

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH NEW DELHI**

O.A. No. 538 OF 2024

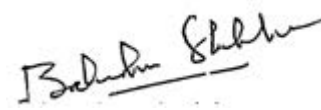
In the matter of: -

**News item titled "Arsenic in Food: should you wash rice before cooking it"
appearing in Times Now dated 31.03.2024.**

Index

Sr. No.	Particulars	Page No.
1.	Reply on behalf of Respondent No. 1, Central Pollution Control Board, (CPCB) in compliance to Hon'ble NGT order dated 15.05.2024.	1-7
2.	Annexure-1 A copy of Gazette Notification of India G.S.R. Number 446(E) MoEF & CC dated 13.06.2011.	8-30
3.	Annexure-2 A copy of Gazette Notification of India G.S.R. Number 395 (E) MoEF & CC dated 04.04.2016.	31-75
4.	Annexure-3 A copy of Disposal/utilization of Fly Ash by Thermal power plants and coal mines.	76-104
5.	Annexure-4 A copy of Management of Pyro-metallurgical slags (high volume low effect waste) from Copper Smelters.	105-119
6.	Annexure-5 A copy of Management of Pyro-metallurgical slags (high volume low effect waste) from Iron & Steel plants	120-146
7.	Annexure-6 A copy of Hon'ble NGT order dated 16.05.2024, in O.A No. 538 of 2024.	147-149

Filed by



Balendu Shekhar
Advocate

(On behalf of Central Pollution Control Board)

Dated: 30.08.2024

Place: Delhi

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH NEW DELHI
O.A. No. 538 OF 2024**

**News item titled "Arsenic in Food: should you wash rice before cooking it"
appearing in Times Now dated 31.03.2024.**

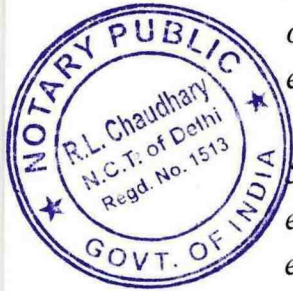
**REPLY ON BEHALF OF RESPONDENT NO.1, THE CENTRAL POLLUTION
CONTROL BOARD, (CPCB)**

1. That this Hon'ble Tribunal has taken *suo-motu* cognizance of the present issue on the basis of the news item titled "Arsenic in Food: Should you wash rice before cooking it" appearing in Times Now dated 31.03.2024. This Hon'ble Tribunal vide order dated 16.05.2024 has observed:

"...4. The article states that rice is particularly susceptible to arsenic contamination because it is grown in flooded fields, and it absorbs more arsenic from water and soil compared to other common food crops. It states that as per World Health Organisation, long term symptoms of arsenic poisoning tend to occur in the skin first and can show up within five years of exposure. Cases of extreme poisoning can even lead to death.

5. The news item raises substantial issue relating to compliance of the environmental norms and implementation of the provisions of scheduled enactment. ..."

2. That, the Hon'ble Tribunal vide the aforesaid order dated 16.05.2024 and notice dated 01.07.2024 has sought the reply of CPCB in the instant matter.
3. That, CPCB is a statutory Board constituted under Section 3 of The Water (Prevention and control of Pollution) Act, 1974. It performs the functions under The Water (Prevention and control of Pollution) Act, 1974, The Air (Prevention and control of Pollution) Act, 1981 and The Environment (Protection) Act, 1986.



4. That with regard to the matters pertaining to product quality standards that specify chemical composition of agro chemicals like pesticides, herbicides, fertilizers, it is humbly submitted that the matters related to production of Fertilizers are dealt by the Ministry of Chemicals and Fertilizers and the matters related to pesticide production, registration and usage are dealt by Directorate of Plant Protection Quarantine & Storage, Ministry of Agriculture & Farmer's Welfare.
5. That with regards to environmental norms for Arsenic, the following standards and guidelines are prescribed/issued under the Environment (Protection) Act, 1986.

A. Effluent

Effluent standards for Arsenic is prescribed by the Ministry of Environment, Forests and Climate Change for the following industries:

- (i) Paint Industries,
- (ii) Bullion Refining,
- (iii) Organic Chemicals Manufacturing Industries
- (iv) Pesticides and Pharmaceutical (Manufacturing and Formulation Industries
- (v) Common Effluent Treatment Plant(CETP)
- (vi) General standards for discharge of environmental pollutants

The effluent standard for Arsenic is prescribed 0.2 mg/l for all the above stated industries (except 0.1 mg/l for Bullion Refining industry) by the Ministry of Environment, Forests and Climate Change. The aforementioned Standards are annexed as **Annexure- 1**

B. Hazardous Waste

As per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, the Hazardous waste has been defined 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 wastes as applicable in respect of Schedule I, Schedule II and Schedule III of the HOWM Rules, 2016.

- i. Hazardous waste from the Industrial waste containing Arsenic including arsenic bearing sludge (Cat 7.3) and residue containing Arsenic (Cat 10.1 & 18.3); have been listed in the Schedules I of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016
- ii. As per Schedule II of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, waste constituents with leachable concentration limit of Arsenic more than equal to 5.0 mg/l is considered as Hazardous waste.
- iii. The maximum permissible limit for Arsenic is 5 ppm which is considered as suitable for recycling of used oil and waste oil

The handling, generation, collection, storage, packaging, transportation, use, treatment, processing, recycling, recovery, pre-processing, co-processing, utilisation, offering for sale, transfer or disposal of the arsenic containing hazardous waste are to be carried out only after obtaining an authorization from the concerned State Pollution Control Board/ Pollution Control Committee and in accordance with the procedures laid down under the Rule 6 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. The copy of the said Rules, 2016 is attached herewith attached as **Annexure - 2**

C. Solid waste

As per the Solid Waste Management Rules 2016, to ensure safe application of compost for food crops and for compost quality, the Arsenic concentration should not be more than 10 mg/kg. The Arsenic concentration should not be



more than equal to 0.2 mg/l for the disposal of treated leachates which is generated from solid waste.

D. Guidelines

That CPCB issued following sector specific guideline for control of pollution including Arsenic w.r.t. Thermal Power Plants, Coal mines, Copper smelter and Iron and steel plants:

- i. Disposal/utilization of Fly Ash by Thermal power plants and coal mines(**Annexure-3**)
 - ii. Management of Pyro-metallurgical slags (high volume low effect waste) from Copper Smelters(**Annexure-4**)
 - iii. Management of Pyro-metallurgical slags (high volume low effect waste) from Iron & Steel plants (**Annexure 5**)
6. That Indian standard specification (IS 10500 2012) by Bureau of Indian Standard (BIS) for drinking water quality which specify the permissible limit for Arsenic is 0.05 mg/l.
7. That it is humbly submitted that CPCB executes National Water Quality Monitoring Programme (NWMP) in association with State Pollution Control Boards (SPCBs)/Pollution Control Committees (PCCs). Presently, ground water quality is monitored at 1233 locations in 27 States/ 06 UTs by respective SPCB/ PCC. Exceedance of Arsenic w.r.t Permissible Limit of 0.05 mg/ L as per BIS Drinking Water Standards IS 10500: 2012, was observed only in the state of West Bengal i.e. in one location (Berhampore, District Murshidabad) out of 67 monitored locations in year 2023. The source of Arsenic in ground water may be of geogenic origin.



8. That in view of the above, it is submitted that this answering Respondent shall abide by any/all orders or directions passed by this Hon'ble Tribunal.



A handwritten signature in blue ink, appearing to be "Dinabandhu Gouda".

(Dinabandhu Gouda)

Scientist 'F'

Central Pollution Control Board



BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH NEW DELHI

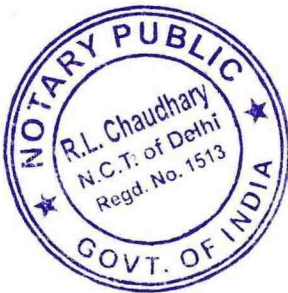
O.A. No. 538 OF 2024

News item titled "Arsenic in Food: should you wash rice before cooking it"
appearing in Times Now dated 31.03.2024.

