at 105°C for approximately 1 hour.

(c) Sample device identification and preparation

The sampling devices listed below are just a few of the items which may be used for chemical evidence collection at an environmental crime scene. Each sampling device listed below has a specific use depending upon the location and type of the material being sampled.

- Coliwasa tube
- Extension auger
- Ponar grab sampler
- Weighted sampler
- Dipper
- Bailer
- Shovels
- Spoons
- Back hoe

Ideally, a separate sampling device should be prepared for each sample point. However, this would require the purchase and preparation of numerous duplicate items. While coliwasa tubes may be inexpensive and disposable, other sampling devices such as stainless steel extension augers and Ponar grab samplers are not. Normally, only one or two of these expensive sampling devices would be available to the environmentally investigator at a crime scene. Therefore, in order to maintain the integrity of the chemical evidence, it may become necessary to clean and prepare, for reuse, certain sampling devices while at the crime scene. This includes the washing of the sampling device with a detergent. The device should then be rinsed with tap water and then rinsed again with distilled water.

7.8 Types of analysis

Due to the different sampling container requirements described above, the investigator at an environmental crime scene must decide the correct analysis to be performed on the chemical evidence before any chemical evidence is gathered. Many factors must be taken into account when making this decision, including the physical appearance of the waste product, information developed at the scene and any statutory requirements. The environmental investigator must know what needs to be proven under the applicable statute

and which chemical analyses are needed to further the investigation (for example, trace amounts of chemicals found for forensic connections). The following is a list of some of the more common analytical parameters which may be tested at a hazardous waste crime scene:

- Volatile organic compounds
- Semi-volatile organic compounds
- Metals analysis
- Total characteristic leaching procedure
- EP toxicity
- Total petroleum hydrocarbons
- Cyanide
- Polychlorinated biphenyls
- Ignitability
- PH
- Radiation
- Asbestos
- Corrosiveness
- Faecal Coliform

7.9 Field tests

Field tests at an environmental crime scene will assist the investigator in evaluating the degree of hazard associated with the working environment and may assist in determining which containers should be placarded for chemical sampling. These field tests should be completely documented, indicating the type of test, equipment utilized, test results and the name of the individual conducting the test. The following is a partial listing of the various field tests which may be utilized at an environmental crime scene:

(a) pH

A simple pH field test will help determine the presence of acids or caustics. This is vital information for both the sampling team and analytical personnel. An extremely high or low pH will make the evidence collection process more difficult and time consuming. Hazardous waste with a high or low pH can affect the sampling technique, safety equipment degradation rates and breakthrough times, sampling containers and sampling tools. It is also a useful tool in the locating of sample points. Any liquid with a pH reading outside of the normal range of between 6.5 and 8.5 should be deemed suspicious and marked as a sample point by the crime scene investigation team. In addition, if the

investigator suspects the presence of plating waste, a high pH may be indicative of the presence of cyanide. Environmental investigators should also be cognizant of the fact that laboratory personnel will require this information prior to the loading of these samples into sensitive analytical equipment.

The pH readings can be obtained by using simple pH strips or the readings can be taken electronically through the use of a portable pH meter. The pH strips may be difficult to handle and read while conducting an environmental investigation. This may be due to reduced visibility and dexterity caused by the wearing of required safety equipment. Attaching the pH strips to the sleeve of a protective garment can solve some handling problems. However, this method should not be used if there is a suspected airborne volatilisation of the chemical waste. Prior exposure to this type of airborne contamination may affect the accuracy of the strips reading. Used strips should not be saved and should be placed into the crime scene's hazardous waste stream.

Normally, the pH strips will fade and change colour over time. This fading and colour change will make future readings of the contaminated strips virtually impossible, thereby rendering them of little or no future evidentiary value. However, a recording of the reading must be made and maintained in the crime scene records. Normally, the portable pH meter is easy to operate and will produce a more accurate reading than the pH strips. If a portable pH meter is going to be used, it must be properly charged and calibrated prior to entering the crime scene. In addition, a record should be maintained as to the name of the individual completing the calibration, the calibration method, and the date and time it was completed.

