



TERMS OF REFERENCE (TOR)

LEGISLATION REVIEW

DEVELOPMENT OF LEGAL BASIS AND REGULATORY MEASURES FOR EFFECTIVE CONTROL OF PCB HANDLING IN PAKISTAN

Project 00091045

Comprehensive reduction and elimination of persistent organic pollutants in Pakistan

Draft version 1.0

Dr. Rodrigo Romero, PhD
RPCENVIRONMENT LTD
Alcantara Street 1026
Santiago
CHILE

August 27th, 2016

Table of contents

<i>Tasks</i>	<i>Page</i>
1. INTRODUCTION.....	3
2. OBJECTIVES.....	3
3. BACKGROUND	3
4. REVIEW OF LEGAL AND REGULATORY TOOLS IN PAKISTAN	4
4.1. HANDLING, MANUFACTURE, STORAGE, IMPORT OF HAZARDOUS WASTE AND HAZARDOUS SUBSTANCES RULES	10
4.2. INTERNATIONAL LEGAL AND REGULATORY BENCHMARKS.....	12
5. PRIORITY STEP TO DEAL WITH PCB/POPS PESTICIDES STOCKPILES	14
6. PROPOSAL TO IMPLEMENT AN INITIAL REGULATORY FRAMEWORK IN PAKISTAN	15
6.1. INTEGRATED MANAGEMENT SCHEME	16
6.2. HAZARDOUS WASTE MANAGEMENT RULES.....	17
6.3. HAZARDOUS WASTE DECLARATION SYSTEM	18
6.4. TRANSPORT OF HAZARDOUS WASTES AND HAZARDOUS SUBSTANCES RULES	21
6.5. STORAGE OF HAZARDOUS SUBSTANCES RULES	23
6.6. THE IMPLEMENTATION STRATEGY	32
7. CONCLUSIONS	33
8. RECOMMENDATIONS	33
9. REFERENCES.....	35
5. ANNEXES	38

1. INTRODUCTION

The present Terms of Reference (TOR) briefly describes the main findings from the review of legal and regulatory documents existing in Pakistan related to the PCB/POPs management, including analysis of the missing regulatory instruments to match the existing national regime with acceptable international benchmarks.

In line with the above mentioned, a review of the country's need in the formulation of relevant laws and regulatory measures for effective environmentally sound management and control of PCB /POPs pesticides is included.

As part of the recommendation to address the gaps of the existing baseline situation, a proposal with an integrated management scheme including rules and guidelines is presented. Considering the particular situation of some PCB/POPs pesticides stockpiles, this proposal could be considered as a priority regulatory framework, based on the life cycle of these chemicals with particular focus on hazardous wastes management. This would establish an effective and environmentally sound control of PCB/POPs pesticides/waste handling in the country, in line with international standards.

The proposal is based on the international legal and regulatory measures dealing with toxic chemicals and hazardous wastes and also on PCB/POPs pesticides strategies implemented in other countries. The proposal also makes references to classification, labelling, transportation and storage conditions and final disposal/elimination of POPs wastes.

2. OBJECTIVES

The aim of this TOR is to perform a review of the existing legislation and regulatory tools in Pakistan related to POPs and the Stockholm Convention, in order to identify relevant laws and regulatory measures that can be implemented for effective control of PCB handling in the country.

In this regard an important aspect of this TOR is identifying missing regulatory instruments and addressing the existing gaps between the national POPs legislation and the internationally recommended benchmarks developed by the Stockholm and Basel Convention Secretariats.

Another important goal associated to this TOR is to provide guidance on the technical and management aspects of PCB handling. One of them related to use of local cement kilns disposal methods under strict verification and compliance of international standards and Stockholm Convention guidelines.

Additionally a relevant objective associated to safe PCB/POPs pesticide waste management is the formulation of the required technical regulations and instructions, needed to this purpose. An appropriate component associated to this objective will be the adequate waste classification, field tests and laboratory standards, inventory labelling, waste treatment, management and disposal within the country's hazardous waste management system.

Finally, all this effort needs to be developed in close agreement with enforcement procedures, in order to ensure a proper environmental sound management of PCB/POPs pesticides operating system.

3. BACKGROUND

The Stockholm Convention on Persistent Organic Pollutants (POPs) was signed by Pakistan on December 6th 2004 and ratified on April 14th 2008. The Ministry of Climate Change has been designated as the National Focal Point of the Convention. As a Party of the Convention the

Government of Pakistan assumes the obligation to implement the Convention in agreement with its guidance text.

To meet the legal and regulatory obligations established by the Stockholm Convention, the Government of Pakistan has to take the necessary legal and administrative measures to eliminate certain chemicals (Article N° 3 & Annex A & B); e.g. its production and use and the import and export of these chemicals. These measures are within the scope of the present review as part of the implementation of the legal and regulatory framework.

The National Implementation Plan (NIP) established by the Government of Pakistan provides a policy framework to address the POPs issues and to meet the obligations that the Convention poses for the country.

However, the national reality in terms of locations, circumstances and priorities in relation to POPs requirements, contrast among the Provinces and Federal Territories¹.

The NIP identified approximately 6033 MT of obsolete stocks of POPs pesticides; many of those stockpiles are located in areas (towns or villages) near to water bodies or poor storage conditions, contaminating the surrounding soil. Therefore, the elimination of these stocks becomes mandatory.

The adequate treatment of these PCBs and POPs pesticides on a local base (within the country borders) is part of the strategy the Government of Pakistan intends to implement, in order to have a satisfactory operational and management system for POPs chemicals in the country, in line with the international environmental standards. However, to fulfil this goal the Government needs to implement an acceptable legal a regulatory framework, taking into account the current limitations and in accordance with international and Stockholm Convention guidelines and standards

To fulfil this purpose, a review of the existing legal and regulatory documents is required, in order to help to identify the realistic priority measures that can be developed in a form of a priority programme, considering the current legal, technical and institutional restrictions in Pakistan.

4. REVIEW OF LEGAL AND REGULATORY TOOLS IN PAKISTAN

The legal and regulatory tools and documents dealing with toxic chemicals, including the PCBs and POPs pesticides in Pakistan are clearly limited.

In line with the requirements to implement an operational and management system for PCBs and POPs pesticides within the country, meeting the international standards, a review of the legal documents submitted by the POPs Project Management Team was performed. These documents are the following indicated below:

- i. Import Trade and Procedure Order, 2000 (Pakistan). Source: <http://www.pakistan.gov.pk> 07/17/2000. (*File name*: Trade Rules 2000.pdf).
- ii. *National Environmental Policy 2005. Government of Pakistan, Ministry of Environment.* (*File name*: NationalEnvironmentalPolicy2005.pdf).
- iii. Handling, Manufacture, Storage, Import of hazardous waste and hazardous substances Rules, Draft-2. (*File name*: 20160201correctedhazardous2016.doc).
- iv. NWFP Environmental Protection Agency. Environmental Assessment Checklist and Guidelines. Brick Kiln Units (*File name*: I1B-Brick Kilns.pdf).

¹ Pakistan is a Federal country with four (4) Provincial governments, in partnership with the Central Federal

- v. Pakistan environmental legislation and the National Environmental Quality Standards. Government of Pakistan October 1997. (*File name*: g_Legislation-NEQS.pdf).
- vi. The Pakistan Environmental Protection Act, 1997, The Gazette of Pakistan. (*File name*: envprotact1997_2.pdf).
- vii. National Biosafety Guidelines (May 2005). Government of Pakistan, Pakistan Environmental Protection Agency (Ministry of Environment). (*File name*: BiosftyGlines2005.pdf).
- viii. Agricultural Pesticide Ordinance/ Act. Ministry of National Food Security & Research Government of Pakistan (*File name*: Agricultural pesticide ordinance (APQ).pdf).
- ix. Consolidated Agricultural Pesticide Rules 1973 Amended & Up dated (*File name*: Agricultural pesticide rules (APR).pdf).
- x. The Gazette of Pakistan. Amendment of Act XL of 1997 in Regulation of Generation, Transmission and Distribution of Electric Power. (*File name*: 8th Amendment (No. F22(14)12012-Legis.).pdf).
- xi. Sectorial guidelines for environmental reports – Major thermal power stations. Government of Pakistan 1997. (*File name*: h_Power.pdf).
- xii. National Transmission & Despatch Company Limited. Policies U/R- 5(5) of Corporate Governances Rules 2013. (*File name*: Policies.docx).
- xiii. The Regulation of Generation, Transmission and Distribution of Electric Power Act 1997. (*File name*: Regulation of Generation, Transmission and Distribution of Electric Power Act 1997 along with all amendments.pdf).
- xiv. National Electric Power Regulatory Authority (Sale of Electric Power by Renewable Energy Companies) Guidelines 2015. (*File name*: Sale of Electric Power by Renewable Energy Companies.pdf).
- xv. National Electric Power Regulatory Authority Standard Operating Procedures (SOPs) for Inspection, Examination and Provision of Copies of Documents, 2015. (*File name*: Standard Operating Procedures for Inspection, Examination and Provision of Copies of Documents, 2015.pdf).
- xvi. The Pakistan water and power development authority act, 1958 – (*File name*: wapda act_latest_20042015.pdf).
- xvii. National conservation strategy and policy statement on environment and development. Government of India, Ministry of Environment & Forest. (*File name*: NCS 1992.pdf).

As result from this review, a number of useful observations and remarks can be drawn to better understand the POPs situation in Pakistan. This understanding is of particular relevance, considering the time frame involved in law's enactment process and the urgent need for priority actions (under an appropriate legal and regulatory framework) in order to eliminate or minimise the current risk of POPs contamination in some areas identified within the conducted POPs surveys².

As an overall conclusion, POPs issues are not included in the national environmental agenda to meet the requirements of the Stockholm Convention's main guidelines.

² Project Document, "Comprehensive reduction and elimination of Persistent Organic Pollutants in Pakistan". UNDP, GEF and the Pakistan Government. March 2015.