AFFIDAVIT

I, Dinabandhu Gouda, working as Scientist 'F' in Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi, the Respondent No. 4 in the above matter, do hereby solemnly affirm, declare on oath and state as under:-

1. That I, the deponent herein is authorized representative to represent the Respondent CPCB in the present case, and as such, I am well conversant with the facts and circumstances of the present case on the basis of the information derived from the official records, and hence, I am competent and authorized to verify, sign and swear this affidavit on behalf of the Respondent CPCB.
2. That the accompanying reply may be read part and parcel of the present affidavit as I am competent to swear this affidavit.
3. That the accompanying reply has been drafted and filed under my instructions and authority the contents thereof are true and correct on the basis of the record maintained during ordinary course of business of CPCB and available records and documents and the contents of the same are read over and explained to me and are not repeated herein for the sake of brevity.



DEPONENT
Dinabandhu Gouda
प्रभागीय प्रमुख, आई.पी.सी.-I/Divisional Head, IPC-I
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
M/o Env't, Forest & Climate Change, Gov't. of India
परिवेश भवन, पूर्वी अरजुन नगर, दिल्ली-110032
Parivesh Bhawan, East Arjun Nagar, Delhi-110032

VERIFICATION

Verified at New Delhi on this day of 30 **AUG 2024** that the contents of the above reply are correct and true on the basis of the records of the case as mentioned in the day-to-day affairs of the CPCB. Nothing has been concealed therefrom or mis-stated.

**DEPONENT**

दानबन्धु गोडा /Dinabandhu Gouda
प्रभागीय प्रमुख, आई.पी.सी.-I/Divisional Head, IPC-I
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
M/o Env't. Forest & Climate Change, Govt. of India
परिवेश भवन, पूर्वी अर्जुन नगर, दिल्ली-110032
Parivesh Bhawan, East Arjun Nagar, Delhi-110032

ATTESTED

NOTARY PUBLIC
GOVT. OF INDIA

30 AUG 2024

**MINISTRY OF ENVIRONMENT AND FORESTS
NOTIFICATION**

New Delhi, the 13th June, 2011

G.S.R. 446(E).— In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:-

1. (1) These rules may be called the Environment (Protection) (Fifth Amendment) Rules, 2011.
- (2) They shall come into force on the date of their publication in the Official Gazette.
2. In the Environment (Protection) Rules, 1986, in Schedule I,-
 - (i) serial number 71 relating to 'Pesticides Industry' and entries relating thereto shall be omitted;
 - (ii) serial number 101 relating to 'Incinerator for Pesticide Industry' and entries relating thereto shall be omitted; and
 - (iii) for serial number 40 relating to 'Pesticide Manufacturing and Formulation Industry' and entries relating thereto, the following serial number and entries shall be substituted, namely:-

S.No. (1)	Industry (2)	Parameter (3)	Standard (4)	
"40"	Pesticide Industry	A. Emission Standards		
			Limiting concentration in mg/Nm ³	
		HCl	20	
		Cl ₂	5	
		H ₂ S	5	
		P ₂ O ₅ as H ₃ PO ₄	10	
		NH ₃	30	
		Pesticides compounds in the form of particulate matter	20	
		CH ₃ Cl	20	
		HBr	5	
		B. Effluent Standards		
			Limiting concentration in mg/l, except for pH and Bioassay test	
		(i) Compulsory Parameters		
		pH		6.5-8.5
		BOD, 3days, 27°C	Formulation unit	30
			Technical grade unit	100
		Oil and Grease		10
Suspended Solids		100		
Bioassay Test		90 percent survival of fish after 96 hours in 100% effluent*		

2169 GI/11-3

(1)	(2)	(3)	(4)
		(ii) Additional Parameters	
		Arsenic (as As)	0.2
		Copper	1.0
		Manganese	1.0
		Mercury	0.01
		Antimony (as Sb)	0.1
		Zinc	1.0
		Nickel, etc. (heavy metals individually)	Shall not exceed individually 5 times the drinking water standards as per Bureau of Indian Standards
		Cyanide (as CN)	0.2
		Nitrate (as NO ₃)	50
		Phosphate (as P)	5.0
		Phenol & Phenolic Compounds as C ₆ H ₅ OH	1.0
		Sulphur	0.03
		Benzene Hexachloride (BHC)	0.01
		Carbonyl	0.01
		Copper Sulphate	0.05
		Copper Oxychloride	9.6
		DDT	0.01
		Dimethoate	0.45
		2,4D	0.4
		Endosulfan	0.01
		Fenitrothion	0.01
		Malathion	0.01
		Methyl Parathion	0.01
		Paraquat	2.3
		Phenathoate	0.01
		Phorate	0.01
		Proponil	7.3
		Pyrethrums	0.01
		Ziram	1.0
		Other Pesticide (individually)	0.10
		*Bioassay Test shall be carried out as per IS: 6582-1971.	
		Note:	
		1. The concerned State Pollution Control Board / Pollution Control Committee shall prescribe limits of Total Dissolved Solids (TDS), Sulphates and Chlorides depending on the usages of recipient water body in down stream, in which effluent shall be disposed off.	
		2. No limit for Chemical Oxygen Demand (COD) is prescribed but, COD in the treated effluent shall be monitored. If COD is persistently reported more than 250 mg/l, the industrial units discharging such an effluent shall be required to identify chemicals	

(1)	(2)	(3)	(4)
		<p>causing the same. In case, these are found to be toxic, as defined in Schedule I of the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, the concerned State Pollution Control Board/ Pollution Control Committee in such cases shall direct the industries to install tertiary treatment system by 31st March, 2012.</p>	
		<p>3. Parameters listed as "Additional Parameters" shall be prescribed depending upon the process and product, on a case to case basis.</p>	
		<p>C. Emission Standards for Incinerator</p>	
			<p>Limiting concentration in mg/Nm³, unless stated</p>
			<p>Sampling Duration in minutes, unless stated</p>
		Particulate Matter	50
			30 or more (for sampling of 300 litres of emission)
		HCl	50
		SO ₂	200
		CO	100
			Daily average
		Total organic Carbon	20
		Total Dioxins and Furans *	8 hours
		Existing Incinerator	0.2 ngTEQ/Nm ³
		New Incinerator	0.1 ngTEQ/Nm ³
		Sb +As + Pb + Cr + Co +Cu +Mn + Ni + V and their compounds	1.5
			2 hours
		<p>* The existing plant shall comply with norms for Dioxins and Furans as 0.1 ngTEQ/Nm³ by 18th August, 2013.</p>	
		<p>Note :</p>	
		<p>i. All monitored values shall be corrected to 11% oxygen on dry basis.</p>	
		<p>ii. The CO₂ concentration in tail gas shall not be less than 7%.</p>	
		<p>iii. In case, halogenated organic waste is less than 1% by weight in input waste, all the facilities in single chamber incinerators shall be designed so as to achieve a minimum temperature of 1100°C in the incinerator. For fluidized bed technology based incinerator, temperature shall be maintained at 950°C.</p>	
		<p>iv. In case halogenated organic waste is more than 1% by weight in input waste, waste shall be incinerated only in twin chamber incinerators and all the facilities shall be designed to achieve a minimum temperature of 850±25°C in primary chamber and 1100°C in secondary combustion chamber with a gas residence time in secondary</p>	

(1)	(2)	(3)	(4)
		combustion chamber not less than two seconds. v. Scrubber meant for scrubbing emissions shall not be used as quencher. vi. Incineration plants shall be operated (combustion chambers) with such temperature, retention time and turbulence, as to achieve Total Organic Carbon (TOC) content in the incineration ash and residue less than 3%, and their loss on ignition is less than 5% of the dry weight. In case of non-conformity, ash and residue as the case may be, shall be re-incinerated. vii. The incinerator shall have a chimney of atleast thirty metres height.	
		D. Effluent from Incinerator	
		Note: (i) Effluent from scrubber (s) and floor washings shall flow through closed conduit or pipe network and be treated to comply with the effluent standards mentioned at 'B' above, read with Schedule VI : General Standards for Discharge of Environment Pollutions (Part A : Effluents) notified under the Environment (Protection) Rules, 1986. (ii) The built up in TDS in wastewater or floor washings shall not exceed 1000 mg/l over and above the TDS of raw water used.	
		E. Stormwater	
		Note: (i) Stormwater shall not be allowed to mix with scrubber water and/or floor washings. (ii) Stormwater shall be channelized through separate drains passing through a HDPE lined pit having holding capacity of 10 minutes (hourly average) of rainfall.	

