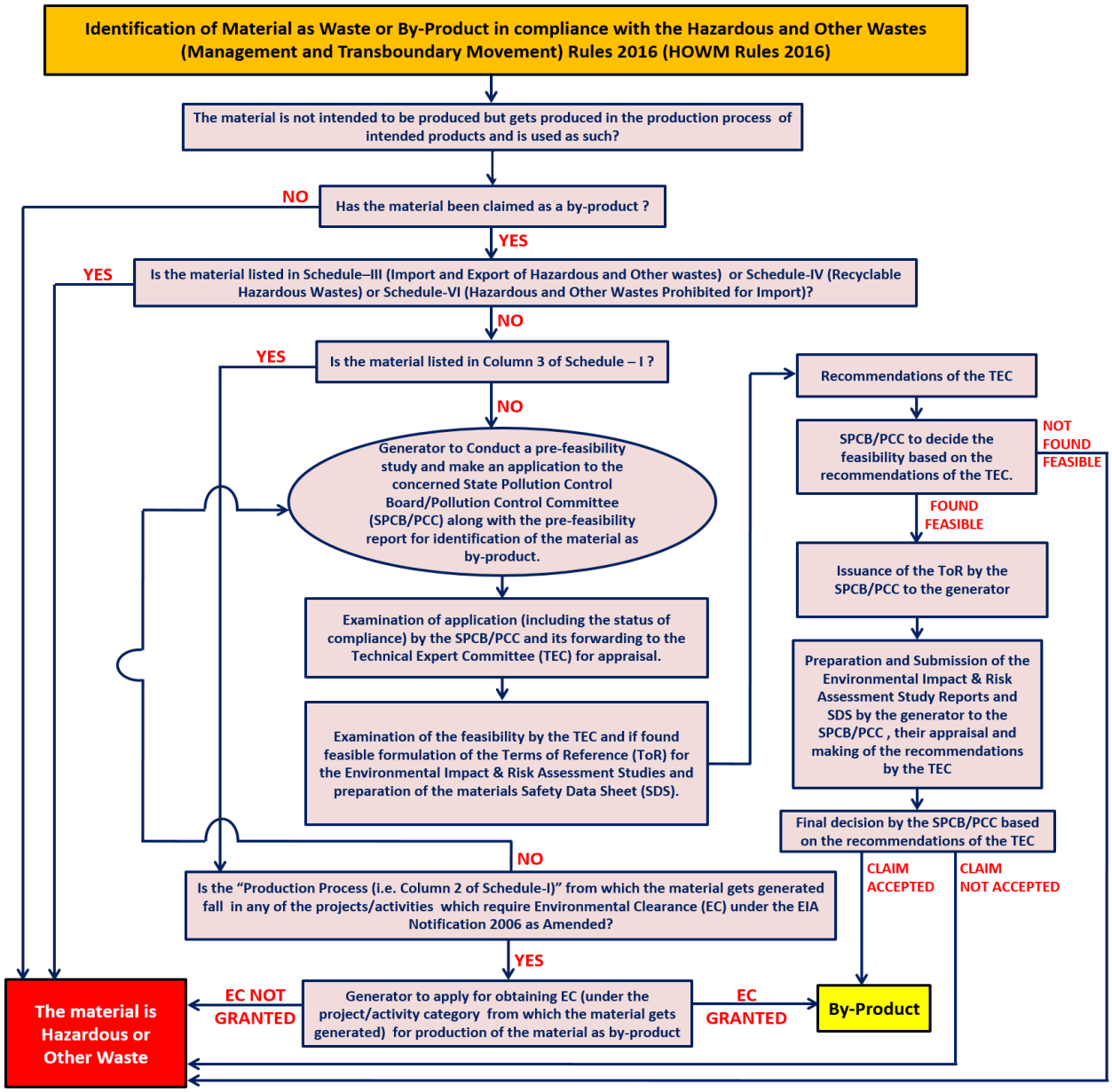
Framework on Identification of Materials Generated from Industrial Processes as Wastes or By-products

[Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016]



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Central Pollution Control Board
(Ministry of Environment, Forest and Climate Change)
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Contents

1.0 Background

Industrial process may also generate waste(s) and by-product(s) besides products(s). The management of Hazardous and Other wastes in India is regulated as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules, 2016)

The "waste" is defined under Clause 3(1) (38) of the HOWM Rules, 2016 as follows:

Waste means materials that are not products or by-products, for which the generator has no further use for the purposes of production, transformation or consumption. The explanation incorporated further for the purposes of this clause states as follows:

(i) *Waste includes the materials that may be generated during, the extraction of raw materials, the processing of raw materials into intermediates and final products, the consumption of final products, and through other human activities and excludes residuals recycled or reused at the place of generation; and*

(ii) *By-product means a material that is not intended to be produced but gets produced in the production process of intended product and is used as such.*

The HOWM Rules are silent about the conditions in regard to the suitability of the "as such use" of the material that is not intended to be produced but gets produced in the production process of intended product for its identification as a "by-product". The distinction between when a material generated from a production process should be considered as a "by-product" and when it should be considered as a "waste" is required to be discern critically. In case a "waste" escapes as "by-product", it may get out of ambit of the aforesaid regulations of HOWM Rules and carry the risk of adverse impacts on human health and environment. On the other hand, if a "by-product" gets categorized as "waste", its generator will have the compulsion of complying with all requisite requirements prescribed under the said HOWM Rules by such generator.

This, therefore, requires formulation of criteria for identification of materials as "wastes" or "by-products".

This document has been prepared based on report submitted by Technical Committee (comprising of Dr. Ranveer Singh Mahwar, Former Additional Director, CPCB and Ms. Deepti Kapil, Scientist 'D', Waste Management- II Division, CPCB, Delhi) constituted by CPCB and technical inputs given by Sh. Bharat K Sharma, Additional Director, CPCB. The report has been

reviewed by CPCB and approval has also been accorded by Ministry of Environment, Forest & Climate Change, Govt. of India.

The preparation of this document is also in compliance with the orders dated 12/04/2019 of the Hon'ble National Green Tribunal, Principal Bench, New Delhi, in the matter of Original Application No. 804/2017: Rajiv Narayan & Anr. Vs Union of India & Ors wherein the directions of the Hon'ble Tribunal include preparation of guidelines or protocol on how to decide a material to be a "by-product".