Therefore we observe a lack of:

- i. Legal provisions for monitoring of POPs emissions and releases
- ii. Legal provisions focusing on POPs life cycle
- iii. Guidelines on risk minimization procedures for POPs handling, transportation, storage and disposal of obsolete stocks
- iv. Legal provisions focusing on public awareness on health and environmental risks associated with POPs
- v. Guidelines on POPs effects to humans and the environment
- vi. Guidelines on PCBs used in electrical equipment, related to handling, management or disposal

Pertinent information directly linked or indirectly coupled with POPs issues, is found in the following documents, which are reviewed below:

(1.) The **National Environmental Policy**³, which provides the general framework addressing the environmental issues facing Pakistan. This national policy identifies the most relevant environmental issues related to: water management, air quality and noise, waste management, biodiversity, climate change and ozone depletion, energy efficiency and MEAs, that the country need further develop; recognizing the existing environmental legislative and regulatory framework should be strictly enforced.

As a general policy, this document does not make any reference to POPs or specifically to PCBs. However different sections (3. Sectorial Guidelines) are indirectly associated to POPs as part of the monitoring or surveillance programmes (indicated in the original document):

3.1 Water supply and management

- c) Establish a water quality monitoring and surveillance system

3.2. Air quality and Noise

- b) Enact the National Clean Air Act
- c) Ensure effective enforcement of the National Environmental Quality Standards and Self Monitoring Rules
- d) Ensure reduction and control of harmful emissions through regulatory programs

3.3 Waste Management

- h) Develop and enforce rules and regulations for proper management of municipal, industrial, hazardous and hospital wastes
- i) Develop and implement strategies for integrated management of municipal, industrial, hazardous and hospital waste at national, provincial and local levels

³ National Environmental Policy, year 2005, Government of Pakistan, Ministry of Environment. (File name: NationalEnvironmentalPolicy2005.pdf).

- p) Develop environmental risk assessment guidelines for existing industries as well as new development interventions
- q) Develop national emergency response and accidents prevention plans to prevent and mitigate the effects of, accidents involving pollution of environment
- r) Provide financial and other incentives (reduction/elimination of tariff, low-interest loans, appreciation certificates and awards) for technology upgrading, adoption of cleaner technology, implementation of pollution control measures and compliance with environmental standards.

(2.) The **Pakistan Environmental Protection Act**⁴, it extends to the whole of Pakistan. This Act does not make any mention either to POPs or specifically to PCBs. However, provides a number of necessary definitions that will be considered in connection with the review of another submitted document "Handling, Manufacture, Storage, Import of hazardous waste and hazardous substances Rules", Draft-2, included at the end of this chapter.

This Act defines "*hazardous substance*" as substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters an adverse environmental effect, and any substance which may be prescribed as a hazardous substance.

The Act also includes definition of "*Waste*", as any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

Additionally, it is included the concept of "*Hazardous waste*" as waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste and includes hospital waste and nuclear waste.

Likewise introduce concept of Industrial activity and Industrial waste.

(3.) The **Agricultural Pesticide Ordinance**⁵ provides a general definition of pesticides, without reference to any particular class (as organophosphate, carbamate, organochlorine pesticides or others). However, it can be associated to POPs pesticides as well. This Ordinance was established to regulate the import, manufacture, formulation, sale, distribution and use of Pesticides in Pakistan.

"*Pesticide*", means any substance or mixture of substances used or represented as means for preventing, destroying, repelling, mitigating or controlling, directly or indirectly, any insect, fungus, bacterial organisms, nematodes, virus, weed, rodent or other plant or animal pests; but does not include a substance which is a 'drug' within the meaning of the Drugs Act, 1940 (XXIII of 1940). In this regard, an updating version of this Ordinance should included POPs pesticides in accordance with specific exemptions and restrictions (Article 3, Annex A, B respectively, of Stockholm Convention). In case of new pesticides, Annex C and D must be considered.

⁴ The Pakistan Environmental Protection Act, 1997, The Gazette of Pakistan. (File name: envprotact1997_2.pdf).

⁵ Agricultural Pesticide Ordinance / Act, Ministry of National Food Security & Research Government of Pakistan. The Gazette of Pakistan, extraordinary, Jan. 25, 1971. (File name: Agricultural pesticide ordinance (APQ).pdf).

(4.) The **Consolidated Agricultural Pesticides Rules, 1973 amended & updated**⁶, provides details for Applicant for registration of pesticides (part II) including rejection of application; import of pesticides into Pakistan and its compliance (part III); manufacture, formulation or sale (part IV); packing, re-packing, re-filling and labelling (part V); storage and use (part VI); Agriculture pesticide technical advisory committee (part VII); Pesticide laboratory (part VIII); Government analyst and inspectors (part IX); Pesticides and their antidotes (part X); Safety precautions (part XI).

These rules are a comprehensive document that can be used as a reference to develop a harmonized POPs rules system (dealing with packing; labelling storage; laboratory; enforcement and inspectors; safety precautions, etc.) within the POPs national regulatory framework.

(5.) In relation to PCBs, there are not specific requirements or specifications for PCB management, within the **“Regulation of Generation, Transmission and Distribution of Electric Power Rule”**, Act⁷.

This Act provides a full range of necessary definitions as: “Distribution company”, “Transmission facilities”; “distribution facility”. However, there is no mention to PCBs (handling, contamination risk, etc.). An updated version of this Act should consider the inclusion of PCBs existences and wastes; in line with Article 3, Annex A, part II of the Stockholm Convention - PCBs in equipment (e.g. transformers, capacitors or other receptacles containing liquid stocks).

(6.) With the **“Import Trade and Procedure Order”** - year 2000⁸, the Federal Government of Pakistan through the Ministry of Commerce controls the import and export of items listed in the respectively appendix.

This Order dated from 1950 as been updated in year 2000, includes among items the ban of import of Hazardous waste into Pakistan (Section 19, Banned Items: Hazardous Wastes as defined and classified in Basel Convention). Concerning POPs, to meet the obligations established by the Stockholm Convention, the Government of Pakistan has to take the legal and administrative measures necessary to eliminate certain chemicals (Article N° 3 & Annex A & B).

Under this Order and in line with Article N° 3; PCBs and POPs pesticides import and export should be also banned, in accordance with the respective exemptions (Annex A & B) and in agreement with the Stockholm Convention obligations.

(7.) A substantial aspect must be taken into consideration, in relation to the Pakistan’s situation analysis and in the context of the **Federal Government**. Indeed, in recent years in Pakistan an important part of the decision-making authority has been transferred to provincial governments.

The Eighteenth Constitutional Amendment has been devolved a number of key functions to the provinces (in Education, Environment and Health)⁹.

This fact introduces an additional challenge to the provincial and federal authorities; in terms of equally take responsibilities in development of a viable implementation of a POPs ESM operational and management system, including monitoring and compliance mechanism (enforcement). This is a relevant element, considering the different level of development of provinces. In this regard and in line with the provincial environmental regulation, the next Guideline needs a particular attention.

⁶ Consolidated` Agricultural Pesticide Rules 1973 Amended & Up dated (File name: Agricultural pesticide rules (APR).pdf).

⁷ Regulation of Generation, Transmission and Distribution of Electric Power Act 1997. (File name: Regulation of Generation, Transmission and Distribution of Electric Power Act 1997 along with all amendments.pdf).

⁸ Import Trade and Procedure Order, 2000 (Pakistan). Source: <http://www.pakistan.gov.pk>, 07/17/2000. (File name: Trade Rules 2000.pdf).

⁹ Ibid ².

(8.) The “**Environmental Assessment Checklists and Guidelines” Brick Kiln Units**¹⁰, is a Guideline developed by the FWFP Environmental Protection Agency and it is applicable to future development of Brick Kiln Units in the Province.

In fact, the brick production with typical kilns is an important activity in developing countries around the world. However, the brick production is also an important area where emission of POPs can be detected.

The installations for brick production present different characteristics depending on their production capacities and fuel used, generally characterized by low energy proficiency. Especially in emerging economies, wood as the traditional fuel is normally replaced by old rubber tires, oil, plastic, etc., promoting emissions of PCDD/PCDF, PCB and HCB. Indeed, high levels of unintentional POPs have been detected in ash (around 100 ng/kg PCDD/PCDF TEQ) and bricks (around 10 ng/kg)¹¹.

Additionally, brick production is an important source of black carbon emission and other short-lived climate pollutants (SLCPs). Recent studies show that implementing more efficient technologies, mainly during the firing of bricks, can result in reductions of pollutant emissions from 10 to 50%, depending on the process, scale and fuel used¹².

Moreover, the brick production is generally an informal sector, characterized by low energy efficiency and poverty. Hence actions need to be undertaken, especially to formalize the sector through public policies, gradually introducing environmental assessment, emission check and technical guidelines. In this regard, the present Environmental Assessment Checklists and Guidelines issued by the FWFP Environmental Protection Agency should be mainstreamed at national level.

Furthermore, as it is now, the Environmental Assessment Checklists and Guidelines will be applicable to the future developments of Brick Kiln Units in the province of NWFP, thus the inclusion of emission check on a regularly basis (one/twice a year, depending on production scale) might be considered for monitoring and environmental compliance. Likewise, an Adequacy Plan for old facilities should be incorporated as well.

(9.) From the **Major Pakistan environmental legislation**¹³ it can be understood that a weak national legislation is covering the basic needs to establish a priority programme for PCB / POPs pesticide regulatory and management framework in Pakistan.

All regulatory instruments included in that document (right column “Legislation” of it), covering different environmental fields as air quality, solid waste and effluents, water quality and resources, environmental protection, etc. (left column “Sector”), were issued before the Stockholm Convention was adopted (May 2001). Even more, the majority of these instruments were published even before professor Sören Jensen first established the PCBs harmful character (Stockholm University, 1966).

In case of certain “Sectors”, closely related to POPs as “Toxic and Hazardous Waste Sector”, all regulatory instruments were issued more than 80 years ago (The Pakistan Penal Code in 1860; The Explosives Act in 1884; The Factories Act in 1934, with the exception of The Agricultural Pesticide Ordinance in 1971 and its Rules in 1973.

¹⁰ NWFP Environmental Protection Agency. Environmental Assessment Checklist and Guidelines. Brick Kiln Units (I1B-Brick Kilns.pdf).

¹¹ Toolkit for Identification and Quantification of Releases of Dioxins, Furans and Other Unintentional POPs, under Article 5 of the Stockholm Convention, January 2013. UNEP, Emission Factors p.82.