[F. No. Q-15017/07/2008-CPW]

RAJNEESH DUBE, Jt. Secy.

Note : The principal rules were published in the Gazette of India vide number S.O. 844 (E), 19th November, 1986; subsequently amended vide S.O. 433 (E), dated 18th April 1987; and recently amended vide G.S.R. 97(E), dated the 18th February, 2009; G.S.R. 149 (E), dated the 4th March, 2009; G.S.R. 512(E), dated the 9th July, 2009; G.S.R. 543 (E), dated the 22nd July, 2009; G.S.R. 595(E), dated the 21st August, 2009; G.S.R. 794 (E), dated the 4th November, 2009; G.S.R. 826 (E), dated the 16th November, 2009; G.S.R. 01 (E), dated the 1st January, 2010; G.S.R. 61(E), dated 5th February, 2010; G.S.R. 485 (E), dated 9th June, 2010; G.S.R. 608 (E), dated 21st July, 2010; G.S.R. 739 (E), dated the 9th September, 2010; G.S.R. 809 (E), dated, 4th October, 2010; G.S.R. 215(E), dated, the 15th March, 2011; G.S.R. 221(E), dated, the 18th March, 2011; G.S.R. 354 (E), dated, the 2nd May, 2011; and G.S.R. 424(E), dated the 1st June, 2011.



भारत का राजपत्र The Gazette of India

सी.जी.-डी.एल.-अ.-06082021-228807
CG-DL-E-06082021-228807

असाधारण
EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (i)
PART II—Section 3—Sub-section (i)

प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 442]
No. 442]

नई दिल्ली, शुक्रवार, अगस्त 6, 2021/श्रावण 15, 1943
NEW DELHI, FRIDAY, AUGUST 6, 2021/SHRAVANA 15, 1943

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 6 अगस्त, 2021

सा.का.नि. 541(अ).—जहां, कतिपय प्रारूप नियम अर्थात् पर्यावरण (संरक्षण) संशोधन नियम, 2020 भारत सरकार के पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय में अधिसूचना संख्या सा.का.नि. 44(अ), तारीख 23 जनवरी, 2020 की अधिसूचना द्वारा पर्यावरण (संरक्षण) नियम, 1986, के नियम 5 के उपनियम (3) के अधीन यथा अपेक्षानुसार भारत के राजपत्र, असाधारण में प्रकाशित किए गए थे, जिसमें सभी व्यक्तियों से जिनके उसके द्वारा प्रभावित होने की संभावना है उस तारीख से जिसको उक्त अधिसूचना में अंतर्विष्ट राजपत्र की प्रतियां जनता को उपलब्ध करा दी गई थी, साठ दिन की अवधि के भीतर आक्षेप और सुझाव आमंत्रित किए गए थे;

और पूर्वोक्त अधिसूचना में अंतर्विष्ट राजपत्र की प्रतियां 23 जनवरी, 2020 को जनता को उपलब्ध करा दी गई थीं;

और, पूर्वोक्त अधिसूचना के प्रतिउत्तर में सभी व्यक्तियों और पणधारियों से प्राप्त आक्षेपों और सुझावों को केंद्रीय सरकार द्वारा सम्यक रूप से विचार किया गया;

अतः, अब, केंद्रीय सरकार, पर्यावरण (संरक्षण) नियम, 1986 के नियम 5 के उपनियम (3) के साथ पठित पर्यावरण (संरक्षण) अधिनियम, 1986 का 29 की धारा 6 और धारा 25 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए पर्यावरण (संरक्षण) नियम, 1986 का और संशोधन करने के लिए निम्नलिखित नियम बनाती है, अर्थात्: -

1. **संक्षिप्त नाम और प्रारंभ-** (1) इन नियमों का संक्षिप्त नाम पर्यावरण (संरक्षण) दूसरा संशोधन नियम, 2021 है।

(2) ये राजपत्र में उनके प्रकाशन की तारीख से एक वर्ष के पश्चात् प्रवृत्त होंगे।

2. पर्यावरण (संरक्षण) नियम, 1986 की अनुसूची-1 में क्रमांक 73 और उससे संबंधित प्रविष्टियों के स्थान पर निम्नलिखित क्रमांक और प्रविष्टियां रखी जाएंगी, अर्थात्:-

क्र. सं.	उद्योग	पैरामीटर	मानक
1	2	3	4
“73।	थोक दवा और निर्माण (फार्मास्युटिकल)	क. बहिःस्राव मानक*	
			एकाग्रता के लिए सीमित मूल्य (पीएच और जैव परख को छोड़कर मिलीग्राम / एल में)
		(i) अनिवार्य पैरामीटर	
		पीएच	6.0 -8.5
		बीओडी (3 दिन 27 डिग्री सेल्सियस)	30
		सीओडी	250
		टीएसएस	100
		तेल और ग्रीस	10
		अमोनिकल नाइट्रोजन	100
		जैव - परख परीक्षण**	100% में पहले 96 घंटों के बाद 90% मछली की उत्तरजीविता
		(ii) अतिरिक्त पैरामीटर###	
		***बेन्जीन	0.1
		***जाइलीन	0.12
		***मीथाइलीन क्लोराइड	0.9
***क्लोरोबेन्जीन	0.2		
पी . के रूप में फॉस्फेट	5		
एस . के रूप में सल्फाइड	2		
फेनोलिक यौगिक	1		
जस्ता	5		
लोहा	3		
कुल क्रोमियम	2		
हेक्सावैलेंट क्रोमियम (क्रो6+)	0.1		
साइनाइड (एचसीएन के रूप में)	0.1		
आर्सेनिक	0.2		
मर्करी	0.01		
लेड	0.1		
एसएआर	26 से कम (भूमि पर केवल वाहन के लिए लागू)		
(iii) सीईटीपी के साथ उद्योग			
<ul style="list-style-type: none"> सीईटीपी के साथ और सीईटीपी के लिए उद्योग हेतु निर्वहन किए गए मानक पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय की अधिसूचना का.आ. 4(अ), तारीख 1 जनवरी, 2016 द्वारा शासित होंगे। 			