(b) L.E.L./O₂

L.E.L. (lower explosive limit) and O₂ (oxygen) meters are essential equipment at any crime scene where hazardous waste has been abandoned.

The L.E.L. meter is designed to detect explosive levels of combustible gases that are present in a specific area and, when placed over a sampling point, will produce a scaled, positive reading if flammable substances are present in the air. A positive reading on this device may indicate that a sample should be collected and subjected to an ignitability test in the laboratory. The L.E.L. meter is also known as a combustible gas indicator and produces its findings in real time. Because the L.E.L. meter is used in potentially explosive atmospheres, it must be certified as intrinsically safe. Investigative law enforcement personnel should insure that the meter is calibrated and tested immediately prior to use. A complete record of this procedure must be maintained. The meter may be tested by introducing a combustible gas such as an unlit butane lighter to the sensor. This test must be conducted in a safe area and away from the hazardous waste. Although

these types of instruments cannot identify a specific compound present, they will alert the environmental investigator to the presence of an unknown substance that is producing a combustible vapour. However, caution must be exhibited in interpreting the detection instrument's results. Any combustible vapour will be detected. This includes many common household products such as nail polish remover, rubbing alcohol and certain alcoholic beverages.

The L.E.L. meter should be placed over a suspected chemical waste and held there for several seconds. The readings on this instrument are scaled and even an extremely low reading is an indication of possible chemical volatilization taking place. A positive reading of this type may indicate to the investigation team that the liquid hazardous waste that is being examined should be placarded as a sample point. The results of these types of readings must be recorded and reported to the sampling team. The team may determine that, in addition to standard analytical methods, the sample should be subjected to an ignitability test in the laboratory. In addition to the above, a positive L.E.L. reading is a safety concern and will have a definitive impact on safety protocols, sampling methodology and sampling tool selection.

Many instruments depend on the presence of oxygen to function properly. They are normally calibrated within a standard atmosphere. Therefore, the level of oxygen present in the sample area may have a profound effect upon the instrument's readings. If the oxygen level within the sample area is too low to support combustion, a negative reading may be obtained. Elevated oxygen levels may also affect the instrument's reading. In addition, should high concentrations of a combustible gas displace the available oxygen, the instrument may become overloaded causing the meter to peg at the highest reading and then return to zero. Clearly, caution must be exhibited by investigators when attempting to rely upon the results produced from this type of instrument.

The O₂ meter will indicate how much oxygen is present in the atmosphere. A lower than normal reading may indicate that an unknown substance has displaced the oxygen. This is especially useful in confined areas where the discharge of hazardous waste is suspected. It is also of critical importance to the safety of the sampling team and may dictate whether self-contained breathing apparatus will be required. A lower than normal reading may indicate that an unknown substance has displaced the oxygen. This type of reading is more common in interior building areas, cargo areas and other confined space areas. The displacement of the oxygen near the opening of a hazardous waste container should be of particular interest to the crime scene investigation team. This is a forensic indication that there is an unknown chemical substance present. A higher than normal oxygen reading should be considered a fire hazard and must be acted upon accordingly. Due to these

concerns, it may be the best policy to have continuous L.E.L. and O₂ readings conducted throughout the crime scene investigation process.

(c) The flame ionization detector

The flame ionization detector (FID) is an excellent instrument for determining chemical sample point locations. It can detect organic chemical compounds in the air, soil and liquids. The FID is essentially a stainless steel burner in which hydrogen is mixed with the incoming sample in the base of the unit; combustion air or oxygen is fed in and diffused around the jet through which the hydrogen gas mixture flows to the cathode tip where ignition occurs. This device has been in use by law enforcement for many years. It is commonly used in arson cases to locate chemical accelerants. The instrument does require a warm-up period that can take several minutes. It is also sensitive to background hydrocarbons such as vehicle exhausts. When using this instrument to screen an unknown liquid as a possible chemical sampling point, every effort must be made not to let the instrument come into direct contact with the suspected material. If a liquid is drawn into the probe, the instrument will not function properly. Most FIDs will give a digital readout in the parts-per-million (PPM) range. This instrument can be described as an electronic bloodhound and has the ability to backtrack certain hydrocarbons and chlorinated hydrocarbons to their concentrated point of origin. This may be extremely useful to the environmental investigator when attempting to locate a concentrated chemical sample point. When searching for possible sampling points the instrument should be held over the suspect area for several seconds. If a digital reading occurs, the instrument should be moved away from the suspected area and allowed to stabilize. The suspected area should then be checked again. If the second screening again produces a positive reading, the area should be placarded for sampling, photographed, and its location noted on the crime scene sketch.