¹² The Climate and Clean Air Coalition. CCAC Initiatives. Mitigating black carbon and other pollutants from brick production, April 2015.

¹³ Pakistan environmental legislation and the National Environmental Quality Standards. Government of Pakistan, October 1997. (File name: g_Legislation-NEQS.pdf).

In relation to Quality Standards for municipal and liquid industrial effluents, the list of parameters includes Chloride instead of AOX (Absorbable Halogen Compound), used as European standard) in order to trace such chemicals as DDT and its metabolites, PCBs and other organic halogenated compounds.

However, an updated version of this Quality Standard was found¹⁴, that includes additional standards (as a National Quality Standard for Drinking Water including Polycyclic Aromatic Hydrocarbons - PAH in the organic fraction; and air pollutants as Ozone (O₃), Carbon Monoxide (CO), Lead (Pb) and respirable particulate matter (PM₁₀ and PM_{2.5}).

4.1. HANDLING, MANUFACTURE, STORAGE, IMPORT OF HAZARDOUS WASTE AND HAZARDOUS SUBSTANCES RULES

Summarizing, as it was discussed above, the current legal and regulatory tools and documents dealing with toxic chemicals, including PCBs and POPs pesticides in Pakistan is quite restricted.

However, within the documents submitted by the POPs Project Management Team, there is a file that needs special attention:

“Handling, Manufacture, Storage, Import of hazardous waste and hazardous substances Rules”, Draft-2. (*File name: 20160201correctedhazardous2016.doc*).

This draft document is an excellent proposal to address the most urgent issues dealing with Toxic chemicals including the PCBs and POPs pesticides, in Pakistan.

Indeed, this draft document, serves as the starting point to implement a priority framework for a PCB/POPs management system in Pakistan. In line with this purpose, a critical review of this draft is presented below:

This document provides an initial regulatory framework for POPs management, establishing a series of definitions needed to this purpose, as “hazardous substances”; (referred to section 2, PEPA 97¹⁵); “exporter”; “importer”, etc. However, it does not make any reference to “hazardous waste” (despite it is included in the same PEPA 97, defined below).

(Environmental Protection Act, 1997, PEPA)

“Hazardous waste” as waste, which is, or which contains a hazardous substance or which may be prescribed as hazardous waste and includes hospital waste and nuclear waste.

“Hospital waste” includes waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories.

“Nuclear waste” means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive.

From the POPs life cycle perspective, the draft document does not mention or provide a definition to “hazardous waste treatment” and “land field disposal” or “hazardous waste elimination,” despite these rules should address the whole cycle of these chemicals and wastes; from manufacture, handling, storage, import and export and final disposal (elimination).

Confusion arises when hazardous wastes must be treated. The principal sources of hazardous wastes are industrial activities, producing wastes with different composition and different content of hazardous substances and materials as:

¹⁴ Pakistan Environment Protection Agency. <http://environment.gov.pk/NEQS/SRO-2010-NEQS>.

¹⁵ The Pakistan Environmental Protection Act, 1997, The Gazette of Pakistan. (File name: envprotact1997_2.pdf).

- Heavy metals (Cd, Cr, Pb, Ni, As, Hg, Se, etc.)
- Hydrocarbons (aromatics, aliphatics, polycyclic, etc.)
- Halogens (Cl, Br, F, I)
- Cyanide, Sulphur, Phosphorous, Magnesium and many other chemical substances in pure and/or combined mixtures

All these wastes can be treated (e.g. recycled, reused, recovered, physico-chemical stabilized, or disposed in a special landfill) according to their composition. Due to their particular features, hospital and nuclear wastes (as hazardous waste as well) involve special requirements. Therefore in many countries management's rules for hospital and nuclear wastes demand especial handling and requests¹⁶.

Another important aspect to review in the draft document "Hazardous waste" is not defined unless is understood as the result of any "industrial activity".

Indeed, the draft document -paragraph 3 further explains this point; "GENERAL RESPONSIBILITY OF THE OCCUPIER DURING INDUSTRIAL ACTIVITY": "these rules apply to an "industrial activity in which one or several chemicals, defined upon their characteristics¹⁷ or from a list of hazardous substances (1,780 compounds listed with their CAS N°¹⁸) can be involved.

In fact, to the purpose of these rules, Hazardous Waste's definition is taken from the Environmental Protection Act.

However "Industrial Activity" it is not taken from this Act and it is defined differently:

(Environmental Protection Act, 1997)

"Industrial activity" means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purpose;

(Draft document)

Industrial activity" means- an operation or process carried out in an industrial installation referred to in Schedule 4 involving or likely to involve one or more hazardous chemicals and includes on-site storage or on-site transport which is associated with that operation or process, as the case may be;

(Schedule 4 defines a list of 19 chemical or physico-chemical processes as oxidation, alkylation, methylation, etc.)

Consequently, the draft document defines "industrial activity" as - an operation or process carried out in an industrial installation, where chemical process or chemical reactions (as oxidation, alkylation, methylation, etc.) take place. Under this definition, "hazardous waste" could also being included.

Such approach blends "industrial activity" and "hazardous waste activities" and, in a certain extent, it could lead to an underestimation of specific threats and risks that hazardous waste treatments represent. This is an issue of critical importance, especially in relation to the transport, treatment and disposal of hazardous wastes. Moreover, this fact could have particular implications in a country where the existing legal/regulatory framework related to these issues (hazardous waste management) is incipient.

¹⁶ Hazardous waste Directive 2008/98/EC,

¹⁷ Defined under three characteristics, namely: (a) Toxic chemicals, (b) Flammable chemicals or (c) Explosives.

¹⁸ Schedule II. List of Prescribed Hazardous Substances (Annex attached to this document).

In line with international guidelines and standards for hazardous waste and nine years experience of this Consultant in the implementation of this type of regulation and rules, the draft document might be modified to address the whole hazardous waste life cycle properly, through a "Hazardous Waste Management Rules".

These rules should establish the regulatory framework for proper identification, characterization, requirements of a handling plan, re-use, recycling, treatment, elimination, incineration, final disposal and landfill's requirements (technical and regulatory), related to hazardous waste management. This is part of a proposal included in the present report, to establish a priority programme for PCB / POPs pesticide within a regulatory and management framework in Pakistan.

To this purpose, a brief overview of international legal and regulatory measures dealing with toxic chemicals and hazardous waste is included below.

4.2. INTERNATIONAL LEGAL AND REGULATORY BENCHMARKS

An important part of the International legal and regulatory references dealing with toxic chemicals in general and PCBs and POPs pesticides in particular, can be found in the European Community (EU) archives. These references normally are in agreement or are complementary with the national legislation of its Member States.

In connection with the review of the draft document "Handling, Manufacture, Storage, Import of hazardous waste and hazardous substances Rules", European policies establish the following:

The European Community

In order to establish a satisfactory framework for handling of waste in the Community, the Commission defines a number of key concepts such as waste, recovery and disposal and puts in place the essential requirements for the management of waste (Directive 2006/12/EC). In November 2008, the Council adopted a new Directive¹⁹ to clarify key concepts such as the definitions of waste, recovery and disposal; to strengthen the measures that must be taken in regard to waste prevention; to introduce an approach that takes into account the whole life cycle of products and materials and not only the waste phase.

In this regard and in order to manage hazardous waste in accordance with the Basel convention, in an environmentally sound manner, waste producers and waste managers should apply the EU waste hierarchy principle (Directive 2008/98/EC, article 4), defined as follow (see Figure 1):

¹⁹ The Directive 2008/98/EC of the European Parliament and of the Council, of April 2008.

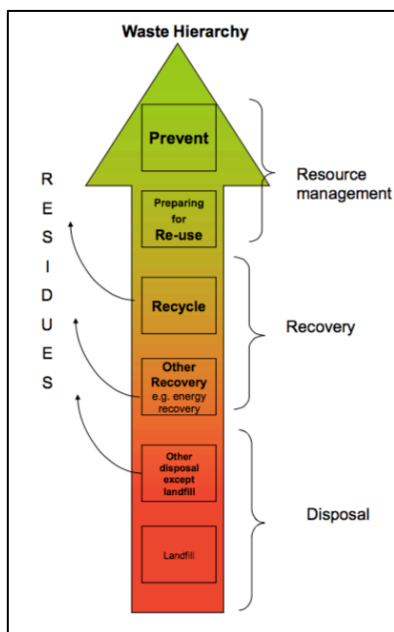


Figure 1. The Waste Hierarchy²⁰.

Waste hierarchy

The following waste hierarchy shall apply as a priority:

- (a) Prevention
- (b) Preparing for re-use
- (c) Recycling
- (d) Other recovery, e.g. energy recovery; and
- (e) Disposal

The Directive 2008/98/EC, is the EU Waste Framework Directive which is focused on waste prevention and waste recovery.

In applying the hierarchy, hazardous waste producers and waste managers shall opt for hazardous waste management that takes into account the resource value of hazardous wastes²¹.

Within the current situation in Pakistan and considering that under certain conditions PCBs oil and POPs pesticides stockpiles can be used as part of the feeding material in cement kilns, this concept/statement is in accordance with one of the target of the “PCBs management project”, in terms of developing local disposal capacity.

²⁰ A strategy for Hazardous Wastes management in England. A policy document issued by the Department for Environment, Food and Rural Affairs. March 2010, p-9. www.defra.gov.uk.

²¹ Ibid.

This target/option is shared with the majority of national stakeholders in Pakistan, insisting that elimination technologies as POPs elimination in Cement kilns should be developed within the country²².

Two main benefits are clearly identified using this approach:

- Improvement of national capacity for POPs management in Pakistan (technical, analytical, regulatory and institutional), and
- Saving resources

Bearing in mind that this option opens a significant and sustainable market within the country, the main barrier to achieve this goal and avoid the option of shipping wastes abroad, should be on the limited technical capacity of Cement Plants, to meet the international standards and the Basel and Stockholm Convention guidelines.

Germany

In agreement with the European Community Member States, the main objective of the German policy on waste (including hazardous) is to achieve a recycling-based economy that conserves resources and reduces adverse impacts on the Environment. Under extended producer responsibility, producers are required to consider the environmental impacts and possible risks of products during its entire life-cycle, creating a system that minimises the adverse environmental impacts and maximises the recovery of resources (recycling, reuse).