	<ul style="list-style-type: none"> राज्य प्रदूषण नियंत्रण बोर्ड अतिरिक्त सुसंगत पैरामीटर को विहित करेगा जैसा कि उद्योगों के सदस्य के आवश्यकता और निर्वहन के अनुसार इस अधिसूचना के पैरा क (ii) में दिया गया है और पर्यावरण शर्तों को प्राप्त करने के विचार की निगरानी को तत्परता से विनिर्दिष्ट करता हो। <p>टिप्पण :- पैरा क में मानक सीईटीपी के सिवाय सभी निर्वहन के लिए लागू हैं</p> <p>*सीईटीपी के लिए उद्योग निर्वहन को लागू नहीं किया जाता है और भूमि तथा सतह जल निकाय के सभी निर्वहन को लागू होगा जिसके अंतर्गत उद्यान और सिंचाई प्रयोजन के लिए जल निस्तारण का प्रयोग किया जाना सम्मिलित है।</p> <p>** जैव परख परीक्षण आई एस. 6582-1971 के अनुसार आयोजित किया जाएगा।</p> <p>“अतिरिक्त पैरा मीटर”के रूप में सूचिबद्ध पैरामीटर प्रक्रिया और उत्पाद पर निर्भर रहते हुए एसपीसीवी द्वारा विहित किए जाएंगे और एसपीसीवी एस द्वारा निर्णय के अनुसार उसकी तत्परता से मानीटरी मासिक/तिमाही रूप से की जाएगी।</p> <p>***ये सीमाएं उन उद्योगों पर लागू होंगी जो बेन्जीन, जाइलीन मिथाइलीन क्लोराइड, क्लोरोबेन्जीन का उपयोग कर रहे हैं।</p> <p>ख. उत्सर्जन मानक (टैंक फार्म वेंट)</p> <table border="1" data-bbox="552 947 1449 1536"> <thead> <tr> <th>पैरामीटर</th> <th>एकाग्रता के लिए सीमित मूल्य (मिलीग्राम / एनएम 3)</th> </tr> </thead> <tbody> <tr> <td>क्लोरीन</td> <td>15</td> </tr> <tr> <td>हाइड्रोक्लोरिक एसिड वाष्प</td> <td>35</td> </tr> <tr> <td>अमोनिया</td> <td>30</td> </tr> <tr> <td>बेंजीन</td> <td>5</td> </tr> <tr> <td>टोल्युनि</td> <td>100</td> </tr> <tr> <td>एसीटोनिट्राइल</td> <td>1000</td> </tr> <tr> <td>डाइक्लोरोमेथेन</td> <td>200</td> </tr> <tr> <td>जाइलीन</td> <td>100</td> </tr> <tr> <td>एसीटोन</td> <td>2000</td> </tr> </tbody> </table> <p>ग. विलायक का कुल संचयी नुकसान भंडारण सूची से वार्षिक आधार पर विलायक 5% से अधिक नहीं होना चाहिए</p>	पैरामीटर	एकाग्रता के लिए सीमित मूल्य (मिलीग्राम / एनएम 3)	क्लोरीन	15	हाइड्रोक्लोरिक एसिड वाष्प	35	अमोनिया	30	बेंजीन	5	टोल्युनि	100	एसीटोनिट्राइल	1000	डाइक्लोरोमेथेन	200	जाइलीन	100	एसीटोन	2000
पैरामीटर	एकाग्रता के लिए सीमित मूल्य (मिलीग्राम / एनएम 3)																				
क्लोरीन	15																				
हाइड्रोक्लोरिक एसिड वाष्प	35																				
अमोनिया	30																				
बेंजीन	5																				
टोल्युनि	100																				
एसीटोनिट्राइल	1000																				
डाइक्लोरोमेथेन	200																				
जाइलीन	100																				
एसीटोन	2000																				
	<p>घ. थोक दवा के विनिर्माण या फार्मास्युटिकल के प्रतिपादन में लगे उद्योग के लिए उद्योग या सीईटीपी कैटरिंग पर बेकार जल या उसके प्रबंध सुविधा से उत्पन्न होने वाले केमिकल और बायोलोजिकल गाढ़ा कीचड़ या किसी अवशेष, हटाए जाने, खतरनाक और अन्य अपशिष्ट (मैनेजमेंट एंड ट्रांस-बाउंडरी मूवमेंट) नियम 2016 के नियम 3 के उपनियम (1) के खंड 17 के उपबंध के अनुसार खतरनाक अपशिष्ट के रूप में वर्गीकृत किया जाएगा और उसमें किए गए उपबंध के अधीन होगा।</p>																				

[फा. सं. क्यू-15017/12/2018-सीपीडब्ल्यू]

नरेश पाल गंगवार, संयुक्त सचिव

टिप्पण : मूल नियम भारत के राजपत्र, असाधारण, भाग II, खंड 3, उप-खंड (i) में संख्यांक का. आ. 844(अ) तारीख 19 नवंबर, 1986 में प्रकाशित किए गए थे और अंतिम बार अधिसूचना संख्यांक सा.का.नि. 243(अ) तारीख 31 मार्च, 2021 द्वारा अंतिम रूप से संशोधित किया गया था।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 6th August, 2021

G.S.R. 541(E).—Whereas, certain draft rules, namely the Environment (Protection) Amendment Rules, 2020 were published in the Gazette of India, Extraordinary, as required under sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, *vide* notification of the Government of India in the Ministry of Environment, Forest and Climate Change *vide* number G.S.R. 44 (E), dated the 23rd January, 2020, inviting objections and suggestions from all persons likely to be affected thereby within a period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

And Whereas, copies of the Gazette containing the aforesaid notification were made available to the public on the 23rd January, 2020;

And Whereas, objections and suggestions received from all persons and stakeholders in response to the aforesaid notification have been duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986) read with sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely: -

1. **Short title and commencement.** - (1) These rules may be called the Environment (Protection) Second Amendment Rules, 2021.

(2) They shall come into force after one year from the date of publication of this notification in the Official Gazette.

2. In the Environment (Protection) Rules, 1986, in Schedule-I, for serial number 73 and the entries relating thereto, the following serial number and entries shall be substituted, namely:-

S.No.	Industry	Parameters	Standard
1	2	3	4
“73.	Bulk Drug and Formulation (Pharmaceutical)	A. EFFLUENT STANDARDS*	
		Limiting value for concentration (in mg/l except for pH and Bio assay)	
		(i) Compulsory Parameters	
		pH	6.0 -8.5
		BOD (3 days 27°C)	30
		COD	250
		TSS	100
		Oil & Grease	10
		Ammonical Nitrogen	100
		Bio - Assay Test**	90% Survival of Fish after first 96 hours in 100% effluent

(ii) Additional Parameters^{##}	
***Benzene	0.1
***Xylene	0.12
***Methylene Chloride	0.9
***Chlorobenzene	0.2
Phosphates as P	5
Sulphides as S	2
Phenolic Compounds	1
Zinc	5
Copper	3
Total Chromium	2
Hexavalent Chromium (Cr ⁶⁺)	0.1
Cyanide (as HCN)	0.1
Arsenic	0.2
Mercury	0.01
Lead	0.1
SAR	Less than 26 (applicable only for discharge on land)
(iii) Industry connected with CETP	
<ul style="list-style-type: none"> The discharge norms for industry connected with CETP and of CETP shall be governed by Ministry of Environment, Forest & Climate Change notification S.O. 4 (E), dated the 1st January, 2016. State Pollution Control Board shall prescribe additional relevant parameters as given at para A (ii) of this notification as per needs and discharge potential of member industries and specify the frequency of monitoring considering the receiving environment conditions. 	
<p>Note:</p> <p>The standards in para A is applicable to all discharges except to CETP.</p> <p>*Not applicable to industry discharging to CETP, and shall be applicable to all discharge to land and surface water bodies including use of treated wastewater for horticulture or irrigation purpose.</p> <p>** The Bio assay test shall be conducted as per IS : 6582-1971</p> <p>## Parameters listed as “Additional Parameters” shall be prescribed by SPCB depending on the process and product and its monitoring frequency shall be monthly/quarterly as decided by SPCBs</p> <p>***Limits shall be applicable to industries those are using Benzene, Xylene, Methylene Chloride, Chlorobenzene.</p>	

B. EMISSION STANDARDS	
(Tank farm Vents)	
Parameter	Limiting value for concentration (mg/Nm³)
Chlorine	15
Hydrochloric acid vapor	35
Ammonia	30
Benzene	5
Toluene	100
Acetonitrile	1000
Dichloromethane	200
Xylene	100
Acetone	2000
<i>C. The total cumulative losses of solvent should not be more than 5% of the solvent on annual basis from storage inventory</i>	
<p>D. Chemical and Biological sludge or any residue, reject, concentrate generated from wastewater treatment or its management facility at Industry or CETP catering to industries engaged in manufacturing of bulk drug or formulation of Pharmaceuticals, shall be classified as Hazardous Waste as per the provision of clause 17 of sub-rule (i) of rule 3 of the Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016 and shall be subject to the provision made therein.</p>	

[F. No. Q-15017/12/2018-CPW]

NARESH PAL GANGWAR, Jt. Secy.

Note : The principle rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i) *vide* number S.O. 844(E), dated the 19th November, 1986 and lastly amended *vide* notification G.S.R. 243(E), dated the 31st March, 2021.

Sr. No.	Industry	Parameter	Standards
1	2	3	4
44.	BULLION REFINING (WASTE WATER DISCHARGE)	EFFLUENTS	
		pH	6.5 – 8.5
		Cynide as CN	0.2
		Sulphide as S	0.2
		Nitrate as N	10.0
		Free Cl ₂ as Cl	1.0
		Zinc as Zn	5.0
		Copper as Cu	2.0
		Nickel as Ni	2.0
		Arsenic as As	0.1
		Cadmium as Cd	0.2
		Oil and Grease	10.0
		Suspended Solids	100
* 45.	DYE & DYE INTERMEDIATE INDUSTRY (WASTE WATER DISCHARGE)	EFFLUENTS	
		pH	6.0 – 8.5
		Colour Hazen Unit	400.0
		Suspended Solids	100.0
		BOD ¹ [(3 days at 27°C)]	100.0
		Oil and Grease	10.0
		Phenolics as C ₆ H ₅ OH	1.00
		Cadmium as Cd	0.2
		Copper as Cu	2.0
		Manganese as Mn	2.0
		Lead as Pb	0.1
		Mercury as Hg	0.01
		Nickel as Ni	2.0
		Zinc as Zn	5.0
		Chromium as Cr ⁶⁺	0.1
		Total Chromium	2.0
		Bio-assay test	90% survival in 96 hours.