The details of the methodology followed in the process; the findings of the global survey and review study done to get the definitions of wastes and by-products contained in the international regulations including the Basel Convention on the issue; an analysis of the HOWM Rules, 2016 and the related environmental legislation specially the Environment Impact Assessment (EIA) Notification 2006; the steps to be followed for identification of material as "waste" or "by-product"; and; Criteria for determining a material as "by-product"; Guiding factor for accepting a material as "by-product" are given in the subsequent paragraphs of this document.

This document would help in identification of material generated from industrial processes as "wastes" and "by-products" thereby resulting into effective enforcement of the HOWM Rules, 2016.

2.0 Methodology

The methodology followed by the committee includes extensive surveys and discussions for, (i) collection and review of the relevant provisions contained in the Basel Convention, the regulations of European Union (EU) and other countries; (ii) critical analysis of HOWM Rules, 2016 and the related environmental legislation of the country; (iii) the various essential aspect (such as feasibility, environmental and health impacts and risk analysis) needing assessments for identification of a material as a "waste" or a "by-product"; (iv) formulation of the criteria/steps to be followed in the process of deciding a material to be a "waste" or a "by-product" and (v) guiding factors for accepting a material as "by-product".

A summary note on the proposed preparation of these guidelines was also posted on the CPCB's website inviting comments from all interested. The comments received were reviewed and incorporated for the best possible inputs.

3.0 Global Scenario on Definitions of Wastes to By-product Relationship and Its Implications

The regulations of the different countries including EU and Basel were reviewed for the definition of wastes, by-products and related terms to explore the criteria that are followed for identification of waste and by-products. This was done to find how these definitions identify a material as 'waste' and how a material is declared as a 'by-product'.

The definitions as laid in the Basel Convention and other international agencies/countries are as follows:

Basel Convention - "Wastes" are 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.

OECD-Waste refers to materials that are not prime products (that is, products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose.

UNSD (United Nations Statistics Division)– Wastes are materials that are not prime products (that is products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose.

Australia- There are a number of definitions of waste that are in use for a variety of purposes across Australia. In-fact, the same material has been defined and classified differently depending on the purpose of the classification, both within a jurisdiction and across jurisdictional borders of the country.

Japan- "waste" refers to refuse, bulky refuse, ashes, sludge, excreta, waste oil, waste acid and alkali, carcasses and other filthy and unnecessary matter, which are in solid or liquid state (excluding radioactive waste and waste polluted by radioactivity).

European Commission (EU)-

- Waste shall mean any substance or object in the categories set out in Annex I which the holder discards or intends or is required to discard.
- Production residue- a material that is not deliberately produced in a production process but may or may not be a waste.
- A production residue that fulfils the conditions of Article 5(1) of the EU's Waste Framework Directive (WFD) is a by-product. Bearing in mind that any substance or object can be either waste or non-waste, by-products are regarded by definition as non-waste. This means that

by-products should be subject, where applicable, to legislation which excludes waste from its scope.

- Article 5(1) WFD sets out the following four conditions that a production residue must meet in order to be considered a by-product:
  - ✓ Further use of the substance or object is certain.
  - ✓ The substance or object can be used directly without any further processing other than normal industrial practice.
  - ✓ The substance or object is produced as an integral part of a production process; and
  - ✓ Further use is lawful, i.e. the substance or object fulfils all relevant product, environmental and health-protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.
- A production residue is something other than the end product that the manufacturing process directly seeks to produce. Where the production of the material concerned is 'the result of a technical choice', it cannot be a production residue and is considered a product.

The survey revealed that there is a wide range of internationally accepted definitions for wastes, process residue and by- products. These include right from the definition of a waste as "material or an object which the holder decided to discard or intends or is required to discard" to a "material which is destined for storage in a secured landfill or incineration after its all possible use and recovery".

It is observed that most of the waste definitions deal with the existing waste. Such definitions seem to accept the fact that people/institutions throw things away, and therefore, the existing legislations appear to be concerned with the dilemma of 'what to do with it?' Another problem with most of these definitions is that they do not suggest that creating waste is an unsustainable option. It seems acceptable to discard something no longer wanted, or to create something with no eventual long-term use at all.

The global survey and review study indicate that the existing definitions are not capable of constructing a system, the application of which can clearly provide the description of the about the type of materials that are not intended to be produced but gets produced in the production processes can be used "as such" without any further processing.

The EU scenario, however, appears to show an emerging recognition that the wastes collected for recycling purposes should be defined as secondary raw materials. It also states that "A by-product or residual product does not constitute a waste if it is destined for direct re-use in its existing form and if the use of a residue as a substitute or ingredient is as environmentally sound as the material it is replacing".

The EU regulations have laid conditions for a material that is not deliberately produced in production process to be a by-product and not a waste. The conditions include the feasibility of the material for its intended use as by-product as well as ensuring of the absence of any adverse impact on the environmental, health and other risks in the process. These conditions have, therefore, been taken into consideration for the preparation of this framework.

4.0 Definitions of Waste and By-product in the HOWM Rules 2016 – An Analysis

4.1 Definitions

4.1.1 Hazardous Waste

The Rules 3(1)(17) defines hazardous waste as : any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes or substances, and shall include - (i) waste specified under column (3) of Schedule-I; (ii) waste having equal to or more than the concentration limits specified for the constituents in class A and class B of Schedule-II or any of the characteristics as specified in class C of Schedule-II; and (iii) wastes specified in Part A of Schedule-III in respect of import or export of such wastes or the wastes not specified in Part A but exhibit hazardous characteristics specified in Part C of Schedule-III.

4.1.2 Other Waste

The Rule 3(1)(23) defined "other wastes" as wastes specified in Part B and Part D of Schedule-III for import or export and includes all such waste generated indigenously within the country.

4.1.3 Waste

The Rule Section 3(1)(38) defines "Waste" as materials that are not products or by-products, for which the generator has no further use for the purposes of production, transformation or consumption. There is an explanation included in this clause which states that the (i) Waste includes the materials that may be generated during, the extraction of raw materials, the processing of raw materials into intermediates and final products, the consumption of final products, and through other human activities and excludes residuals recycled or reused at the place of generation; and (ii) by-product means a material that is not intended to be produced but gets produced in the production process of intended product and is used as such.

It may be noted here that the wastes are also materials that are never intended to be produced but get produced in the production processes of the intended products and the HOWM Rules 2016 permit identification of only that material as by-product which can be used "as such" without any further processing. **Also, the definition of the by-product given under Rule 3(1)(38) does not specify anything about "as such" as an identification "notwithstanding anything contained in the rest of the provisions of the HOWM Rules 2016 or any other Rules notified under**

Environment (Protection) Act 1986". This implies that the identification of a material as 'waste' or as 'by-product' under this Rule is to be permitted only if such an identification does not involve anything inconsistent with the rest of the provisions of the HOWM Rules 2016 and only after ensuring compliance to the concerned other Rules notified under the Environment (Protection) Act 1986.