As all the European Community Member States, the German policy on waste, in case of POPs waste is in accordance with the relevant Community legislation²³

United Kingdom

The Hazardous Waste Regulations of England and Wales²⁴ is a comprehensive document dealing with both hazardous and non-hazardous wastes. It includes provisions for special waste to be treated as hazardous and/or non-hazardous wastes. This Regulation is directly linked with the communitarions directives (Directive 2006/12/EC and 2008/98/EC, related to hazardous wastes). As all the European Community Member States, the U.K. policy on POPs waste is in line Community legislation²⁵.

5. PRIORITY STEP TO DEAL WITH PCB/POPS PESTICIDES STOCKPILES

Summarising, in line with the review of Pakistan legal documents dealing with chemicals and acknowledging the results of the PCB/POPs inventories surveys conducted by the Ministry of Climate Change and UNDP in recent years, it is mandatory to set up a realistic strategy to deal with Toxic Chemicals.

In order to accomplish this task in the best possible way, a list of priorities for future actions must be established.

²² Ibid, ².

²³ Regulation on Persistent Organic Pollutants EC-No 850/2004 of the European Parliament and of the Council, April 2004.

²⁴ The Hazardous Waste (England and Wales) Regulations 2005. No. 894. Environmental Protection, England and Wales.

²⁵ Ibid.²³.

To establish a priority list, the existence of following situations, (especially in terms of the existing public infrastructure and technical capabilities available today), must be taken into consideration:

- Inadequate enforcement mechanisms (POPs inspectorate services), resulting in
 - Weak enforcement at the borders
- Poor storage facilities
- Lack of accountability and management of contaminated sites
- Inappropriate disposal facilities and disposal of empty containers of pesticides and PCBs equipment
- Lack of technical capabilities and analytical labs for POPs identification
- Limited working tools and capacity of the national institutions dealing with POPs
- Lack of legal provisions on POPs screening, importation, use and disposal of their waste
- Poor record keeping of POPs inventories

Particularly, as the result of weak enforcement capacity:

- The traffic of POP and PCBs across Pakistan borders has been established²⁶.
- Illegal trade of PCB-containing equipment and sale of old transformers to neighbouring countries often occurs²⁷.
- The 1,500 ton PCBs/POPs pesticides stockpiles require urgent actions to eliminate or at least minimize the risk of PCBs/POPs contamination of communities within the surrounding areas.

Recognizing, this requires urgent actions, thus the elimination of PCB/POPs stockpiles should be established as first priority step. To this purpose it will be necessary to establish a Programme or a Protocol to verify the degree of achievement of cement kiln in PCBs elimination process (including burning test, overall methodology, loading, handling of feed materials, sampling and analysis, blank conditions, emission pattern and characterization; the emission standards and associated requirements), in order to establish the proper procedure needed to fulfil this objective.

6. PROPOSAL TO IMPLEMENT AN INITIAL REGULATORY FRAMEWORK IN PAKISTAN

Notwithstanding the weak legal and regulatory framework for PCB/POPs management existing in the country to meet the legal and regulatory obligations established by the Stockholm Convention, the Government of Pakistan has to take the necessary legal and administrative measures to eliminate certain chemicals (Article N° 3 & Annex A & B); e.g. its production and use and the import and export of these chemicals.

²⁶ National implementation plan for phasing out and elimination of POPs from Pakistan under Stockholm Convention article 7 (a). December 2009.

²⁷ Ibid, ².

Moreover, considering that no production of POPs exists in the country, the measures should be focused on POPs elimination of use or restriction (in certain cases, Annex a & B of the Convention) and import and export.

Bearing in mind the current limited capacity for PCB/POPs management at national level to be aligned with existing international standards, the implementation of legal and regulatory tools must be conducted through gradual improvement of the legal and regulatory framework existing today in Pakistan.

From an integrated approach (considering the three Basel, Rotterdam and Stockholm Conventions), the management of POPs must be seen “from cradle to grave”, in order to have a more effective, comprehensive and useful view over these toxic chemicals. In this context, the three conventions together provide a framework governing the environmentally sound management of hazardous chemicals (including POPs) throughout their life cycles.

With the integrated approach to these POPs as wastes, the Convention obliges countries members (Parties) to develop strategies for identifying and manage these wastes in an environmentally sound manner (Article N° 6). As waste management activities, the Basel Convention requires each country to minimize waste generation and to ensure, to the extent possible, the availability of disposal facilities within its own territory. Indeed, in line with this requirement, a central objective of the present project (“Comprehensive PCB Management Project in Pakistan”) is to enhance management capacities and disposal of POPs within its territory.

Based on the above-described facts, the proposal of an Initial Regulatory Framework should include three regulatory tools: namely, Hazardous Waste Management Rules; “Transport of Hazardous Wastes and Hazardous Substances Rules” and “Storage of Hazardous Substances Rules”.

Additionally, this proposal considers the integration of a “Hazardous Waste Declaration System” in order to provide a control and verification framework to these regulatory tools (enforcement).

This approach, in other countries (South America) has proven to be successful in promoting and mainstreaming POPs issues including development of technical, analytical and institutional capacities.

6.1. INTEGRATED MANAGEMENT SCHEME

Within an integrated management scheme, the proposal of an Initial Regulatory Framework that includes the three regulatory tools and a Declaration System for environmental control, should be an effective mechanism to reduce POPs releases and to regulate POPs waste disposal.

- a. “Hazardous Waste Management Rules” (including PCB/POPs pesticides).
- b. “Hazardous Waste Declaration System.
- c. “Transport of Hazardous Wastes and Hazardous Substances Rules” (including PCB/POPs pesticides).
- d. “Storage of Hazardous Substances Rules” (including PCB/POPs pesticides).

From hazardous waste management perspective, these four elements can be presented as an integrated management scheme for toxic chemicals (including POPs):

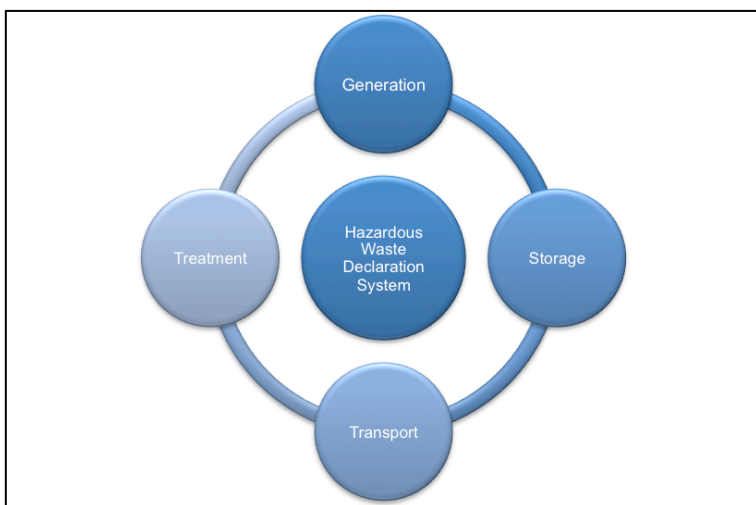


Figure N° 2. Toxic chemical (POPs) Integrated management scheme.

The basic idea behind this scheme is the interlink among independent parties, providing different services within the framework of hazardous waste management:

- ✓ The PCB or POPs pesticides owner (hazardous waste generator)
- ✓ The transport (responsible of hazardous waste transfer / transportation)
- ✓ The Treatment Facility or the final disposal stage
- ✓ The National Body in charge of environmental compliance in the field of hazardous waste

6.2. HAZARDOUS WASTE MANAGEMENT RULES

Within a management system of hazardous waste; transport and storage conditions and its requirements are key elements to assure a safety and environmental sound management of this type of waste.

The ESM of hazardous waste shall include relevant steps as handling, register, analytical characterization, treatment and final disposal and a number of associated requirements (type of waste to be treated, type of treatments, safety procedures, land field construction, land field disposal requirements, land field monitoring plan, emergency/contingency plan, Closing Plan, etc.). Thus, within the “Priority Regulatory Framework” these steps must be included.

The implementation of these steps should also meet the sanitary and safety conditions. A proposal addressing these issues in order to implement a “Hazardous waste management Rules” is presented below, with a general description of main topics that must be included:

Title 1. General requirements and definitions

Title 2. Identification and classification of hazardous waste

Hazardous characteristics

Disposal requirements

Leaching requirements

Lists of hazardous and non hazardous waste

- Title 3. Generation of hazardous waste
Facilities and Requirements
Management (handling) Plan
- Title 4. Storage of hazardous waste
Site requirements
Storage requirements
- Title 5. Transport of hazardous waste
Emergency (contingency) Plan
- Title 6. Treatment / elimination
Facility characterization and its requirements
Emergency (contingency) Plan
Industrial activities included
Recycling, re-use
Landfield
 - Site characteristics
 - Design and construction
 - Facilities and systems required
 - Operational Plan
 - Requirement for disposal
 - Restriction for disposal
 - Closing Plan
- Incineration
- Underground mines elimination
- Special hazardous wastes
- Title 7. Report and Follow-up System
(explained in previous chapter)
- Title 8. Penalties and Procedures
- Title 9. Referential and Supplementary Provisions

6.3. HAZARDOUS WASTE DECLARATION SYSTEM

The “Hazardous Waste Declaration System” defined as a control and verification mechanism must operate under the administration of the national regulatory body.

To facilitate its implementation, the System should be included and defined within the “Hazardous Waste Managements Rules” as a modified version of the draft document addressing these issues (*Handling, Manufacture, Storage, Import of hazardous waste and hazardous substances Rules, 2016 draft-2*).

This can be formulated through an additional chapter:

Chapter X

The Hazardous Waste Declaration System

Article X.1. Hazardous waste owners are subject of the “Hazardous Waste Declaration System”, operating at national level, with the purpose to provide the Environmental Authority the information in time and quality needed (from generation facility until consignee). The

Environmental Authority will define the provisions to set up the corresponding system pursuant the standards of the present title.

Article X.2. From generation facility until consignee, the declaration, issued by the generator should be attached to hazardous wastes.