* Standards Notified as Sl. No. 8 may also be referred.

¹ Substituted by Rule 2 of the Environment (Protection) Amendment Rules, 1996 notified by G.S.R.176(E), dated 2.4.1996 may be read as BOD (3 days at 27°C) wherever BOD 5 days 20°C occurred



भारत का राजपत्र

The Gazette of India

असाधारण

EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (i)

PART II—Section 3—Sub-section (i)

प्राधिकार से प्रकाशित

PUBLISHED BY AUTHORITY

सं. 400]

नई दिल्ली, बुधवार, जुलाई 21, 2010/आषाढ़ 30, 1932

No. 400]

NEW DELHI, WEDNESDAY, JULY 21, 2010/ASADHA 30, 1932

पर्यावरण और वन मंत्रालय

अधिसूचना

नई दिल्ली, 21 जुलाई, 2010

सा.का.नि. 608(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 6 और धारा 25 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, पर्यावरण (संरक्षण) नियम, 1986 का और संशोधन करने के लिए निम्नलिखित नियम बनाती है, अर्थात् :—

- (1) इन नियमों का संक्षिप्त नाम पर्यावरण (संरक्षण) (चौथा संशोधन) नियम, 2010 है।
- (2) ये राजपत्र में उनके प्रकाशन की तारीख को प्रवृत्त होंगे।

2. पर्यावरण (संरक्षण) नियम, 1986 की अनुसूची I में, क्रम संख्या 68 और इससे संबंधित प्रविष्टियों के स्थान पर निम्नलिखित क्रम संख्या और प्रविष्टियाँ अन्तःस्थापित की जाएंगी, अर्थात् :—

क्रम सं.	उद्योग	पैरामीटर	मानक
(1)	(2)	(3)	(4)
68	कार्बनिक रसायन उत्पादक उद्योग	क-बहिस्त्राव मानक	सांद्रण सीमा मि.ग्रा./लीटर में, पी एच और बायोएस्से परीक्षण को छोड़कर
		अनिवार्य पैरामीटर	
		पी एच	6.5-8.5
		बी ओ डी 3 दिन, 27°C	100
		तेल एवं ग्रीस	10
		बायोएस्से टेस्ट +	100 प्रतिशत बहिस्त्राव में 96 घंटे के बाद 90 प्रतिशत मछलियाँ अवशेष
		अतिरिक्त पैरामीटर	
		नाइट्रेट (N के रूप में)	10
		आर्सेनिक (As के रूप में)	0.2
		क्रोमियम (हेक्सावैलेंट)	0.1
		क्रोमियम (कुल)	1.0
		सीसा (Pb के रूप में)	0.1
		साइनाईड (CN के रूप में)	0.2

(1)	(2)	(3)	(4)
		जस्ता (Zn के रूप में)	5.0
		पारद (Hg के रूप में)	0.01
		तांबा (Cu के रूप में)	2.0
		निकिल (Ni के रूप में)	2.0
		फिनॉल्क्स (C ₆ H ₅ OH के रूप में)	5.0
		सल्फाईड	2.0
		+ बायोएस्से परीक्षण IS:6582-1971 के अनुसार संचालित किया जाए।	
		टिप्पण :	
		(i) इस समूह में हेलोएलिफेटिक, प्लास्टीसाईजर, ऐरोमेटिकस (एल्कोहल, फिनॉल्स, इस्टर, तेजाब और लवण, एल्डीहाइड और किटॉन), प्रतिस्थापित ऐरोमेटिकस, एलिफेटिक (एल्कोहल, ईस्टरस, तेजाब, एल्डीहाइड, किटॉन, अमीनस और एमाइड्स) और डिटर्जेंट उद्योग सम्मिलित रहेंगे।	
		(ii) यद्यपि रासायनिक आक्सीजन मांग (COD) के सन्नियम यहां उल्लिखित नहीं है, किन्तु COD को मानीटर किया जायेगा। यदि उपचारित बहिस्त्राव में COD की मात्रा 250 मि.ग्रा./लीटर से अधिक है तो उच्च COD का बहिस्त्राव करने वाली संबंधित औद्योगिक इकाईयों को ऐसे COD के लिये जिम्मेदार रसायनों की पहचान करनी होगी। यदि ये खतरनाक रसायन उत्पादन, भंडारण तथा आयात नियम, 1989 के अधीन विषैले रसायन के रूप में पाये जाते हैं तब संबंधित उद्योग तृतीय उपचार संयंत्र लगाएंगे।	
		(iii) उपर्युक्त मानक, लघु श्रेणी के डिटर्जेंट सूत्रण इकाईयों में लागू नहीं होंगे।	

ख. भस्मीकरण संयंत्र के लिये उत्सर्जन मानक

विविक्त पदार्थ	50	जब तक अन्यथा उल्लिखित न हो, सांद्रण सीमा मि.ग्रा./नार्मल घन मी. में	जब तक अन्यथा उल्लिखित न हो, सैम्पलिंग अवधि मिनटों में
		30 अथवा अधिक (सैम्पलिंग के लिए लगभग 300 लीटर उत्सर्जन)	
HCl	50	30	
SO ₂	200	30	
CO	100	दैनिक औसत	
कुल जैविक कार्बन	20	30	
कुल डायक्सीनस एवं फयूरान्स*	मौजूदा भस्मीकरण संयंत्र	0.2 ngTEQ/Nm ³	8 घंटे
	नए भस्मीकरण संयंत्र	0.1 ngTEQ/Nm ³	8 घंटे
Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V + Cd + Th + Hg और उनके यौगिक		1.5	2 घंटे

(1)

(2)

(3)

(4)

* विद्यमान संयंत्र द्वारा डायक्सीन्स एवं फ्यूरोन्स के लिए 0.1 ngTEQ/Nm^3 मानदंड का अनुपालन तारीख 1 जनवरी, 2014 के भीतर करेंगे।

टिप्पण :

- (i) सभी मानीटर किए गए मानों को 11% ऑक्सीजन के अनुसार शुष्क आधार पर ठीक किया जाए।
- (ii) उत्सर्जित गैस में कार्बन डाईआक्साइड की सांद्रता 7% से कम नहीं होगी।
- (iii) यदि भस्मीकरण हेतु अपशिष्ट में हेलोजिनेटिड कार्बनिक अपशिष्ट वजन में 1% से कम हो तो, ट्विन चैम्बर भस्मीकरण संयंत्र में सभी सुविधाओं को इस तरह डिजाइन किया जाएगा ताकि प्राइमरी चैम्बर में $850 \pm 25^\circ\text{C}$ और सेकेण्डरी कम्बशन चैम्बर 950°C का न्यूनतम तापमान बनाया जा सके जिसके साथ सेकेण्डरी कम्बशन चैम्बर में गैस अवरोधक समय दो सेकेण्ड से कम नहीं होगा।

अथवा

एकल चैम्बर भस्मीकरण संयंत्र में गैसीय संकटमय अपशिष्ट हेतु सभी सुविधाओं को इस तरह डिजाइन किया जाएगा ताकि कम्बशन चैम्बर में 950°C न्यूनतम तापमान बनाया रखा जा सके जिसके साथ गैस अवरोधक समय दो सेकेण्ड से कम नहीं होगा।

- (iv) यदि भस्मीकरण हेतु अपशिष्ट में हेलोजिनेटिड कार्बनिक अपशिष्ट, वजन में 1% से अधिक हो तो केवल ट्विन चैम्बर भस्मीकरण संयंत्र में अपशिष्ट का भस्मीकरण किया जाएगा तथा सभी सुविधाओं को इस तरह डिजाइन किया जाएगा ताकि प्राइमरी चैम्बर में $850 \pm 25^\circ\text{C}$ और सेकेण्डरी कम्बशन चैम्बर 1100°C न्यूनतम तापमान बनाए रखा जा सके जिसके साथ सेकेण्डरी कम्बशन चैम्बर में गैस अवरोधक समय दो सेकेण्ड से कम नहीं होगा।
- (v) उत्सर्जन मार्जन के लिए जो मार्जक हैं उनका उपयोग क्वेन्चर के रूप में नहीं किया जाएगा।
- (vi) भस्मीकरण संयंत्रों (अर्थात् कम्बशन चैम्बर्स) को ऐसे तापमान, अवरोधन समय और उथल-पुथल के साथ चलाया जाएगा ताकि अपशिष्ट और भस्मीकरण राख में कुल कार्बनिक कार्बन (TOC) यौगिक 3% से कम हो और उनके भस्मीकरण क्षय की मात्रा का शुष्क भार 5% से कम हो। गैर-अनुपालन के मामले में यथास्थिति राख और अपशिष्ट का दुबारा भस्मीकरण किया जाएगा।
- (vii) भस्मीकरण संयंत्र के लिये चिमनी की न्यूनतम ऊंचाई तीस मीटर अवश्य रहेगी।