4.2 Transboundary Movement of Wastes and Compliance to the Basel Convention

The Hazardous and Other Wastes listed in Schedule-III (Import and Export of Hazardous and Other wastes) and Schedule-VI (Hazardous and Other Wastes Prohibited for Import) of the HOWM Rules 2016 are part of the Annexure-VIII and Annexure-IX of the Basel Convention on the Transboundary Movement of Hazardous Wastes.

The Rule 12(7) of the HOWM Rules allows export of the wastes that are prohibited for import (Schedule-VI) with the permission of Ministry of Environment, Forest and Climate Change. Infact, each of the wastes listed in Schedule-III and Schedule-VI has a specific Basel Number for the purpose of its identification for tracking of its transboundary movement. The Govt of India being a party to the Basel Convention requires these materials to remain identified as wastes for maintaining alignment with the compliance requirements of this convention.

4.3 Recyclable Wastes

The Rule 3(1) 25 defines "recycling" as reclamation and processing of hazardous or other wastes in an environmentally sound manner for the originally intended purpose or for other purposes.

There are a total of 20 commonly recyclable wastes listed in Schedule-IV of the HOWM Rules 2016. The classification of these wastes as recyclable itself implies that they are not suitable for use "as such" in any of the industrial processes and hence cannot be identified as by-products.

4.4 Utilization of Hazardous and Other Wastes as Resource

The Rule 9 (1) of the HOWM permits utilisation of hazardous and other wastes as a resource or after pre-processing either for co-processing or for any other use, including within the premises of the generator (if it is not part of process) after obtaining the authorisation from the concerned SPCB/CPCB as per the procedure prescribed therein.

This implies that the suitability of the waste for its utilization as a resource is limited to the uses permitted under this Rule without any change in its present status of its identification in the HOWM Rules 2016.

4.5 Schedule-I, Schedule-II and Identification of by-products

4.5.1 Schedule-I

There are a total of 128 types of hazardous wastes generated from 38 different industrial processes listed in the Schedule-I of HOWM Rules. A comparison of this list with the projects/activities prescribed in the Environment Impact Assessment Notification, 2006 shows that the establishment or any change in the activities of the 28 of these 38 processes requires obtaining of Environmental Clearance (EC) from the Prescribed Authority. A total of 99 types of wastes are generated from these 28 processes. The rest of the 10 processes generate 29 types of wastes. This implies that the consideration for any of the type waste that gets generated from the any of the process appearing in the Schedule-I of HOWM Rules and also covered in the projects/activities listed the EIA Notification, as "by-product" requires the generator to seek Environment Clearance from the concerned Prescribed Authority for such a production.

4.5.2 Schedule-II

This schedule classifies a waste to be hazardous wastes into three classes namely Class A, Class B and Class C.

The Class A is based on leachable concentration limits [Toxicity Characteristic Leaching Procedure (TCLP) or Soluble Threshold Limit Concentration (STLC)]. There are a total of 79 constituents (A1 to A79) for which limits of the leachable concentrations have been specified, the exceeding of any of more which means the waste is a hazardous.

The Class B is based on Total Threshold Limit Concentration (TTLC). There are only two constituents (B1 and B2) and their respective TTLC limits specified in this class which if exceeded will mean the waste to be hazardous.

The schedule also requires that the hazardous constituents to be analysed in the waste shall be relevant to the nature of the industry and the materials used in the process.

The Class C classification is based on the hazardous Characteristics of the wastes. A waste that contains any of the 50 constituents listed therein will be considered as hazardous if the waste exhibits any of the 13 characteristics (C1 to C13) listed in this schedule. The 13 characteristics are, Flammable (C1), Corrosive (C2),Reactive or explosive (C3), Toxic (C4), Substances or Wastes liable to spontaneous combustion(C5), Substances or Wastes which, in contact with water emit flammable gases (C6), Oxidizing (C7), Organic Peroxides (C8), Poisons(acute) (C9),Infectious (C10), Liberation

of toxic gases in contact with air or water(C11), Eco-toxic (C12) and Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above (C13).

4.6 Relevance to Identification of By-product

It is evident from the analysis of the definitions provided in the HOWM Rules 2016 that any material that is not intended to be produced but gets produced in any of the process of production of the intended products may get remain as a 'waste' or as a 'by-product'.

A clear and consistent distinction between when a material obtained after a production process should be considered as a 'by-product' and when it should be considered as 'waste' is of great concern that will significantly influence the enforcement of HOWM Rules 2016.

It is also to be noted here that various inorganic salts, acids, bases, etc. are commonly sold as by-products and used directly without any further processing in various ancillary industries. However, such acids, salts, etc. need to be examined with respect to contaminations, if any, which may have impact on human health and environment and depending upon level of presence or absence of such contaminations, such acids, salts, etc. are required to be categorized as by-product or waste. For instance, generator of spent sulphuric acid from dye & dye intermediates or other chemical manufacturing processes may claim the same as `by-product' arguing that it contains 30-70% sulphuric acid and can be used in Single Super Phosphate (SSP) production but such usage may have adverse impact on soil, water bodies or plant since the spent acid may contain harmful organic compounds, metals, halogen, etc. (depending upon process of spent acid generation) which could be embedded in SSP though in trace level but continuous use of such SSP in agriculture over the years may result in adverse impact on soil, flora, fauna, etc. Hence, such spent acid cannot be declared as by-product and need to be regulated as waste and its utilization as resource recovery, if any, also requires to be regulated by way of preparing SOP/guidelines under Rule 9 of the HOWM Rules, 2016. SPCBs/PCCs are required to discern whether a given material is a waste or by-product. Without this clarity, there is a possibility that the provision of "by-product" in the hazardous waste rules may be misused by hazardous waste generators to escape from the stringent provisions of the rules.

Thus, **the identification of any material as by-product on the other hand will means that the material has been found as a suitable resource in its all the possible end use scenarios and also to the extent that its regulation under the HOWM Rules 2016 is not required except in case of the by-product so identified become surplus or expired or an off**

specification material requiring disposal as per the provisions of these Rules. This means that the by-product so identified has to be as good as a product in the context of the Feasibility, the Environmental Impact and the Risks involved in its all possible end use scenarios.

5.0 Essential Aspects Involved in the Identification of Materials as Wastes or By-products

(i) Materials that are not intended to be produced but get produced in any of the processes of production of the intended products will invariably contain a variety of hazardous constituents depending upon the nature of the industry and the materials used in the process in which they get produced.