(d) The photo-ionization device

The photo-ionization device (PID) is also known as the total ionizables present monitor. Most organic compounds and some inorganic compounds can be ionized when they are subjected to ultraviolet light. The PID converts the concentration of ionizable chemicals in a sample to an electric signal. The amount of current produced is proportional to the amount of organic compound present. The detection limit on this instrument is in the low PPM range. The PID is very sensitive to aromatic compounds, some chlorinated compounds and a limited amount of inorganic compounds such as nitric oxide and ammonia. High humidity may affect the PID by slowing down its response time. When using this instrument to locate potential sample points, it should be held close to, but not touching, the suspected area. The instrument should be then moved away

from the potential sample point and allowed to read the ambient air. Once the instrument has what is called "zeroed", it should again be placed over the sample area. If a second reading is obtained, the sample point should be placarded, photographed, and its location noted on the crime scene sketch.



Make sure you know where to find equipment necessary to carry out the field tests!

7.10 Hazardous waste and chemical evidence collection, preservation and storage

During the sampling procedures the crime scene coordinator, safety officer and science officer should remain together. The crime scene coordinator will note each sample point and volumes in the crime scene records and complete a crime scene sketch. The crime scene coordinator must ensure that the chain of custody for the chemical evidence is preserved in accordance with standard evidence collection procedures. The safety officer must give final approval for all activities conducted in any hot zone.

When the sample team approaches the hazardous waste containers, they should first look for the sampling placard posted by the investigation team, which will ensure that the correct containers will be sampled. An impermeable barrier such as a tarpaulin should be spread out near the sample point, but not in an area where any member of the sampling team will step on it during the sampling. The tarpaulin should not be reused at any subsequent sample point.

The sampling tools and containers that are going to be used at this sample point should be removed from their carry trays and placed onto the tarpaulin.

Once the sampling equipment has been laid out in an orderly fashion, the sampling operation may begin. The first step is to gently and slowly loosen the bung plug. Under no circumstances should the face of the lead or assistant sampler be placed over or near the bung hole. During this container opening process, there is the possibility of the release of highly concentrated and potentially harmful vapours that may have formed over the liquid's surface. This high pressure release has the potential for severely contaminating the facemask and protective clothing worn by the sampling team. Once the bung plug has been removed, it should be left on the surface of the container until the completion of the sampling event. The lead and assistant sampler should then remove new sampling gloves from their sealed container and place them over their outer chemical resistant gloves. With these freshly gloved hands, the sample team may now begin to handle the sampling equipment. The coliwasa tube or drum thief should be removed from its sealed packaging. Blunt end scissors may be used for this purpose.

When using a coliwasa tube, the interior stopper should

be in the open position as it is slowly inserted into the drum by the lead sampler. When a drum thief is used, the lead sampler's thumb should be kept away from the top of the tube as the tube is slowly inserted into the drum. This slow insertion will allow the chemicals being sampled to slowly fill the tube in its original stratified position with the least amount of disturbance and mixing. The stratification or layering of chemicals is a common phenomenon associated with 55 gallon drums of hazardous waste. This effect can be caused by product degradation, the settling of the chemicals, or the presence of chemicals with different specific gravities. Each chemical layer is a separate piece of chemical forensic evidence that must be collected and analysed properly. Once the stratified sample has filled the tube, it should be withdrawn from the drum. For coliwasa tubes, the interior stoppers should be in the closed position during withdrawal. When using a drum thief, the lead sampler's thumb should be placed over the tube's opening. The assistant sampler should open a sterilized sample container and hold it, with both hands, over the drum. The lead sampler should place the tip of the tube all the way into the sample container. The chemical sample should then be slowly released into the sample container. This will diminish the possibility of a back splash that may cause the assistant sampler's gloves to become contaminated with a concentrated chemical waste product. This method will also reduce the amount of trace VOC that may be driven off.