ग. भस्मीकरण संयंत्र के लिये बहिःस्त्राव मानक

- (i) मार्जक और तल धुलाई अपजल से उत्पन्न बहिःस्त्राव ढकी हुई नाली या पाईप नेटवर्क के माध्यम से बहाया जाएगा और इसका शोधन ऊपर 'क' भाग में उल्लिखित बहिःस्त्राव मानकों के अनुरूप किया जाएगा।
- (ii) तल धुलाई अपजल में कुल घुलित कणों (TDS) की मात्रा कच्चे जल में विद्यमान TDS की मात्रा के ऊपर 1000 मि.ग्रा./लीटर से अधिक नहीं होगी।

घ. वर्षा जल

- (i) वर्षा जल को मार्जक जल और/अथवा तल धुलाई अपजल के साथ मिलने के लिए अनुमति नहीं दी जाएगी।
- (ii) वर्षा जल को वर्षा जल के 10 मिनट (घंटे का औसत) की संग्रहण क्षमता के एचडीपीई परत वाले गड्ढे के माध्यम से अलग नाली से बहाया जाएगा।"

[फा. सं. क्यू-15017/30/2009-सीपीडब्ल्यू]

रजनीश दुबे, संयुक्त सचिव

टिप्पण.—मूल नियम, भारत के राजपत्र में सं. का.आ. 844(अ), तारीख 19 नवम्बर, 1986 द्वारा प्रकाशित किए गए थे; और तत्पश्चात् सं. का.आ. 433(अ), तारीख 18 अप्रैल, 1987; उसके पश्चात् सा.का.नि. 176(अ), तारीख 2 अप्रैल 1996 द्वारा संशोधित किए गए और अभी हाल में सा.का.नि. 97(अ), तारीख 18 फरवरी, 2009; सा.का.नि. 149(अ), तारीख 4 मार्च, 2009; सा.का.नि. 512(अ), तारीख 9 जुलाई, 2009; सा.का.नि. 543(अ), तारीख 22 जुलाई, 2009; सा.का.नि. 595(अ), तारीख 21 अगस्त, 2009; सा.का.नि. 794(अ), तारीख 4 नवम्बर, 2009; सा.का.नि. 826(अ), तारीख 16 नवम्बर, 2009; सा.का.नि. 1(अ), तारीख 1 जनवरी, 2010; सा.का.नि. 61(अ), तारीख 5 फरवरी, 2010 और सा.का.नि. 485(अ), तारीख 9 जून, 2010 द्वारा उनका संशोधन किया गया।

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 21st July, 2010

G.S.R. 608(E).—In exercise of the powers conferred by Section 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:—

1. (1) These rules may be called the Environment (Protection) (Fourth Amendment) Rules, 2010.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986, in Schedule-I, in serial number 68 and the entries relating thereto, the following serial number and entries shall be substituted, namely:—

Sl. No.	Industry	Parameter	Standard
(1)	(2)	(3)	(4)
68.	Organic Chemicals Manufacturing Industry	A. Effluent Standards	
			Limiting concentration in mg/l, except for pH and Bioassay test
			Compulsory parameters
		pH	6.5-8.5
		BOD 3 days, 27°C	100
		Oil & Grease	10
		Bioassay test +	Minimum 90% survival after 96 hours in 100% effluent
			Additional parameters
		Nitrate (as N)	10
		Arsenic (as As)	0.2
		Chromium (Hexavalent)	0.1
		Chromium Total	1.0
		Lead (as Pb)	0.1
		Cyanide (as CN)	0.2
		Zinc (as Zn)	5.0
		Mercury (as Hg)	0.01
		Copper (as Cu)	2.0
		Nickel (as Ni)	2.0
		Phenolics (as C ₆ H ₅ , OH)	5.0
		Sulphide	2.0

+ The Bioassay test shall be conducted as per IS : 6582-1971.

Note :

- (i) Industries covered under this group include halo aliphatics, plasticizers, aromatics (alcohols, phenols, esters, acids and salts, aldehydes and ketones), substituted aromatics, aliphatics (alcohols, esters, acids, aldehydes, ketones, amines and amides) and detergents.
- (ii) Though norms for COD are not mentioned here but, COD shall be monitored. If the COD in treated effluent exceeds 250 mg/l, the concerned industrial units discharging such effluent shall be required to identify chemicals responsible for high COD in effluent. In case, these are found to be toxic as defined under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, the concerned industry shall install tertiary treatment system.
- (iii) The above mentioned standards shall not be applicable to small scale detergent formulating units.

(1)	(2)	(3)	(4)
B. Emission Standards for Incinerator			
	Limiting concentration in mg/Nm ³ , unless otherwise stated		Sampling Duration in minutes unless otherwise stated
	Particulate Matter	50	30 or more (for sampling about 300 litres of emission)
	HCl	50	30
	SO ₂	200	30
	CO	100	daily average
	Total Organic Carbon	20	30
	Total Dioxins and Furans*	Existing Incinerator	8 hours
		New Incinerator	8 hours
	Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V + Cd + Th + Hg and their compounds	1.5	2 hours

*The existing plant shall comply with norms for Dioxins and Furans as 0.1 ngTEQ/Nm³ by 1st January, 2014.

Note :

- (i) All monitored values shall be corrected to 11% oxygen on dry basis.
- (ii) The CO₂ concentration in tail gas shall not be less than 7%.
- (iii) In case, halogenated organic waste is less than 1% by weight in input waste, all the facilities in twin chamber incinerator shall be designed so as to achieve a minimum temperature of 850 ± 25°C in primary chamber and 950°C in secondary combustion chamber and with a gas residence time in secondary combustion chamber not less than two seconds.

or

all the facilities in single chamber incinerator for gaseous hazardous waste shall be designed so as to achieve a minimum temperature of 950°C in the combustion chamber with a gas residence time not less than two seconds.

- (iv) In case halogenated organic waste is more than 1% by weight in input waste, waste shall be incinerated only in twin chamber incinerators and all the facilities shall be designed to achieve a minimum temperature of 850 ± 25°C in primary chamber and 1100°C in secondary combustion chamber with a gas residence time in secondary combustion chamber not less than two seconds.
- (v) Scrubber meant for scrubbing emissions shall not be used as quencher.
- (vi) incineration plants shall be operated (i.e. combustion chambers) with such temperature, retention time and turbulence, as to achieve Total Organic Carbon (TOC) content in the incineration ash and residue less than 3%, and their loss on ignition is less than 5% of the dry weight. In case of non-conformity, ash and residue, as the case may be shall be re-incinerated.
- (vii) The incinerator shall have a chimney of at least thirty meters height.

C. Effluent Standards for Incinerator

Note :

- (i) Effluent from scrubber(s) and floor washing shall flow through closed conduit or pipe network and be treated to comply with the effluent standards mention at 'A' above.

(1)	(2)	(3)	(4)
		(ii)	The built up in Total Dissolved Solids (TDS) in waste water of floor washings shall not exceed 1000 mg/l over and above the TDS of raw water used.

D. Storm water

Note :

- (i) Storm water shall not be allowed to mix with scrubber water and/or floor washings.
- (ii) Storm water shall be channellized through separate drains passing through a HDPE lined pit having holding capacity of 10 minutes (hourly average) of rainfall.”

[F. No. Q-15017/30/2009-CPW]

RAJNEESH DUBE, Jt. Secy.