(ii) The materials that are not intended to be produced have no control of their quality. Infact, the quality will be highly dependent even on the level best management practices followed in the production system. This uncertain quality is expected to deteriorate even further in case such materials get identified as by-products which mean their coming out from being regulated under the HOWM Rules 2016 and other concerned National and International environmental legislation that are applicable to the wastes.

(iii) The use "as such" of such a material may lead a complete change in characteristics including hazardous constituents contained in it. The constituents which are marginally leachable may become completely soluble and even get vaporised resulting into contamination of not only the products made from its use but also into an increased and/or additional release of contaminants in air, water, soil, working environment. This may also result into a total change in the characteristics of the wastes that are generated in its end use process. The use "as such" of such a material may also result into a non-hazardous waste becoming a hazardous waste and/or recyclable waste becoming a non-recyclable waste in the end use process industry.

(iv) The use of such materials may also result into products which may become unfit for use in the food and pharmaceutical industry.

(v) The use of such a material as substitute of the products already in use may have an adverse impact on the overall economy of the entire process depending upon the production, demand and supply of the products it is replacing and the presence of multiple constituents in the materials that are not intended to be produced. For instance, the use "as such" of the spent HCl (that is generated in the metal surface treatment processes) will not only mean the risk of the HCl produced from the Chlor-Alkali Industry becoming surplus. Moreover, the spent HCl generated from metal surface treatment contains a number of

heavy metals which even if assumed to end up as waste in the process of its use will mean a waste with high level of these heavy metals.

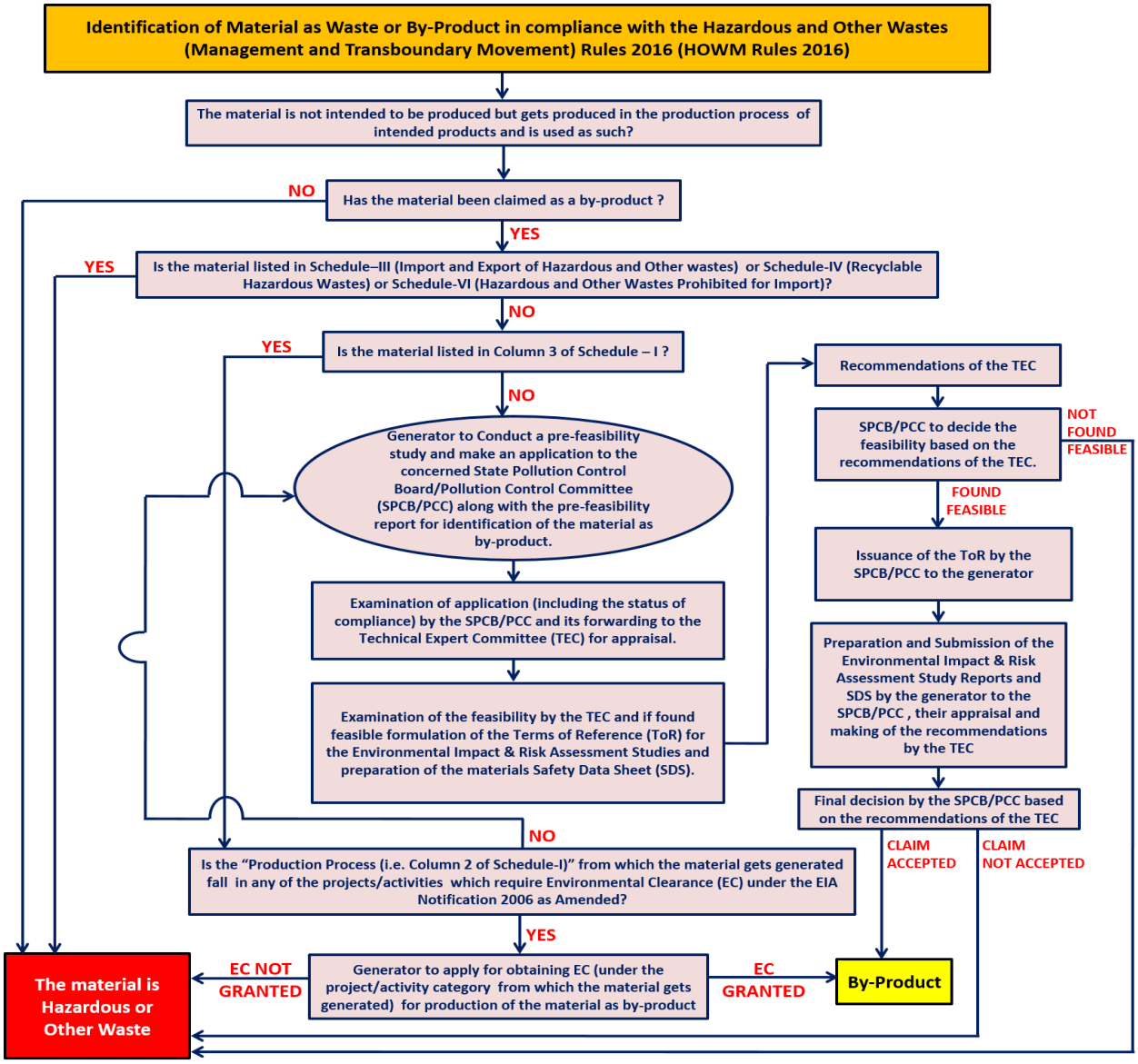
(vi) A complete knowledge of the Life Cycle of the constituents present in such materials is a must. This means ensuring availability of the credible data/information on the composition of such materials and the fate of each of the constituent contained in it during its use "as such" process.

(vii) It can be therefore safely concluded that consideration of any such material for its identification as 'by-product' should be based on conducting of a prefeasibility study first and if found feasible conducting of the Environmental Impact and Risk Assessment studies for confirmation of the absence of any adverse impacts and risks in the end use of the material as substitute in any other process.

6.0 Criteria for Identification of material as waste or by-product

6.1 Overall Criteria Flow Chart

The overall process for identification of material as 'by-product is shown in the figure given below:



Note:

(i) Any material which was identified as hazardous waste under the Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008 will remain as Hazardous or Other Waste under the HOWM Rules 2016 unless the material is identified as a by-product following the above criteria.

(ii) The by-products identified through the criteria elaborated above will be applicable and enforceable only after suitable grant/amendment in Environmental Clearance, if applicable, and also, the grant

/amendment in consent under Water and Air Acts for the industry/activity/project. Till such time the original classification of the waste alongwith prescribed disposal mechanism stands for compliance.