As a general rule, when the hazardous wastes are in a 55 gallon drum, at least two 40mls evidence samples should be collected from each drum. Each sample container should be filled to the top and there should be no existing headspace or air pocket in the sample container. Once the sample container has been filled to its proper level, the assistant should screw on a Teflon lined silica septa lid. This sample should not be placed near or next to any unused sampling equipment. Bulk liquid sampling can be a messy process and there will be, in all likelihood, some contamination present on the exterior of the sample container. The entire process should then be repeated so that a duplicate sample may be obtained. The duplicate sample is an evidence safeguard. Should one of the sample containers rupture or break during the sampling, transportation, or analytical process; an additional sample will be available for analysis.

Once the samples from a particular hazardous waste container have been collected, the sample containers should be sealed using some form of gummed evidence seal which should be placed all the way around the sample container lid. Under no circumstances should the evidence seal be placed over the septa.

At the completion of the chemical evidence sealing process, each sample container should be placed into a sealable plastic bag. This plastic bag is considered the second level of containment. This plastic bag and the completed sample sheet should then be placed into another sealable plastic bag. This type of packaging will create three layers of containment thereby further protecting the chemical evidence and it offers additional protection for those individuals who will be transporting the hazardous chemical evidence. The trip blank should

be sealed and packaged in the same manner as described above. The sealed chemical evidence should not be placed into the same carry tray as any unused sampling equipment. A separate carry tray or cooler should be used.

When sampling hazardous waste containers, it is essential for the sampling team to determine how much liquid volume is actually present. Notes or observations that simply state that a container was half full are insufficient for a criminal investigation and prosecution. These accurate liquid volume measurements must be made after the completion of the sampling event. The crime scene notes should reflect the measurement data and the name of the sampling team member making the measurements.

To determine the volume of a 55 gallon drum or other container, the height of the liquid and the internal radius of the container must be obtained. To measure the height of liquid, a disposable wooden measuring stick should be inserted into the container until it reaches the bottom. The following mathematical formula can be used to determine the volume of liquid chemical present in various sized containers: $\text{volume} = (\pi) \times (\text{radius})^2 \times (\text{height})$. This formula, depending upon the size of the container, will provide a volume in cubic feet or cubic inches. To convert this information into gallons, the following mathematical conversions can be used: $0.13368 \text{ ft.}^3 = 1 \text{ gallon}$ or $231 \text{ in.}^3 = 1 \text{ gallon}$. When attempting to determine a 55 gallon drum measurement, the height of liquid may also be compared to a standard 55 gallon drum chart. This chart converts known inches of liquid, in a 55 gallon drum, into gallons.

When the wooden measuring stick is withdrawn from the container, a brightly coloured pin should be inserted into the stick at the appropriate inch or liquid level mark. This data should then be recorded in the crime scene notes. The measuring stick should be placed next to the sampling placard and photographed.

The chemical evidence should be photographed at the completion of the labelling and sealing process. These photographs may be taken with the samples seized next to the drum from which they were removed. However, in order to cut down on possible personnel exposure time, the photographs of the samples may be taken once the evidence has been removed from the crime scene.

In order to maintain the integrity of the chemical evidence, a proper chain of custody must exist. The chain of custody should be traceable through documentation, which should indicate who had custody of the chemical evidence from the time it was collected all the way through the analytical process. Each individual taking custody of the evidence should sign the documents. The crime scene investigation team's responsibility for evidence integrity does not end with the shipping of the chemical evidence to a laboratory. The laboratory should be contacted and its chain of custody procedures reviewed prior to the shipment of any chemical evidence.

Most chemical evidence is best preserved by refrigerating the samples at 4°C. However, individual

analytical methodologies should be consulted directly for holding times and preservation requirements for individual chemical compounds. The refrigeration unit should be secured in such a way as to prevent it from being damaged during transportation. The chemical evidence should be delivered to the laboratory for analysis as soon as practicable.