Note.—The principal rules were published in the Gazette of India *vide* number S.O. 844(E), dated 19th November, 1986; and subsequently amended *vide* S.O. 433(E), dated 18th April, 1987; subsequently Schedule VII published *vide* G.S.R. 176(E), dated 2nd April, 1996; and recently amended *vide* G.S.R. 97(E), dated the 18th February, 2009; G.S.R. 149(E), dated the 4th March, 2009; G.S.R. 512(E), dated the 9th July, 2009; G.S.R. 543(E), dated the 22nd July, 2009; G.S.R. 595(E), dated the 21st August, 2009; G.S.R. 794(E), dated the 4th November, 2009; G.S.R. 826(E), dated the 16th November, 2009; G.S.R. 1(E), dated the 1st January, 2010; G.S.R. 61(E), dated the 5th February, 2010 and G.S.R. 485(E), dated the 9th June, 2010.



भारत का राजपत्र The Gazette of India

असाधारण

EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (i)

PART II—Section 3—Sub-section (i)

प्राधिकार से प्रकाशित

PUBLISHED BY AUTHORITY

सं. 925]	नई दिल्ली, शुक्रवार, दिसम्बर 28, 2018/पौष 7, 1940
No. 925]	NEW DELHI, FRIDAY, DECEMBER 28, 2018/PAUSHA 7, 1940

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय अधिसूचना

नई दिल्ली, 28 दिसम्बर, 2018

सा.का.नि. 1241(अ).—मानव निर्मित रेशे के संबंध में भारत के राजपत्र, असाधारण में पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय में भारत सरकार की अधिसूचना सं. सा.का.नि. 36 (अ), दिनांक 17 जनवरी, 2018 द्वारा प्रारूप अधिसूचना प्रकाशित की गई थी जिसमें उससे प्रभावित होने की संभावना वाले सभी व्यक्तियों से आम जनता को उक्त अधिसूचना को अंतर्विष्ट करने वाले राजपत्र की प्रतियां उपलब्ध कराए जाने की तिथि से साठ दिनों की अवधि के अंदर आपत्तियां एवं सुझाव आमंत्रित किए गए थे;

और, राजपत्र की प्रतियां तारीख 17 जनवरी, 2018 को जन-सामान्य को उपलब्ध कराई गई;

और, प्रारूप अधिसूचना की प्रतिक्रिया में सभी व्यक्तियों एवं हितधारकों से प्राप्त सभी आपत्तियों एवं सुझावों पर केंद्र सरकार द्वारा उचित रूप से विचार किया गया है;

अतः अब पर्यावरण (संरक्षण) नियम, 1986 के नियम 5 के उपनियम (3) के साथ पठित पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धाराएं 6 और 25 के द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए केंद्र सरकार पर्यावरण (संरक्षण) नियम, 1986 में और संशोधन लाने हेतु एतद्वारा निम्नलिखित नियम बनाती है, अर्थात:-

केन्द्रीय सरकार पर्यावरण (संरक्षण) नियम, 1986 का और संशोधन करने के लिए निम्नलिखित नियम बनाती है, अर्थात :-

1. **संक्षिप्त नाम और प्रारम्भ :-** (1) इन नियमों का नाम पर्यावरण (संरक्षण) चौथा संशोधन नियम, 2018 है।
- (2) ये नियम सरकारी राजपत्र में प्रकाशन की तारीख से लागू होंगे।

2. पर्यावरण (संरक्षण) नियम, 1986 में अनुसूची-I में, क्र.सं. 42 और उससे संबंधित प्रविष्टियों के लिए निम्नलिखित क्र.सं. तथा प्रविष्टियां प्रतिस्थापित की जाएंगी अर्थात् :-

क्र.सं. (1)	उद्योग (2)	मानदण्ड (3)	मानक (4)
"42	पेन्ट उद्योग	क- उत्सर्जन मानक	
			संकेन्द्रण इससे अधिक न हो
		पार्टिकुलर मैटर (प्रि-मिक्सर तथा मिक्सर से संबद्ध सभी प्रक्रियाओं के निकास मार्ग)	50 मिग्रा /Nm ³
		टिप्पण :-	
		(i) धूल उत्पन्न करने वाले सभी उपस्करों या प्रक्रियाओं में धूल निष्कासन की व्यवस्था की जाएगी।	
		(ii) सभी बोरा गृहों आदि को न्यूनतम 12 मीटर ऊँची या उद्योग में भवन, शेड या संयंत्र के सर्वोच्च बिन्दु से न्यूनतम दो मीटर ऊपर, जो भी ऊँची हो, चिमनियों या चट्टों से जोड़ा जाएगा।	
		(iii) इकाई, शॉप फ्लोर या परिभ्रमणशील उत्सर्जनों को उद्योग में 12 मी. ऊँचाई वाले चट्टे या भवन या शेड या संयंत्र के सर्वोच्च बिन्दु से न्यूनतम दो मीटर ऊपर के चट्टे, जो भी अधिक ऊँचा हो, के माध्यम से सरणीकृत करेगी।	
		ख. बहिःस्राव मानक	
		(i) बड़े पैमाने पर जल आधारित संयंत्र, प्रसंस्करण खंड से शून्य द्रव निस्सरण का पालन करेंगे।	
		(ii) सूक्ष्म, लघु तथा मध्यम उद्यम विकास अधिनियम, 2006 (2006 का 27) के अनुसार सभी सूक्ष्म, लघु तथा मध्यम इकाइयां तथा विलायक आधारित बड़े पैमाने की पेंट इकाइयां निम्न प्रकार से मानकों का पालन करेंगी :	
		मानदंड	संकेन्द्रण इससे अधिक नहीं (मिग्रा/लि. pH, जैव निर्धारण को छोड़कर)
		pH	6.5 -8.5
		कुल सस्पेंडिड ठोस (TSS)	100
		बायोकेमिकल आक्सीजन डिमांड (BoD)(27°C पर 3 दिन)	30
क्र.सं. (1)	उद्योग (2)	मानदंड (3)	मानक (4)
		फेनोलिक्स C ₂ H ₅ OH	1.0
		तेल और ग्रीस	10
		जैव निर्धारण परीक्षण	96 घंटों में 100% बहिःस्राव से 90% उत्तरजीविता
		भारी धातु	
		सीसा Pb	0.1
		क्रोमियम (हेक्सावैलेन्ट)	0.1

		कुल क्रोमियम	2.0
		तांबा Cu	2.0
		निकल Ni	2.0
		जिंक Zn	5.0
		आर्सेनिक As**	0.2
		कोबाल्ट Co	0.2
		कुल भारी धातुएं	7.0
		ग - प्रयोगोपरान्त अपशिष्ट जल	
		उद्योग द्वारा प्रयोगोपरान्त अपशिष्ट जल के 'शून्य निस्सरण' के लिए सभी प्रयास किये जाएंगे, और यदि उद्योग, प्रयोगोपरान्त अपशिष्ट जल का निस्सरण बेहतर समझता है, तो निम्नलिखित मापदण्डों का अनुपालन किया जाएगा :-	
			संकेन्द्रण इससे अधिक न हो (pH तथा तापमान को छोड़कर मिग्रा/प्रति लि.)
		pH	6.5 - 8.5
		सस्पेंडिड ठोस	100
		तेल और ग्रीस	10
		तापमान	अन्तर्ग्रहण जल के तापमान से 5°C से अधिक नहीं
		घ - वर्षा जल	
		(i) किसी संयंत्र, इकाई के लिए वर्षा जल, (जिसके भूखंड का आकार न्यूनतम 250 वर्ग मी. है) मार्जक जल, बहिःस्राव और / या फर्श की धोवनों के साथ मिश्रित नहीं होने दिया जाएगा।	
		(ii) किसी इकाई की बैटरी सीमा के भीतर वर्षा जल को, उच्च घनत्व पोलि एथीलीन (एचडीपीई) की लाइनों के माध्यम से गुजरने वाली भिन्न नाली या पाइप के द्वारा निकाल कर एक गट्टे तक ले जाया जाएगा जिसकी क्षमता 10 मिनट (घंटेवार औसत से) के वर्षा जल को धारण करने की हो।	
		ड. विलायक क्षतियों के लिए दिशा-निर्देश	
		(i) यदि प्रयुक्त विलायक, 1000 टन/वर्ष से कम है तो विलायक की कुल क्षति प्रयुक्त विलायक के 5% से अधिक नहीं होगी; और	
		(ii) यदि प्रयुक्त विलायक 1000 टन/वर्ष से अधिक है तो विलायक की कुल क्षति प्रयुक्त विलायक के 3% से अधिक नहीं होगी।	
		*इकाइयां शोधित बहिःस्राव में भारी धातुओं की निर्धारित सीमाओं का पालन करेंगी तथापि, ऐसे मामलों में जहां अन्तर्ग्रहीत जल में भारी धातुओं का संकेन्द्रण निर्धारित सीमाओं से अधिक है, राज्य प्रदूषण नियंत्रण बोर्ड या प्रदूषण नियंत्रण समितियां भारी धातुओं की अधिक सीमाएं विनिर्दिष्ट कर सकती हैं, बशर्ते अधिकतम सीमा अन्तर्ग्रहण जल की पृष्ठभूमि सीमाओं तक निर्बन्धित हो।	
		**यदि यदि भू-जल में As भू-संरचना जनित (जियोजेनिक) है, तो राज्य प्रदूषण नियंत्रण बोर्ड/प्रदूषण नियंत्रण समितियां इससे संबंधित सीमा में समुचित रूप से छूट	