(iii) The identification of a material as 'waste' or 'by-product' is to be done on case to case basis for the material that is claimed as by-product.

6.2 Steps to be followed

Step-1

Examine the production process and find out whether the material is "intended to be produced" or "not intended to be produced but gets produced". If the material produced is an intended production it is deemed to be a "**product**". If the material is not intended to be produced but gets produced in the production process and is being claimed as a by- product go to STEP-2.

Step-2

Check the classification of the material claimed as by- product as per the HOWM Rules 2016 and find out whether the material is listed in Schedule-III (Import and Export of Hazardous and Other wastes) or Schedule-IV (Commonly Recyclable Hazardous Wastes) or Schedule-VI (Hazardous and Other Wastes Prohibited for Import) of these rules. If the material is appearing in the aforesaid Schedules, it is deemed to be **"a hazardous or other waste"**. In case the material does not appear in any of these three Schedules go to next step.

Step-3

Check whether the material claimed as by- product is listed in Column 3 of Schedule-I of the HOWM Rules 2016. In case it is not listed in the Column 3 of this Schedule go to Step-4A and if listed in this schedule go to Step-5.

Step-4A

The generator to conduct a pre-feasibility study covering all possible end uses of material claimed as by-product and make an application to the concerned State Pollution Control Board/Pollution Control Committee

(SPCB/PCC) in the form prescribed[1] by the SPCB/PCC for this purpose along with the pre-feasibility report for identification of the material as by-product. The aspects to be covered (but not limited to) in the pre-feasibility study are given in **Appendix-I**.

Step-4B

The concerned SPCB/PCC to examine the application including the validity and status of the compliance of the conditions of the Consents, Authorization etc and forward the application to the Technical Expert Committee (TEC)[2]** for the appraisal of the feasibility of the material's identification as by-product. The generator along with the consultant/agency[3] engaged by him is required to make a presentation before the TEC. In case the pre-feasibility study is found feasible, the TEC may formulate the Terms of Reference (TOR) for conducting the Environmental Impact and Risk Assessment Studies and preparation of the material's Safety Data Sheet (SDS) by the generator (The OSHA- Hazard Communication Standard for Safety Data Sheets is attached at **Appendix-III** for reference). Based on the recommendations of the TEC, SPCB/PCC may take appropriate decision/ further action.

Step-4C

The SPCB may examine the recommendations of the TEC and communicate the generator accordingly for rejection of the claim or issuance of the TOR for conducting the Environmental Impact and Risk Assessment Studies and submission of the reports. The aspects to be covered (but not limited to) in these studies are given in **Appendix-II**.

Step -4D

The Submission of the Environmental Impact & Risk Assessment Study Reports and the Safety Data Sheet by the generator to the SPCB/PCC, their appraisal and making of recommendations by the TEC in regard to identification of the material as by-product. The generator along with the consultant engaged by him is required to present the details of the studies

[1] The SPCB/PCC may prepare an application format based on Form -1 provided in the EIA notification 2006, by incorporating the need and the type of the information and documents that may be needed for the purpose of identification of materials as waste or by-product.

[2] To be constituted by the SPCB/PCC or SPCB/PCC may assign this additional scope to the existing Technical Committee constituted for obtaining "No Increase in Pollution Load" certificate / permission from the State Pollution Control/Pollution Control Committee for cases of change in product mix without change in quantity and pollution load w.r.t. notification number S.O.3518(E) notified under the Environment (Protection) Act, 1986.

[3] Accredited by the National Accreditation Board for Education and Training (NABET), Quality Council of India

conducted and the findings and the SDS before the TEC. SPCB/PCC based on the recommendations of the TEC may take appropriate decision/ further action in this regard.

Step-4E

Final decision by the SPCB/PCC based on the recommendations of the TEC. In case the claim is accepted, the material gets identified as "**by-product**" and if not accepted it remains a "**hazardous or other waste**". In case of the material's identification as by-product, SPCB/PCC may ask the generator to obtain the revised consents and authorization accordingly.

Step-5

If the material claimed as by-product is listed in Column 3 of Schedule-I of the HOWM Rules, 2016, check whether the process from which its gets generated i.e Column 2 of Schedule-I falls in any of the projects or activities which require Environment Clearance (EC) under the EIA Notification 2006. In case listed in the EIA notifications, go to Step-6 else go to Step-4A.

Step-6

The generator may apply (under the project/activity category from which the material gets generated) to the concerned authority for obtaining the EC for the production of the material as by-product. The studies to be conducted for this purpose should include the aspects given in **Appendix-I** and **Appendix-II** and preparation of the material's Safety Data Sheet. In case the EC is granted the material may be identified as a "**by-product**". In case EC is not granted the material remains a "**hazardous or other waste**".

7.0 Guiding factors for accepting a material as "by-product"

Guiding factors for accepting a material as "by-product" would vary depending on the materials being generated and its intended use. However, following are general (but not limited to) criteria for accepting a material as "by-product":

(i) The material fits into the definition of "by-product" as defined under clause 3(1)(38) of the HOWM Rules, 2016.
(ii) Various constituents/contaminants and their concentration in the material are known.
(iii) The material doesn't require special purification/pre-processing when compared with the raw material which is intended to be substituted by the material.
(iv) The material meets BIS specification or other prescribed standards of the product intended to be substituted by material.
(v) Consumption of the material is known and there is sufficient and established demand for such consumptions.
(vi) Consumption of the material does not cause adverse impact on effluent emission/waste generation at the process where the same is intended to be used.
(vii) The constituents/contaminants present in the material do not have environmental impact and risk at its intended end use.
(viii) It doesn't have adverse impact on the market of the product which is intended to be substituted by the material.

The guiding factors may be considered by SPCBs/PCCs while accepting a material as "by-product". In the event of accepting a material as by-product, the SPCB/PCC shall also stipulate conditions w.r.t. handling and end use including Material Safety Data Sheet (MSDS) and the by-product shall be handled and managed as per the conditions stipulated by the SPCB/PCC.

8.0 Concluding Remarks

A material that is not intended to be produced but gets produced in the production process of intended product will remain as Hazardous and Other waste in the HOWM Rules 2016 unless it is identified as a by-product following the criteria given in these guidelines to confirm that the material's use "as such" is feasible in the country, does NOT involve any adverse impact on the environmental and risk of hazards, and its Safety Data Sheet is prepared and submitted by the generator of the material.