7.11 Hazardous waste and chemical evidence transportation

It is the responsibility of the investigator to ensure that any chemical evidence that is shipped meets all national and international hazardous material transportation requirements. In most instances, hazardous waste samples will fall under the legal designation of a hazardous material. The international shipment of these types of materials is governed by several different entities. Air transport shipments of hazardous evidence are regulated by either the International Civil Aviation Organization's Technical Instructions for the Safe Transportation of Dangerous Goods by Air or the International Air Transport Association. Maritime shipment of hazardous evidence is regulated by the International Maritime Organization's International Maritime Dangerous Goods code.

7.12 Site clean-up

At the conclusion of the evidence gathering operations, the crime scene will be closed, and the environmental investigative personnel will work with the proper authorities to ensure that the hazardous contents of the trailer are properly disposed of. The crime scene coordinator and safety officer must ensure that all contaminated equipment and clothing is bagged and removed from the crime scene and that all pools, tanks and drums have been properly resealed or covered.

7.13 Closing the crime scene

The crime scene coordinator must receive, from the sampling team leader, an inventory of all chemical evidence collected at the site. The crime scene coordinator must also take custody of all film and photographs made during the search.

If the crime scene is in a building, the crime scene coordinator must issue a receipt for evidence removed to a representative of the owner of the building as well as preserve a carbon copy. If no representative is available, the receipt must be securely taped to an exterior door of the building. The crime scene coordinator must ensure that all investigation personnel are accounted for and have exited the crime scene, and should note the time that the crime scene is closed.

7.14 Post crime scene investigation

The post crime scene investigation will begin with

a focus on four specific areas: an examination of witness statements; tracing of the vehicle on which the hazardous wastes were carried or found, if any; the analysis of traditional evidence; and the examination of the chemical analytical reports. Each witness should be interviewed at least twice and their statements should be fully examined for any additional investigative leads. Traditional law enforcement techniques should be used in an attempt to trace the vehicle used to carry the wastes as well as the point of its original ownership and prior location. Traditional evidence such as fingerprints, trash, labels and markings on the hazardous waste containers should also be reviewed for additional investigative leads. Any handwritten sequential numbers found on the drums is critical to the investigation due to the fact that it is indicative of a prior environmental inventory and survey. Normally, when hazardous waste containers are marked in this fashion, it is an indication that the material had been previously sampled and analysed.

This may provide the key criminal elements of knowledge and motive. The possibility of knowledge on the part of the suspect is based upon the probable existence of analytical reports that indicate the hazardous nature of the chemical waste. The motive, which is likely to be financial, is based upon the probable estimated cost, to the suspect, for the proper disposal of this form of hazardous waste. Finally, the chemical analytical reports should be reviewed carefully. These will assist the environmental investigator in determining the type of industry that generated the hazardous chemical waste. Each type of manufacturing process, such as circuit boards, printing operations, plating operations or even clandestine narcotics manufacture, utilizes different hazardous raw materials in its manufacturing process. By examining the analytical reports, a determination can be made regarding the type of industry that generated this particular hazardous waste.



Discharge and marine litter, near Buncrana, Ireland, 1991 Source: Aquatronics Ltd.

OTHER INFORMATION

- **Basel Convention Website**

<http://www.basel.int>

- **Form for Movement Document**

<http://www.basel.int/pub/move.pdf>

- **Form for Notification Document**

<http://www.basel.int/pub/notif.pdf>

- **Globally Harmonised System of Classification and Labelling of Chemicals (GHS)**

<http://www.unece.org/trans/danger/danger.htm>

- **Guidance Elements (Decision VI/16)**

<http://www.basel.int/meetings/cop/cop6/english/Report40e.pdf>

- **Guide to the Control System**

<http://www.basel.int/pub/instruct.doc>

- **Interpol**

www.interpol.int

- **Manual for the Implementation of the Basel Convention**

<http://www.basel.int/meetings/sbc/workdoc/manual.doc>

- **Various technical guidelines on management of hazardous wastes:**

<http://www.basel.int/meetings/sbc/workdoc/techdocs.html>

- **UN Recommendations on the Transport of Dangerous Goods, Model Regulations**

<http://www.unece.org/trans/danger/danger.htm>

- **World Customs Organisation**

www.wcoomd.org