Article X.3. The Ministry of health shall be responsible to establish provisions, through resolution, design, content, and characteristics of the declaration.

Article X.4. To the proper system operation, users (generator, transporters and consignees) are bound to:

Generator: The Generator shall...

Transporter: The Transporters shall...

Consignee: The Consignee shall...

Article. X.5. The provisions of the present title shall not applicable to the transport of waste hazardous not superior to 2 tonnes of hazardous waste or to 6 kilograms of "acute toxic wastes" (it should be defined).

However, nowadays, information systems are powerful tools to all type of disciplines. In the field of environmental control, the use of information systems becomes a current need to improve and extend the enforcement capacity.

Emerging mobile digital platforms are being using to monitor air quality and to verify air pollution index in big cities. The use of information systems has proved to be a successful tool for controlling the life-cycle of chemicals as well.

Consequently, Hazardous Waste Declaration System can operate in a written form (paper, in remote locations) and in a Web-based configuration, to improve effectiveness of hazardous waste management and PCBs/ POPs control.

The basic idea is to implement a Web-based information system for hazardous waste and hazardous substances (*) (including POPs). This process has been implemented in other countries. The particular experience in Chile has proven to be a successful mechanism for hazardous waste control.

In order to better understand the effects of the information system on hazardous waste disposal and their relationship to the whole management framework, a brief description of the system is presented as follow:

The Web-based information system (WBIS) is an electronic declaration (manifest) consisting in a web-based transaction that meets all those requirements (legal, administrative and commercial) of a declaration in paper.

In this case, the requirements of this declaration are those established by the environmental authority related to the elimination of hazardous waste (POP disposal in our case).

To this purpose (under the rules established by the authority), three players interact: the generator (hazardous waste owner), the transporters and the addressee (receiver or consignee of hazardous waste – for treatment /disposal/elimination).

(.) This category should not be included in the beginning.

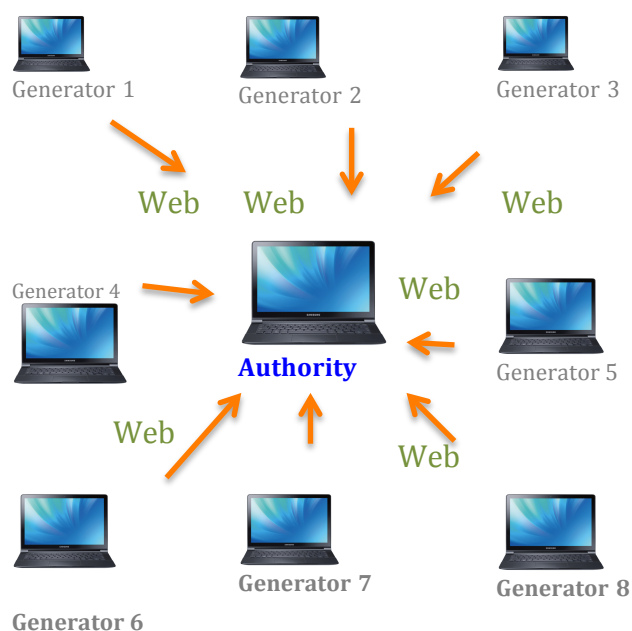


Figure 22. Web based information system for hazardous waste management.

To facilitate the implementation of the Web-based declaration, a transition period should be established to allow those waste generator and/or disposal facilities with restricted web-based connections (remote locations) meet these provisions through a written form (paper) declaration.

The whole cycle is described below.

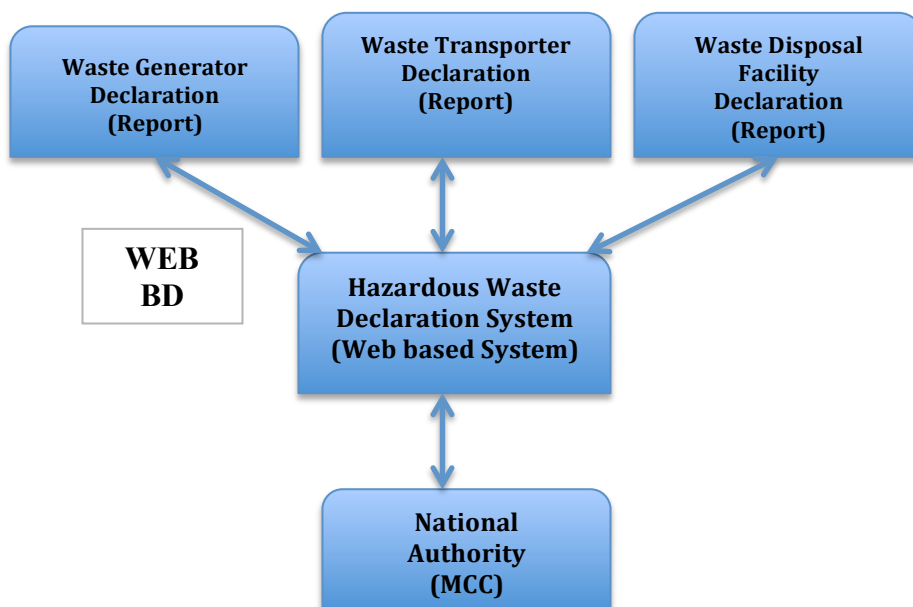


Figure 23. The whole cycle where Generator, Transporter and Consignee are interacting under the Authority's supervision, through on-line Web based information system for hazardous waste management.

6.4. TRANSPORT OF HAZARDOUS WASTES AND HAZARDOUS SUBSTANCES RULES

Transport of hazardous waste is one important part in the implementation of an ESM scheme of toxic chemicals. This includes transportation of hazardous waste on-site (within the generator facility or off-site (from a generator's site to a facility that can recycle, treat, store or dispose this waste).

Hazardous wastes often are not segregated and in addition due to their characteristics (toxicity, reactivity, flammability or corrosivity) its transportation is a challenge.

Transportation is one of the most important areas of concern associated with handling of hazardous wastes because the packaging and method of transport can be reason to produce accidents or spill of wastes. Besides, rapid identification of a spilled substance can determine how effectively and safely the situation can be controlled.

Thus, the insertion of such component within the "Priority Regulatory Framework" has been included.

The implementation of rules for a secure and safety of hazardous waste transportation system (off-site transportation) should consider the main followings features and guidelines:

Container. Shall be of appropriate leak-proof material with mechanical stability.

Labelling of the container. Shall be clear to identify the waste, describe the possible hazard, and the remedial measures / first aid required in case of accidental spills.

Transportation vehicle: Shall provide through labelling the following minimal data: information on waste type, remedial measures / first aid required in case of accidental spills, telephone contact person / controlling agency in case of emergency.

Authorization. All hazardous waste transporters must have authorization issued by the corresponding institution (Ministry) and it ID number.

Collector / transporter selection: Shall be technical competent with relevant skills, authorized by a corresponding competent body.

Emergency procedures: Shall incorporate in a Protocol for handling hazardous wastes.

Insurance: Shall be available prior the transportation will be conducted.

PACKAGING

The containers must be able to withstand normal handling and retain integrity for a minimum period of 6 months. In general, packaging for hazardous substances must meet the following requirements:

- i) All packaging material including containers shall be of such strength, construction and type as not to break open or become defective during transportation.
- II) All packaging material including containers shall be so packaged and sealed that spillages of hazardous wastes / substances are prevented during transportation due to jerks and vibrations caused by uneven road surface.
- iii) Re-packaging materials including that used for fastening must not be affected by the contents or form a dangerous combination with them.

- iv) Packaging materials should be that there will be no significant chemical or galvanic action among any of the material in the package.

Container used for packaging hazardous wastes shall meet the following requirements:

- i) Shall be of mild steel with suitable corrosion-resistant coating for a variety of waste or 200 L plastic drums and HDPE/LDPE containers.

LABELLING

Transport of hazardous substances and goods shall be follows the Globally Harmonized System of Classification of Chemicals (GHS)²⁸. There are two types of labelling requirements:

- I) Labelling of individual transport containers
- II) Labelling of transport vehicles

All hazardous wastes containers must be clearly marked with currents contents. The markings must be waterproof and firmly attached so that they cannot be removed.

Containers that contain hazardous wastes shall be labelled with the words "HAZARDOUS WASTES. The information on the label must include the code number of the waste, the waste type, the origin (name, address, telephone number of the generator), hazardous property (e.g. flammable) and the symbol for the hazardous property (e.g. the red square with flame symbol).

The label must withstand the effects of rain and sun.

COLLECTION AND TRANSPORTATION

- a) The generator shall ensure that wastes are packaged in a manner suitable for safe handling, storage and transport.
- b) The generator shall ensure that information regarding characteristic of wastes (corrosive, reactive, toxic) is provided on the label.
- c) Transport of hazardous wastes shall be in accordance with the provisions of the rules made by the competent authority.
- d) All hazardous waste containers shall be provided with a general label.
- e) The generator of wastes shall strictly follow the provision established for interprovincial transportation.

RESPONSIBILITY OF HAZARDOUS WASTES TRANSPORTER

Transporter of hazardous wastes is responsible for:

- a) Authorization. All hazardous waste transporters must have authorization issued by the corresponding institution (Ministry) and it ID number.
- b) The transport vehicle shall be designed suitably to handle and transport the hazardous wastes.
- c) Transporting the waste in closed containers at all times.

²⁸ Ibid.

- d) Delivering the hazardous wastes shipment at designated points only.
- e) Informing local authority, hazardous waste generator, and other concerned immediately in case of spillage, leakage or other accidents during transportation.
- f) The transporter shall train the driver with regard to the emergency response measures to be taken during the transportation of waste.
- g) Clean up in case of contamination
- h) Cleaning of vehicles shall be carried out at designated places or where are facilities to treat such wastewaters.

TRANSPORTATION

The following are the requirements pertaining to the transportation of hazardous wastes:

- i) Vehicle used for transportation shall be in accordance with corresponding provision from competence authority.
- ii) Transporter shall possess valid authorization to transport hazardous wastes.
- III) Carrying of passengers is strictly prohibited.
- IV) The trucks shall be dedicated for transportation of hazardous wastes only and they shall not be used for any other purpose.
- V) Each vehicle shall carry first-aid kit, spill control equipment and fire extinguisher.
- VI) Hazardous waste transport shall run only at a speed specified by the competent authority's provisions.