The by-products identified through the process elaborated in the present document will be applicable and enforceable only after suitable grant/amendment in EC, if applicable, and also, the grant /amendment in consent under Water and Air Acts for the industry/activity/project. Till such time the material or by-product shall be categorized as waste and managed accordingly. Further, quantity and end use of such by-product shall be specified in the amended EC/Consent.

Reference Links:

(1) Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008
http://cpcb.nic.in/displaypdf.php?id=aHdtZC9taHRydWxlczIwMDgucGRm

(2) Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016
http://www.iwma.in/HWM%20Rules.pdf

(3) EIA Notification 2006
http://environmentclearance.nic.in/writereaddata/EIA_notifications/2006_09_14_EIA.pdf

(4) EIA Amendment Notification 2009
http://sikenvis.nic.in/writereaddata/S_O%203067-2009.pdf

(5) Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
https://www.basel.int/Portals/4/Basel%20Convention/docs/text/BaselConventionText-e.pdf

(6) National definition of waste- All Regions/Countries, Parties of the Basel Convention
http://www.basel.int/Portals/4/Basel%20Convention/docs/natreporting/2009/compI/2009-question-2a.pdf

(7) OECD – Glossary of Statistical Terms
https://stats.oecd.org/glossary/detail.asp?ID=2896

(8) UNEP- What is waste - A Multitude of Definitions and Approaches
http://www.grid.unep.ch/waste/html_file/06-07_what_waste.html

(9) Basel Convention Country Fact Sheet
http://archive.basel.int/natreporting/2006/cfs/japan.doc

(10) Waste definitions and classifications- Report on Issues, Opportunities and Information Gaps
http://www.environment.gov.au/system/files/resources/d05aa2d3-be01-44f3-904b-04dd09e9b0a1/files/waste-classification-gaps-part1.pdf

(11) Environment Agency (EU) End-of-waste and by-product hazard and risk assessment
https://s3-eu-west-1.amazonaws.com/is-it-waste/risk-guidance.pdf

(12) Guidance on the interpretation of key provisions of Directive 2008/98/EC on waste
http://ec.europa.eu/environment/waste/framework/pdf/guidance_doc.pdf

(13) COMMUNICATION FROM THE COMMISSION on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018SC0020&from=EN

(14) The health and environmental impacts of hazardous wastes- Impact Profiles
http://www.environment.gov.au/system/files/resources/bc0e52ba-8f78-4ce1-83b4-4910f4a1f0e9/files/hazardous-waste-impacts.pdf

(15) Guidance on the preparation of safety Data Sheets -The United Nations Economic Commission for Europe (UNECE)
https://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev07/English/07e_annex4.pdf

(16) Hazard Communication Standard: Safety Data Sheets
https://www.osha.gov/Publications/OSHA3514.html

(17) Hazard Communication Standard: Safety Data Sheets
https://www.osha.gov/Publications/OSHA3514.pdf

(18) What is a Material Safety Data Sheet (MSDS)- University of Regina, Canada
https://www.uregina.ca/hr/hsw/assets/docs/pdf/Laboratory-Safety/Material-Safety-Data-Sheet.pdf

Appendix-I

Aspects to be covered (but not limited to) in the pre-feasibility study[4]

(1) Annual quantity of the claimed by-product generation

(2) Composition of the claimed by-product and the observed maximum concentration of each of the constituents contained in it (please refer Schedule-II for identification of the constituents concerning the material).

(3) The product which the claimed by-product is expected to substitute and its end use process.

(4) Composition of the product presently in use in regard to the concentration of each of the constituent identified under item (2) above.

(5) Acceptability of the claimed by-product's composition compared to product presently in use specially, in terms of products that are being produced in the process where the claimed by product is proposed to be used.

(6) Impact on the type of the hazardous wastes that are being generated in the process where the claimed by product is proposed to be used. This to be specially seen from the point that the use of claimed by-product may have a negative impact on the usefulness of the hazardous or other waste (that is presently getting generated in the end use process) as resource or energy recovery.

(7) Present status of the demand and supply of the product (which would be partially or fully substituted by the claimed by-product, as the case may be) presently in use.

(8) Impact on the market of the product as a result of the substitution by the claimed by-product.

(9) Scope for the substitution of the product currently in use especially in case the product itself is not the primary product of the industry where it gets produced. To make it clear here that the HCl is mainly produced as a secondary material in the production of caustic soda in the country. Any substitution of its use with the spent HCl will therefore mean the fresh HCl becoming surplus in the caustic Soda Industry and requiring treatment for disposal.

(10) Cost of upgrading (if required) the pollution control measures presently in place specially in the context of their need up gradation for compliance to the conditions of the consent and Authorization.

[4] To be conducted by an agency accredited by the National Accreditation Board for Education and Training (NABET), Quality Council of India.

(11) The overall impact of using the claimed by-product in the process where a fresh product is currently in use in the country in terms of the quality of the products that are being produced and the wastes which get generated.

Appendix-II

Aspects to be covered (but not limited to) in the Environmental Impact and Risk Analysis Studies[5]

(1) Annual quantity of the claimed by-product generation

(2) Composition of the claimed by-product and the observed maximum concentration of each of the constituents contained in it (please refer Schedule-II for identification of the constituents concerning the material).

(3) Impact of the use of the claimed by-product on the process (where it is intended to be used) with regard to the release of contaminants in the air, water, soil and work zone environment.

(4) Impact on generation of hazardous and other wastes from the proposed process, where the claimed by-product is intended to be used.

(5) Need of making changes in the existing air/water consents and authorization, where the claimed by-product is intended to be used.

(6) Impact on the adequacy of pollution control measures presently in place specially in the context of their need up gradation in compliance, where the claimed by-product is intended to be used.

(7) Expected impacts on the environment and human health, where the claimed by-product is intended to be used. This should be done on the lines of the EIA studies that are done for the new projects and the identification of the environmental and health management plans required to be added.

(8) Analysis of Risks involved in the end use of the material/product derived by using claimed by-product and identification of the additional requirements in the management plans

(9) The overall environment and human health impact of using the claimed by-product in the process where a fresh product (which would be partially or fully substituted by the claimed by-product) is currently in use and the risks involved in doing so.

(10) Justification of the acceptability of the findings.

[5] All the studies mentioned above should be conducted by an agency accredited by the National Accreditation Board for Education and Training (NABET), Quality Council of India, for this type of studies

OSHA® BRIEF

Hazard Communication Standard: Safety Data Sheets

The Hazard Communication Standard (HCS) (29 CFR 1910.1200(g)), revised in 2012, requires that the chemical manufacturer, distributor, or importer provide Safety Data Sheets (SDSs) (formerly MSDSs or Material Safety Data Sheets) for each hazardous chemical to downstream users to communicate information on these hazards. The information contained in the SDS is largely the same as the MSDS, except now the SDSs are required to be presented in a consistent user-friendly, 16-section format. This brief provides guidance to help workers who handle hazardous chemicals to become familiar with the format and understand the contents of the SDSs.

The SDS includes information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical. The information contained in the SDS must be in English (although it may be in other languages as well). In addition, OSHA requires that SDS preparers provide specific minimum information as detailed in Appendix D of 29 CFR 1910.1200. The SDS preparers may also include additional information in various section(s).

Sections 1 through 8 contain general information about the chemical, identification, hazards, composition, safe handling practices, and emergency control measures (e.g., fire fighting). This information should be helpful to those that need to get the information quickly. Sections 9 through 11 and 16 contain other technical and scientific information, such as physical and chemical properties, stability and reactivity information, toxicological information, exposure control information, and other information including the date of preparation or last revision. The SDS must also state that no applicable information was found when the preparer does not find relevant information for any required element.

The SDS must also contain Sections 12 through 15, to be consistent with the UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS), but OSHA will not enforce the content of these sections because they concern matters handled by other agencies.

A description of all 16 sections of the SDS, along with their contents, is presented below:

Section 1: Identification

This section identifies the chemical on the SDS as well as the recommended uses. It also provides the essential contact information of the supplier. The required information consists of:

- Product identifier used on the label and any other common names or synonyms by which the substance is known.
- Name, address, phone number of the manufacturer, importer, or other responsible party, and emergency phone number.
- Recommended use of the chemical (e.g., a brief description of what it actually does, such as flame retardant) and any restrictions on use (including recommendations given by the supplier).

Section 2: Hazard(s) Identification

This section identifies the hazards of the chemical presented on the SDS and the appropriate warning information associated with those hazards. The required information consists of:

- The hazard classification of the chemical (e.g., flammable liquid, category[1]).
- Signal word.
- Hazard statement(s).
- Pictograms (the pictograms or hazard symbols may be presented as graphical reproductions of the symbols in black and white or be a description of the name of the symbol (e.g., skull and crossbones, flame).
- Precautionary statement(s).
- Description of any hazards not otherwise classified.
- For a mixture that contains an ingredient(s) with unknown toxicity, a statement describing how much (percentage) of the mixture consists of ingredient(s) with unknown acute toxicity. Please note that this is a total percentage of the mixture and not tied to the individual ingredient(s).

Section 3: Composition/Information on Ingredients

This section identifies the ingredient(s) contained in the product indicated on the SDS, including impurities and stabilizing additives. This section includes information on substances, mixtures, and all chemicals where a trade secret is claimed. The required information consists of:

Substances

- Chemical name.
- Common name and synonyms.
- Chemical Abstracts Service (CAS) number and other unique identifiers.
- Impurities and stabilizing additives, which are themselves classified and which contribute to the classification of the chemical.

Mixtures

- Same information required for substances.
- The chemical name and concentration (i.e., exact percentage) of all ingredients which are classified as health hazards and are:
  - Present above their cut-off/concentration limits or
  - Present a health risk below the cut-off/concentration limits.
- The concentration (exact percentages) of each ingredient must be specified except concentration ranges may be used in the following situations:
  - A trade secret claim is made,
  - There is batch-to-batch variation, or
  - The SDS is used for a group of substantially similar mixtures.

Chemicals where a trade secret is claimed

- A statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

[1] Chemical, as defined in the HCS, is any substance, or mixture of substances.

Section 4: First-Aid Measures

This section describes the initial care that should be given by untrained responders to an individual who has been exposed to the chemical. The required information consists of:

- Necessary first-aid instructions by relevant routes of exposure (inhalation, skin and eye contact, and ingestion).
- Description of the most important symptoms or effects, and any symptoms that are acute or delayed.
- Recommendations for immediate medical care and special treatment needed, when necessary.

Section 5: Fire-Fighting Measures

This section provides recommendations for fighting a fire caused by the chemical. The required information consists of:

- Recommendations of suitable extinguishing equipment, and information about extinguishing equipment that is not appropriate for a particular situation.
- Advice on specific hazards that develop from the chemical during the fire, such as any hazardous combustion products created when the chemical burns.
- Recommendations on special protective equipment or precautions for firefighters.

Section 6: Accidental Release Measures

This section provides recommendations on the appropriate response to spills, leaks, or releases, including containment and cleanup practices to prevent or minimize exposure to people, properties, or the environment. It may also include recommendations distinguishing between responses for large and small spills where the spill volume has a significant impact on the hazard. The required information may consist of recommendations for:

- Use of personal precautions (such as removal of ignition sources or providing sufficient ventilation) and protective equipment to prevent the contamination of skin, eyes, and clothing.
- Emergency procedures, including instructions for evacuations, consulting experts when needed, and appropriate protective clothing.
- Methods and materials used for containment (e.g., covering the drains and capping procedures).
- Cleanup procedures (e.g., appropriate techniques for neutralization, decontamination, cleaning or vacuuming; adsorbent materials; and/or equipment required for containment/clean up).

Section 7: Handling and Storage

This section provides guidance on the safe handling practices and conditions for safe storage of chemicals. The required information consists of:

- Precautions for safe handling, including recommendations for handling incompatible chemicals, minimizing the release of the chemical into the environment, and providing advice on general hygiene practices (e.g., eating, drinking, and smoking in work areas is prohibited).
- Recommendations on the conditions for safe storage, including any incompatibilities. Provide advice on specific storage requirements (e.g., ventilation requirements).

Section 8: Exposure Controls/Personal Protection

This section indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure. The required information consists of:

- OSHA Permissible Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.
- Appropriate engineering controls (e.g., use local exhaust ventilation, or use only in an enclosed system).
- Recommendations for personal protective measures to prevent illness or injury from exposure to chemicals, such as personal protective equipment (PPE) (e.g., appropriate types of eye, face, skin or respiratory protection needed based on hazards and potential exposure).
- Any special requirements for PPE, protective clothing or respirators (e.g., type of glove material, such as PVC or nitrile rubber gloves; and breakthrough time of the glove material).

Section 9: Physical and Chemical Properties

This section identifies physical and chemical properties associated with the substance or mixture. The minimum required information consists of:

- Appearance (physical state, color, etc.);
- Odor;
- Odor threshold;
- pH;
- Melting point/freezing point;
- Initial boiling point and boiling range;
- Flash point;
- Evaporation rate;
- Flammability (solid, gas);
- Upper/lower flammability or explosive limits;
- Vapor pressure;
- Vapor density;
- Relative density;
- Solubility(ies);
- Partition coefficient: n-octanol/water;
- Auto-ignition temperature;
- Decomposition temperature; and
- Viscosity.