More detailed information regarding storage, packaging and equipment needed for hazardous wastes are described in the next chapter "Storage of hazardous substances rules".

6.5. STORAGE OF HAZARDOUS SUBSTANCES RULES

Within the framework of safety handling of hazardous waste and hazardous substances, specially in case of PCBs and POPs pesticides, "Storage Rules" play a critical role and they are a basic component within the life cycle of toxic chemicals.

One of the main purposes of these rules is to assure safety handling and management of toxic chemicals and waste, where the warehouse plays a central role.

However in the absence of common facilities, temporary permission to store hazardous wastes inside generator facilities is a rather common procedure. Nevertheless this procedure at the end promotes the illegal dumping of wastes. In this regard and due to the POPs features (toxicity and persistence) this procedure is of particular importance.

The main steps for safety storage of hazardous substances (waste) are below. This includes a number of self-explaining charts, photos and schemes to provide a good overview of the whole process involved in the storage procedure for ESM of toxic chemicals including POPs.

Key stages

The implementation of Storage of Hazardous Substances Rules involves the following key stages:

- I. Responsibilities in the warehouse. The main responsibility lay on the operator of the facility. He is responsible for the overall proper labelling, storage, training internal and related conditions.
- I.I Approvals. The Approvals establish the operating conditions of the facility. It is a binding regulation for the operator of the facility.
- II. Risk assessment. In warehouse where hazardous substances are being stored in packages and containers, the operator is required to carry out a risk assessment.
- III. Labelling. Substances and mixtures classified as hazardous must also labelled in accordance with the legislation on hazardous substances and/or dangerous goods.



Figure 3. Example of container labelling.

- IV. Packaging and storage units. Packaging and containers (hereinafter referred to as “packaging”) are the primary protective measures when storing hazardous substances.

Also it is important to consider the following characteristics:

- Mechanical stability
- Chemical stability
- Right size
- Shape and labelling
- Proper closure
- Protection against breakage
- Sustaining the protective function of packaging
- Avoiding contamination from non-hazardous substances.
- Light UV radiation, temperature



Figure 4. Securing palletized load units. Containers in a high-bay warehouse



Figure 5. Package orientation



Figure 6. Wire-mesh box pallet unsuitable for use



Figure 7. Interlinked stacking

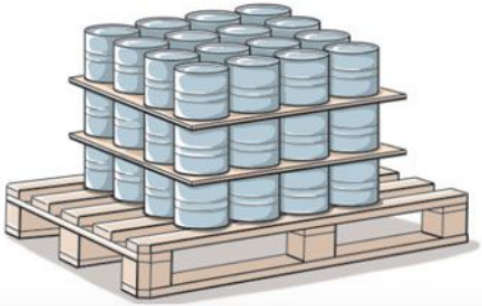


Figure 8. Securing of columns and sacks by intermediate layers

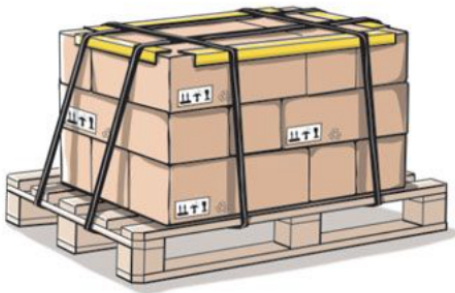


Figure 9. Strapping with additional edge protectors. Long edge protectors underneath the strap hold the stacked cartons on the pallet together better



Figure 10. Strapped barrels



Figure11. Wire-mesh box pallet with gas cylinders

Only instructed employees who carry out work in accordance with operating instructions and regulations may be employed in the warehouse. The employees are under obligation to notify the warehouse management immediately about any occurrences and accidents.

Operating instructions for hazardous substances.

- Hazards that are linked to the storage of these dangerous substances.
- Technical, organisation and personal protective measures, as well as code of behaviour.
- References to joint storage bans.
- Behaviour in the event of emergencies, e.g. instructions for occurrences of leaks or fires.

Personal protective equipment. The protective equipment (depending on requirements) according to the results of the risk assessment.

Storage class	10-11	12	13	15	8B	8A	F	6.2	6.10	6.1C	6.1A	5.2	5.1C	5.1B	4.3	4.2	4.1B	4.1A	3	2	1
Explosive substances	1																				
Gases	2A	2		2		2								1							2, 3
Aerosol packages	2B													1							
Flammable liquids	3	5		5						6					4						
Other explosive substances	4.1A	1	1	1	1	1	1	1													
Flammable solid or desensitizing explosive substances	4.1B									6		4	1		4	6	6				
Pyrophoric or self-igniting substances	4.2	6		6	6	6	6	6	6	6	6						6	6			
Substances producing oxidizing gases with water	4.3	6	6	6	6	6	6	6	6	6	6										
Highly oxidizing substances	5.1A																				
Oxidizing substances	5.1B	7		7	7	7	7			4	4	4	4	1							
Ammonium nitrate and mixtures containing ammonium nitrate	5.1C	1	1	1	1	1	1	1							5						
Organic peroxides and self-reactive substances	5.2	1			1	1															
Combustible acutely toxic substances	6.1A	5		5																	
Non-combustible acutely toxic substances	6.1B																				
Combustible acutely toxic or chronic substances	6.1C																				
Non-combustible acutely toxic substances or substances with chronic effects	6.1D																				
Infectious substances	6.2																				
Radioactive substances	7							1													
Combustible corrosive substances	8A																				
Non-combustible corrosive substances	8B																				
Combustible liquids	9																				
Combustible solids	11																				
Non-combustible liquids	12																				
Non-combustible solids	13																				
Other combustible and non-combustible substances	10-13																				

Separate storage is required

Joint storage permitted

Number

Joint storage is only permitted with maximum 100 kg

Work clearance:

A work clearance system including special written instructions by the employer shall be applied in the event of activities that could cause hazards through interaction (e.g. welding). Work clearance shall be provided by the responsible person before the beginning of the activities.

Access to the warehouse:

No Access for unauthorized persons



Special qualifications for operating materials handling industrial trucks

Monitoring work stages

Inspections

VII. Design of warehouse and warehouse equipment

Types of warehousing



Figure 13. Rack storage (High bay stores). Block storage and line storage



Figure 14. Line storage outdoors with ground marking

Storage in cabinets



Figure 15. Safety cabinet

Operating equipment



Figure 16. Transport in the warehouse

Containment facilities



Figure 17. Containment facility for liquid hazardous substances

VIII. Traffic routes



Figure 18. Traffic routes in a warehouse for hazardous substances

Pedestrian prohibited



(Emergency exit/Escape route)



IX. Goods Receipt



Figure 19. Goods delivery to a chemicals warehouse

X. Emergency response organisation

XI. First-aid



Figure 20. First aid box

Fire extinguishers

Table 1. Suitability for the respective purpose

	Fire Classes DIN EN 2			
	A	B	C	D
	Substances to be extinguished			
Types of fire extinguishers	Solid, glow-forming substances	Liquid substances or substances becoming liquid	Gaseous substances, also under pressure	Combustible metals (use only with powder spray)
Powder extinguisher with ABC extinguishing powder	+	+	+	–
Powder extinguisher with BC extinguishing powder	–	+	+	–
Powder extinguisher with metal fire powder	–	–	–	+
Carbon dioxide extinguisher	–	+	–	–
Water extinguisher (also with additives, e.g. wetting agent, antifreeze or corrosion inhibitor)	+	–	–	–

Procedure in the event of product leakage



Figure 21. Cleaning away spilled storage product using explosion-protected vacuum cleaner

Labelling of hazardous substances follow the “globally harmonized system of classification of chemicals (GHS) of U.N. (sixth revised edition, 2015). The respective tables are presented in Annex B of the present report.

6.6. THE IMPLEMENTATION STRATEGY

Finally, to well establish the Initial Regulatory Framework proposed above (including the priority step), it is necessary consider the existing technical and institutional capacity in the country, its limitations as well as certain barriers to achieve the overall goals. Some of these restrictions are:

- Low level of expertise at national level for PCB/POPs elimination (or disposal)
- Limited PCB/POPs analytical capabilities
- Low awareness level on the PCB/POPs risk management
- Limited municipal capacity for overall waste classification and associated risks
- Limited control over recycling of hazardous wastes
- Limited facilities to store PCB/POPs materials under ESM procedures

To overcome these barriers a basic strategy is needed, in order to underpin the practical implementation of this framework and the priority step.

This strategy is based on three principles:

- (a) It should be gradual to accomplish tasks
- (b) It should be realist to define goals and more important, to define humans resources and associated fund.
- (c) It should be focused on local capacity building

A clear example of (a) is reflected on the Hazardous Waste Declaration System (as control mechanism). In this regard, the system can be implemented on a written form (on paper) specially in case of remote locations. Nevertheless, the proposed Web-based platform can be developed by stages. Initially in a pilot phase, for instance in the capital, restricted to the Islamabad metropolitan area could be implemented.

Another adequate example of (a) and (c) is found on the elimination of the 1,500 ton PCB/POPs stockpiles. In this regard, the strategy should be focused on helping to find the best alternative to implement a working regime to **locally and progressively eliminate** the POPs stockpiles in line with ESM guidelines and meeting the international standards.

7. CONCLUSIONS

The main conclusions to be drawn from this review are the followings:

1. The present legal and regulatory framework is limited. However it can be further developed and be also modified to mainstreaming POPs issues.
2. To minimize the risk of PCB/POPs contamination, handling of these toxic chemicals should be incorporated under an integrated management framework (scheme or system) taking into consideration the whole PCB/POPs cycle, with particular focus on POPs hazardous waste.
3. Acknowledging the current technical and institutional restrictions and acknowledging the informal recycling, improper classification and improper disposal of hazardous waste existing in Pakistan, with the evident human health implications; the first regulatory priority should be focused on hazardous waste rules implementation.
4. In line with the above mentioned, it is suggested the implementation of a control and verification system as the Hazardous Waste Declaration System and if it is possible, coupled to a PRTR System (Pollutants Emission Transfer Register) as an effective control mechanism addressing the whole life cycle of toxic chemicals as POPs.
5. The Hazardous Waste Declaration System can be implemented in written form on paper and progressively shift to a web-based platform. A transition period (as a proposal) of 3-5 years to accomplish the shift to a web-based platform should be established.
6. Another important aspect associated to the present review, is related to the Cement Plants and the use of local cement kilns disposal methods. In this regard, from the present review, a regulatory legislation needs to be developed including emission standards and effective enforcement mechanisms, in order to allow the application of such methods under strict verification of compliance with international standards and Stockholm Convention guidelines.

8. RECOMMENDATIONS

The main recommendations are describes as follow:

1. An updating version of Agricultural Pesticide Ordinance Act, 1971 should include POPs pesticides in accordance with specific exemptions and restrictions (Article 3, Annex A, B respectively, of Stockholm Convention). In case of new pesticides, Annex C and D must be considered.
2. The Consolidated` Agricultural Pesticide Rules 1973 Amended & Up dated; can be used as a reference to develop a harmonized POPs pesticide rules system (dealing with packing; labelling, storage; laboratory; enforcement and inspectors; safety precautions, etc.) within the POPs national regulatory framework.
3. An updated version of “The Regulation of Generation, Transmission and Distribution of Electric Power Act 1997” should consider the inclusion of PCBs existences and wastes; in line with Article 3, Annex A, part II of the Stockholm Convention - PCBs in equipment (e.g. transformers, capacitors or other receptacles containing liquid stocks).
4. The Environmental Assessment Checklists and Guidelines (Brick Kiln Units), should be

mainstreamed at national level. Furthermore, the insertion of emission check on a regular basis might be considered for environmental monitoring purposes. Likewise, an Adequacy Plan for old facilities should be incorporated as well.

5. It is suggested to consider the Chilean experience within the management of hazardous wastes and hazardous substances. In line with this, implementation and use of Hazardous Waste Declaration System (web-based system) as a useful tool that can be replicated and adapted to other realities (countries).

9. REFERENCES

1. Project document "Comprehensive reduction and elimination of Persistent Organic Pollutants in Pakistan", UNDP, GEF and the Pakistan Government; signed in March 20th 2015.
2. Destruction and Decontamination Technologies for PCBs and POPs wastes under the Basel Convention. Training Manual for Hazardous Waste project Managers, Volume B, Part IV – Implementation Process. Part 1, Section 6, 8 and 9.
3. Destruction and Decontamination Technologies for PCBs and POPs wastes under the Basel Convention. Training Manual for Hazardous Waste project Managers, Volume B, Part IV – Implementation Process. Part 1, Section 5.
4. National Implementation Plan (NIP) for phasing out and elimination of POPs from Pakistan under Stockholm Convention, article 7 (a). Government of Pakistan, Ministry of Environment Islamabad. POPs Enabling Project, Islamabad, PAKISTAN.
5. Basel Convention, 2007. Updated general technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with POPs. <<http://www.basel.int/meetings/sbc/workdoc/techdocs.html>>
6. NEP, 2001. The Stockholm Convention on Persistent Organic Pollutants. United Nations Environmental Programme. <<http://www.chem.unep.ch/sc/default.htm>>. UNEP, 2004. Review of the Emerging, Innovative Technologies.
7. GEF STAP guidance document (STAP is an independent advisory body of the GEF).
8. BS EN 1948:2006. Stationary source emissions. Determination of the mass concentration of PCDDs/PCDFs and dioxin-like PCBs. Sampling of PCDDs/PCDFs (Part 1); Extraction and clean-up of PCDDs/PCDFs (Part 2) and Identification and quantification of PCDDs/PCDFs (Part 3).
9. National Environmental Policy, year 2005, Government of Pakistan, Ministry of Environment. (File name: NationalEnvironmentalPolicy2005.pdf).
10. The Pakistan Environmental Protection Act, 1997, The Gazette of Pakistan. (File name: envprotact1997_2.pdf).
11. Agricultural Pesticide Ordinance / Act, Ministry of National Food Security & Research Government of Pakistan. The Gazette of Pakistan, extraordinary, Jan. 25, 1971. (File name: Agricultural pesticide ordinance (APQ).pdf).
12. Consolidated` Agricultural Pesticide Rules 1973 Amended & Up dated (File name: Agricultural pesticide rules (APR).pdf).
13. Regulation of Generation, Transmission and Distribution of Electric Power Act 1997. (File name: Regulation of Generation, Transmission and Distribution of Electric Power Act 1997 along with all amendments.pdf).
14. Import, Trade and Procedure Order, 2000 (Pakistan). Source: <http://www.pakistan.gov.pk>, 07/17/2000. (File name: Trade Rules 2000.pdf).

15. NWFP Environmental Protection Agency. Environmental Assessment Checklist and Guidelines. Brick Kiln Units (I1B-Brick Kilns.pdf).
16. Toolkit for Identification and Quantification of Releases of Dioxins, Furans and Other Unintentional POPs, under Article 5 of the Stockholm Convention, January 2013. UNEP, Emission Factors p.82.
17. The Climate and Clean Air Coalition. CCAC Initiatives. Mitigating black carbon and other pollutants from brick production, April 2015.
18. Pakistan environmental legislation and the National Environmental Quality Standards. Government of Pakistan, October 1997. (File name: g_Legislation-NEQS.pdf).
19. Pakistan Environment Protection Agency. <http://environment.gov.pk/NEQS/SRO-2010-NEQS>.
20. The Pakistan Environmental Protection Act, 1997, The Gazette of Pakistan. (File name: envprotact1997_2.pdf).
21. The Directive 2008/98/EC of the European Parliament and of the Council, of April 2008.
22. A strategy for Hazardous Wastes management in England. A policy document issued by the Department for Environment, Food and Rural Affairs. March 2010, p-9. www.defra.gov.uk.
23. Regulation on Persistent Organic Pollutants EC-No 850/2004 of the European Parliament and of the Council, April 2004.
24. The Hazardous Waste (England and Wales) Regulations 2005. No. 894. Environmental Protection, England and Wales.
25. National implementation plan for phasing out and elimination of POPs from Pakistan under Stockholm Convention article 7 (a). December 2009.
26. Publications of the European Community related to Storage of Hazardous Substances:
 - (1a) Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No. 1907/2006, last amended by Ordinance (EU) No. 487/2013.
 - (1b) Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances, last amended by Directive 2009/2/EC.
 - (2a) Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major- accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC.
 - (2b) Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances; last amended by Ordinance (EC) No. 137/2008.
 - (3) Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC, last amended by Regulation (EU) No 167/2013.

- (4) Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work, last amended by Regulation (EC) No 1137/2008.
- (5) Council Directive 75/324/EEG of 20 May 1975 on the approximation of the laws of the Member States relating to aerosol dispensers, last amended by Directive 2013/10/EU

5. ANNEXES

ANNEX A

**Statutory Notification (S.R.O)
GOVERNMENT OF PAKISTAN
MINISTRY OF CLIMATE CHANGE**

NOTIFICATION

Islamabad, the January-----, 2016

S.RO.NO. ()/2016.- In exercise of the powers conferred by section 31 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), read with Section 13 and Section 14 thereof, the Federal Government is pleased to make the following rules, namely:-

1. Short title and commencement.

- (1) These rules may be called the Handling, Manufacture, Storage, Import of hazardous waste and hazardous substances Rules, 2016

SCHEDULE -4

(See Rule 2(h) (i))

1. Installation for the production, processing or treatment of organic or inorganic chemicals using for this purpose, among others;




- (a) alkylation
- (b) Amination by ammonolysis
- (c) carbonylation
- (d) condensation
- (e) dehydrogenation
- (f) esterification
- (g) halogenation and manufacture of halogens
- (h) hydrogenation
- (i) hydrolysis
- (j) Oxidation
- (k) Polymerization
- (l) Sulphonation
- (m) desulphurization, manufacture and transformation of sulphur containing compounds
- (n) nitration and manufacture of nitrogen containing compounds
- (o) manufacture of phosphorous-containing compounds
- (p) formulation of pesticides and of pharmaceutical products
- (q) distillation
- (r) extraction
- (s) solvation




ANNEX B




STORAGE CONDITIONS: **LABELLING**





Table description.




Labelling of hazardous substances shall be follow the “globally harmonized system of classification of chemicals (GHS) of U.N. (sixth revised edition, 2015).



Labelling	Description
	<p>Explosive substances Substances that can be caused to explode through heat, impact or initial ignition, are termed explosive substances. These include substances which according to</p> <ol style="list-style-type: none"> CLP-Regulation (CLP) (1a) are classified in the hazard class “explosive substances” and classified as unstable, explosive or in the sub-classifications 1.1 to 1.5 are marked with the H-sentences H200, H201, H202, H203, H204 or H205, Hazardous Goods Law are classified in class 1, sub-classifications 1.1 to 1.6. <p>e.g. nitro-glycerine, dibenzoylperoxide, gunpowder</p>
	<p>Gases Gases are substances that</p> <ol style="list-style-type: none"> at 50 °C have a vapour pressure of more than 300 kPa (3 bar) or at 20 °C and a standard pressure of 101.3 kPa are completely gaseous. <p>This includes substances that</p> <ol style="list-style-type: none"> are marked according to CLP (1a) <ol style="list-style-type: none"> with H280 or H281 as compressed, liquefied, dissolved (under pressure), with H220 or H221 as flammable gases, with H270 as oxidising gases, are assigned to class 2 per Hazardous Goods Law (30). These gases also include hydrogen fluoride (UN 1051) and hydrogen cyanide (UN 1052). <p>e.g. acetylene, ammoniac, chlorine, oxygen</p>
	<p>Aerosols Aerosol dispensers which are classified as follows:</p> <ol style="list-style-type: none"> marked according to CLP with the H-sentences H222 or H223; which are assigned to the UN number 1950 according to Hazardous Goods Law.