The SDS may not contain every item on the above list because information may not be relevant or is not available. When this occurs, a notation to that effect must be made for that chemical property. Manufacturers may also add other relevant properties, such as the dust deflagration index (Kst) for combustible dust, used to evaluate a dust's explosive potential.

Section 10: Stability and Reactivity

This section describes the reactivity hazards of the chemical and the chemical stability information. This section is broken into three parts: reactivity, chemical stability, and other. The required information consists of:

Reactivity

- Description of the specific test data for the chemical(s). This data can be for a class or family of the chemical if such data adequately represent the anticipated hazard of the chemical(s), where available.

Chemical stability

- Indication of whether the chemical is stable or unstable under normal ambient temperature and conditions while in storage and being handled.
- Description of any stabilizers that may be needed to maintain chemical stability.
- Indication of any safety issues that may arise should the product change in physical appearance.

Other

- Indication of the possibility of hazardous reactions, including a statement whether the chemical will react or polymerize, which could release excess pressure or heat, or create other hazardous conditions. Also, a description of the conditions under which hazardous reactions may occur.
- List of all conditions that should be avoided (e.g., static discharge, shock, vibrations, or environmental conditions that may lead to hazardous conditions).
- List of all classes of incompatible materials (e.g., classes of chemicals or specific substances) with which the chemical could react to produce a hazardous situation.
- List of any known or anticipated hazardous decomposition products that could be produced because of use, storage, or heating. (Hazardous combustion products should also be included in Section 5 (Fire-Fighting Measures) of the SDS.)

Section 11: Toxicological Information

This section identifies toxicological and health effects information or indicates that such data are not available. The required information consists of:

- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact). The SDS should indicate if the information is unknown.
- Description of the delayed, immediate, or chronic effects from short- and long-term exposure.
- The numerical measures of toxicity (e.g., acute toxicity estimates such as the LD50 (median lethal dose)) - the estimated amount [of a substance] expected to kill 50% of test animals in a single dose.
- Description of the symptoms. This description includes the symptoms associated with exposure to the chemical including symptoms from the lowest to the most severe exposure.
- Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA.

Section 12: Ecological Information (non-mandatory)

This section provides information to evaluate the environmental impact of the chemical(s) if it were released to the environment. The information may include:

- Data from toxicity tests performed on aquatic and/or terrestrial organisms, where available (e.g., acute or chronic aquatic toxicity data for fish, algae, crustaceans, and other plants; toxicity data on birds, bees, plants).
- Whether there is a potential for the chemical to persist and degrade in the environment either through biodegradation or other processes, such as oxidation or hydrolysis.
- Results of tests of bioaccumulation potential, making reference to the octanol-water partition coefficient (K_{ow}) and the bioconcentration factor (BCF), where available.
- The potential for a substance to move from the soil to the groundwater (indicate results from adsorption studies or leaching studies).
- Other adverse effects (e.g., environmental fate, ozone layer depletion potential, photochemical ozone creation potential, endocrine disrupting potential, and/or global warming potential).

Section 13: Disposal Considerations (non-mandatory)

This section provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container, and safe handling practices. To minimize exposure, this section should also refer the reader to Section 8 (Exposure Controls/Personal Protection) of the SDS. The information may include:

- Description of appropriate disposal containers to use.
- Recommendations of appropriate disposal methods to employ.
- Description of the physical and chemical properties that may affect disposal activities.
- Language discouraging sewage disposal.
- Any special precautions for landfills or incineration activities.

Section 14: Transport Information (non-mandatory)

This section provides guidance on classification information for shipping and transporting of hazardous chemical(s) by road, air, rail, or sea. The information may include:

- UN number (i.e., four-figure identification number of the substance)[2].
- UN proper shipping name[2].
- Transport hazard class(es)[2].
- Packing group number, if applicable, based on the degree of hazard[2].
- Environmental hazards (e.g., identify if it is a marine pollutant according to the International Maritime Dangerous Goods Code (IMDG Code)).
- Guidance on transport in bulk (according to Annex II of MARPOL 73/78[3] and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code (IBC Code)).
- Any special precautions which an employee should be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises (indicate when information is not available).

[2] Found in the most recent edition of the United Nations Recommendations on the Transport of Dangerous Goods.

[3] MARPOL 73/78 means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended.

Section 15: Regulatory Information (non-mandatory)

This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS. The information may include:

- Any national and/or regional regulatory information of the chemical or mixtures (including any OSHA, Department of Transportation, Environmental Protection Agency, or Consumer Product Safety Commission regulations).

Section 16: Other Information

This section indicates when the SDS was prepared or when the last known revision was made. The SDS may also state where the changes have been made to the previous version. You may wish to contact the supplier for an explanation of the changes. Other useful information also may be included here.

Employer Responsibilities

Employers must ensure that the SDSs are readily accessible to employees for all hazardous chemicals in their workplace. This may be done in many ways. For example, employers may keep the SDSs in a binder or on computers as long as the employees have immediate access to the information without leaving their work area when needed and a back-up is available for rapid access to the SDS in the case of a power outage or other emergency. Furthermore, employers may want to designate a person(s) responsible for obtaining and maintaining the SDSs. If the employer does not have an SDS, the employer or designated person(s) should contact the manufacturer to obtain one.

References

OSHA, 29 CFR 1910.1200(g) and Appendix D.

United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS), third revised edition, United Nations, 2009.

These references and other information related to the revised Hazard Communication Standard can be found on OSHA's Hazard Communication Safety and Health Topics page, located at: http://www.osha.gov/dsg/hazcom/index.html.

Disclaimer: This brief provides a general overview of the safety data sheet requirements in the Hazard Communication Standard (see 29 CFR 1910.1200(g) and Appendix D of 29 CFR 1910.1200). It does not alter or determine compliance responsibilities in the standard or the Occupational Safety and Health Act of 1970. Since interpretations and enforcement policy may change over time, the reader should consult current OSHA interpretations and decisions by the Occupational Safety and Health Review Commission and the courts for additional guidance on OSHA compliance requirements. Please note that states with OSHA-approved state plans may have additional requirements for chemical safety data sheets, outside of those outlined above. For more information on those standards, please visit: http://www.osha.gov/dcsp/osp/statestandards.html.

This is one in a series of informational briefs highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

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