Labelling	Description
	<p>Flammable liquids With these substances, dangerous gas/air mixtures can form and cause fires and explosions. The risk increases as the flashpoint/boiling point decreases.</p> <p>This includes substances which according to</p> <ol style="list-style-type: none"> 1. the Hazardous Substances Ordinance (Gefahrstoffverordnung) (15) are marked with the R-sentences R10, R11 or R12, 2. CLP (1a) are marked with the H-sentences H224, H225 or H226, 3. the Hazardous Goods Law are assigned to class 3. <p>e.g. diethyl ether, petrol, acetylene, butyl acetate</p>
	<p>Other explosive substances These consist of substances which may explode under the effect of flame or which are sensitive to shock or friction.</p> <p>In Germany, these substances are classified on the basis of the Second Ordinance to the Explosives Act (2. SprengV) (28) by the BAM (Bundesanstalt für Materialforschung und -prüfung/Federal Institute for Materials Research and Testing).</p> <p>This includes</p> <ol style="list-style-type: none"> 1. substances of the storage groups I to III according to the Second Ordinance to the Explosives Act (2. SprengV), 2. self-reactive substances type A and type B (marked with H240 and H241 respectively), 3. substances which are marked with R2 or R3 pursuant to the Hazardous Substances Ordinance (GefStoffV). <p>e.g. 2,4-dinitrophenylhydrazine (with 0.5 ml H₂O/g), hydroxylammonium chloride</p>
	<p>Flammable solids These are readily combustible substances or items that according to</p> <ol style="list-style-type: none"> 1. CLP are marked with the H-sentence H228, 2. the Hazardous Substances Ordinance (GefStoffV) are marked with R11, 3. the Hazardous Goods Law are assigned to flammable substances of class 4.1. <p>e.g. sulphur, phosphorus pentasulphide</p>

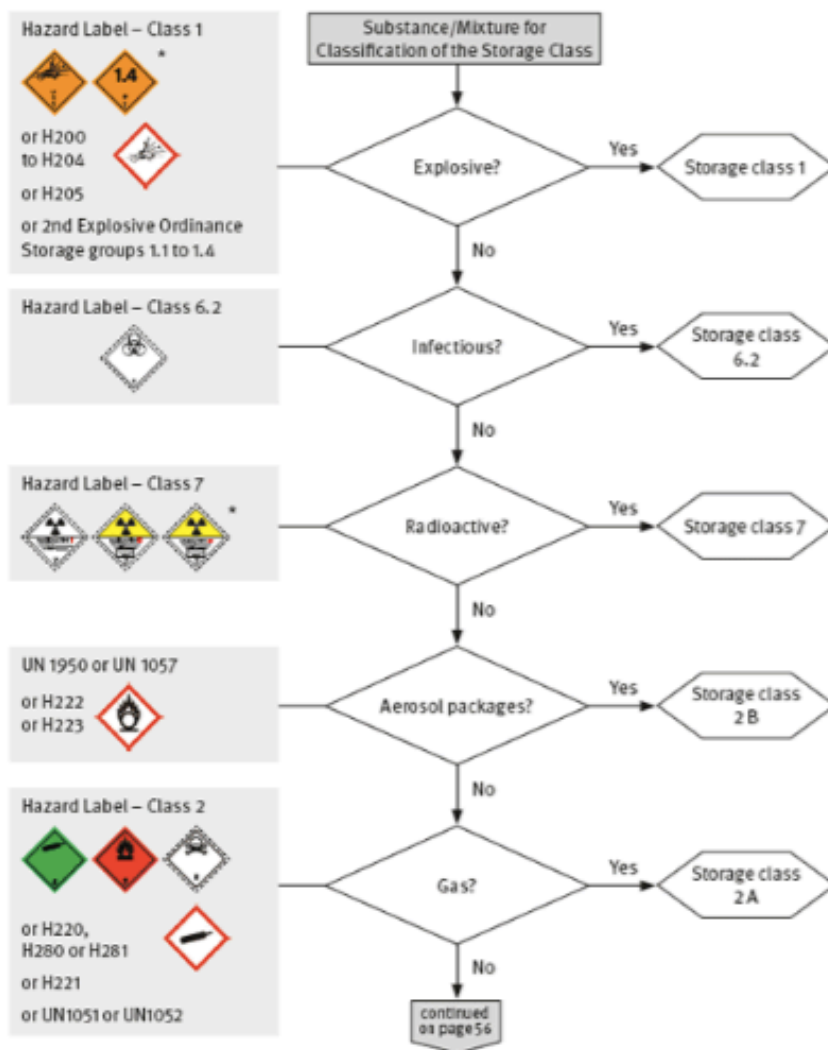
Labelling	Description
	<p>Pyrophoric or self-heating substances Liquids and solids that react so violently with atmospheric oxygen that they are self-heating and in some cases even ignite, which could cause a fire in a warehouse.</p> <p>This includes substances that according to</p> <ol style="list-style-type: none"> 1. CLP (1a) are marked with the H-sentence H250, H251 or H252, 2. the Hazardous Substances Ordinance (GeStoffV) (15) are marked with R17, 3. the Hazardous Goods Law (30) are assigned to spontaneously combustible substances of class 4.2. <p>e.g. white phosphorous or aluminium alkyls</p>
	<p>Substances which emit flammable gases in contact with water. Some substances react vigorously in contact with water or humidity, and emit flammable gases which can then ignite spontaneously.</p> <p>This includes substances that according to</p> <ol style="list-style-type: none"> 1. CLP are marked with the H-sentence H260 or H261, 2. the Hazardous Substances Ordinance (GeStoffV) are marked with R15, 3. the Hazardous Goods Law are assigned to class 4.3. <p>e.g. trichlorsilane, sodium, calcium carbide</p>
	<p>Oxidising substances In the event of a fire, these substances increase the severity of the reaction and therefore cause a very rapid spread of a fire. They can react very violently with other stored hazardous substances as well as with packaging materials and cause spontaneous fires.</p> <p>This includes substances that according to</p> <ol style="list-style-type: none"> 1. CLP are marked with the H-sentences H271 or H272, 2. the Hazardous Goods Law are assigned to class 5.1. <p>e.g. potassium nitrate, sodium nitrite, sodium peroxide, hydrogen peroxide, perchloric acid</p>

Labelling	Description
	<p>Organic peroxides Organic peroxides are organic substances which contain the bivalent -O-O- structure and may be considered as derivatives of hydrogen peroxide where one hydrogen or both of the hydrogen atoms have been replaced by organic radicals.</p> <p>These include</p> <ol style="list-style-type: none"> 1. Organic peroxides type C, D, E or F which are marked with the H-sentence H242, (42) (35) 2. Organic peroxides which are classified in class 5.2 according to Hazardous Goods Law. <p>e.g. benzoyl peroxide, 4.4-dichlorobenzoyl peroxide, peroxy acetic acid</p>
	<p>Toxic and very toxic substances These are substances which even in a relatively small quantity are able by a single action or by action of short duration to cause damage to human health or death as a result of inhalation, cutaneous absorption or ingestion.</p> <p>This includes substances that are</p> <ol style="list-style-type: none"> 1. marked according to CLP (1a) with H300, H310 or H330, 2. marked with R26, R27 or R28 according to the Hazardous Substances Ordinance (GefStoffV) (15), 3. assigned to class 6.1 according to the Hazardous Goods Law. (30) <p>e.g. arsenic(III) oxide, sodium cyanide, mercury(II) chloride</p>
	<p>Substances with chronic effects are marked according to CLP with the H-sentences</p> <ol style="list-style-type: none"> a. H301 or H311 or H331 (acute toxicity), b. H340 (germ-cell mutagenicity), c. H350 (carcinogenicity), d. H360 (reproductive toxicity), e. H370 (specific target organ toxicity (STOT)), f. H372 (specific target organ toxicity (STOT)).
	<p>Infectious substances These are assigned to class 6.2 according to the Hazardous Goods Law.</p> <p>These are not covered by this code of practice.</p>

Labelling	Description
	<p>Radioactive substances</p> <ol style="list-style-type: none"> where handling requires notification and authorization pursuant to Section 4 Radiological Protection Ordinance (Strahlenschutzverordnung). (29) which are classified in class 7 according to the Hazardous Goods Law, are not covered by this code of practice.
	<p>Corrosive substances</p> <p>Substances with corrosive properties can damage the skin, mucous membranes or tissue. They can also cause damage, for example, to wood, metal or plastics. These also include substances that first form corrosive liquid substances with water or corrosive vapours or mist with natural humidity.</p> <p>This includes substances that according to</p> <ol style="list-style-type: none"> CLP are marked with the H-sentence H314, (1a) the Hazardous Substances Ordinance (GefStoffV) (15) are marked with the R-sentences R34 or R35 or the Hazardous Goods Law are classified in class 8. (30) <p>e.g. hydrochloric acid, sulphuric acid, potassium hydroxide, sodium hydroxide, phosphorous trichloride</p>
	<p>Substances hazardous to the environment</p> <p>Substances hazardous to the environment include, among others, liquid or solid water-contaminating substances, as well as solutions and mixtures with such substances (such as preparations and waste).</p> <p>This includes substances that according to</p> <ol style="list-style-type: none"> CLP are marked with the H-sentences H400, H410 or H411, the Hazardous Substances Ordinance are marked with the R-sentences R50, R51, R52 or R53 or the Hazardous Goods Law are marked "dangerous to the environment".

Labelling	Description
	<p>Irritants and harmful substances These include among others</p> <ul style="list-style-type: none"> substances which if inhaled, coming into contact with the skin or swallowed can cause harmful effects to health (R-sentences R20, R21, R22) and corresponding CLP (1a) substances with acute toxicity category 4 (H-sentences H302, H312, H332) as well as substances that can irritate the eyes, respiratory organs or skin or cause a sensitization through skin contact (R-sentences R36, R37, R38, R43) and corresponding to CLP must be marked with the H-sentences H315, H319, H335 or H317 and since the introduction of the CLP also substances that cause drowsiness and dizziness (H336) [Note: These previously bore the R-sentence R67, but no symbol]. <p>Irritant and harmful substances are not subject to Hazardous Goods Law labelling obligations.</p>
	<p>Limited quantities (LQ) According to hazardous goods regulations, specific exemptions may be applied in the case of certain packed hazardous goods. The labelling, however, only states that a hazardous substance is involved; there is no indication of the dangers it may cause. (35) (57)</p>

FLOWCHART FOR ASSIGNING STORAGE CLASSES (ASSIGNMENT GUIDELINES)



* Example, classes 1 and 7 also have other danger labels