		दे सकती हैं बशर्ते अपरिष्कृत जल (रॉ वाटर) में As की मात्रा के अलावा अपशिष्ट जल में As की मात्रा 0.2 मि.ग्रा./ली. से अधिक न हो और कुल भारी धातुओं की सीमा अनुरक्षित रहे।
--	--	---

[फा. सं. क्यू- 15017/39/2011-सीपीडब्ल्यू]

डा. ए. सेन्थिलवेल, वैज्ञानिक 'जी'

नोट :- मूल नियम भारत का राजपत्र, असाधारण, भाग-II खंड-3, उपखंड- (i) का.आ. सं. 844(अ), दिनांक 19 नवंबर, 1986 के द्वारा प्रकाशित किये गये थे और अंतिम बार अधिसूचना संख्या सा.का.नि. 1025 (अ) दिनांक 9 नवम्बर, 2018 के द्वारा संशोधित किये गये थे।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 28th December, 2018

G.S.R. 1241(E).—Whereas, a draft notification, for Man-Made Fibre was published in the Gazette of India, Extraordinary, vide notification of the Government of India in the Ministry of Environment, Forest and Climate Change vide number G.S.R. 36 (E), dated the 17th January, 2018, inviting objections and suggestions from all persons likely to be affected thereby within a period of sixty days from the dated on which copies of the Gazette containing the said notification were made available to the public;

And Whereas, copies of the Gazette were made available to the public dated 17th January, 2018;

And Whereas, all objections and suggestions received from all persons and stakeholders in response to the draft notification have been duly considered by the Central Government;

Now Therefore, in exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986) read with sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:-

1. **Short title and commencement.**-(1) These rules may be called the Environment (Protection) fourth Amendment Rules, 2018.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986, in Schedule-I, for serial number 42 and the entries relating thereto, the following serial number and entries shall be substituted, namely:-

S.No.	Indus	Parameter	Standards
(1)	(2)	(3)	(4)
“42	Paint Industry	A- Emission Standards	
			Concentration not to exceed
		Particulate Matter (all process vents attached to pre-mixers and mixers)	50 mg/Nm ³

		<p>Note:-</p> <p>(i) All dust generating equipment or processes shall be provided with dust extraction arrangement.</p> <p>(ii) The bag houses, etc. shall be connected to chimneys or stacks of at least twelve metres height or at least two metres above the top most point of the building, shed or plant in the industry, which so ever is higher.</p> <p>(iii) The unit shall channelise shop floor or fugitive emissions through a stack of twelve metres height or at least two metres above the top most point of the building or shed or plant in the industry, which so ever is higher.</p>	
		B. Effluent Standards	
		<p>(i) Large scale water based plants shall meet zero liquid discharge from process section.</p> <p>(ii) All Micro, Small and Medium units as per Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006) and Solvent based large scale paint units shall meet the standards given as:</p>	
		Parameter	Concentration not to exceed, (in mg/l except for pH and Bioassay)
		pH	6.5 – 8.5
		Total Suspended solid (TSS)	100
		Bio-Chemical Oxygen Demand (BOD) (3 days at 27°C)	30
S. No.	Industry	Parameter	Standards
(1)	(2)	(3)	(4)
		Phenolics as C ₆ H ₅ OH	1.0
		Oil and Grease	10
		Bio-Assay Test	90% survival in 100% effluent in 96 hours
		Heavy Metals*	
		Lead as Pb	0.1
		Chromium (Hexavalent)	0.1
		Total Chromium	2.0
		Copper as Cu	2.0
		Nickel as Ni	2.0
		Zinc as Zn	5.0
		Arsenic as As**	0.2
		Cobalt as Co	0.2
		Total Heavy metals	7.0
		C- Service Wastewater	
		All efforts shall be made by the industry for 'zero discharge' of service wastewater, and in case, the industry prefers to discharge service wastewater, the following norms shall be complied with:-	
			Concentration not to exceed, (in mg/l except for pH and temperature)

pH	6.5 – 8.5
Suspended Solids	100
Oil and Grease	10
Temperature	Not more than 5°C higher than the intake water temperature
D- Storm-Water	
(i) Storm water for a plant, a unit (having plot size at least 250 square metres) shall not be allowed to mix with scrubber water, effluent and/or floor washings.	
(ii) Storm water within the battery limits of a unit shall be channelized through separate drain or pipe passing through a High Density Poly ethylene (HDPE) lines pit having holding capacity of 10 minutes (hourly average) of rainfall.	
E- Guidelines for Solvent Losses	
(i) the total losses of solvent should not be more than 5% of the solvent consumed, if solvent consumption less than 1000 tons/Annum; and	
(ii) the solvent loss should not be more than 3% of the solvent consumed, if solvent consumption greater than 1000 tons/Annum.	
* The units shall meet the prescribed limits of heavy metals in treated effluent, however, in cases where heavy metal concentration in intake water is more than prescribed limits, State Pollution Control Boards or Pollution Control Committees may specify higher limits of heavy metals provided the maximum limits are restricted to the background limits of intake water.	
** In case As is geogenic in ground water, the State Pollution Control Boards/Pollution Control Committees may relax the limit with respect to it appropriately, provided the built of As in waste water does not exceed 0.2 mg/l over and above the As in raw water and limit with respect to total heavy metals is maintained”.	

[F. No. Q-15017/39/2011-CPW]

DR. A. SENTHIL VEL, Scientist 'G'

Note:- The principal rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i) *vide* number S.O. 844 (E), dated the 19th November, 1986 and lastly amended *vide* notification number G.S.R. 1025(E), dated the 9th November, 2018.

3. अपील करने का आधार :
4. मांगी गई राहत :
5. पैरा 2 में संदर्भित आदेश, जिसके विरुद्ध अपील
दायर की जा रही है, के अतिरिक्त अनुलग्नकों की सूची :

हस्ताक्षर.....

तारीख :

नाम और पता

X

X

[23-16/2009-एचएसएमडी]

विश्वनाथ सिन्हा, संयुक्त सचिव

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 4th April, 2016

G.S.R. 395(E).—Whereas the draft rules, namely the Hazardous And Other Wastes (Management and Transboundary Movement) Rules, 2015, were published by the Government of India in the Ministry of Environment, Forest and Climate Change *vide* number G.S.R. 582(E), dated the 24th July, 2015 in the Gazette of India, Extraordinary Part II, section 3, sub-section (ii) inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

AND WHEREAS the copies of the said Gazette containing the said notification were made available to the public on the 24th day of July, 2015;

AND WHEREAS the objections and suggestions received within the specified period from the public in respect of the said draft rules have been duly considered by the Central Government;

NOW, THEREFORE, in exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), and in supersession of the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, except as respects things done or omitted to be done before such supersession, the Central Government hereby makes the following rules, namely:-

**CHAPTER I
PRELIMINARY**

1. Short title and commencement. - (1) These rules may be called the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. Application. - These rules shall apply to the management of hazardous and other wastes as specified in the Schedules to these rules but shall not apply to -

- (a) waste-water and exhaust gases as covered under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) and the rules made thereunder and as amended from time to time;
- (b) wastes arising out of the operation from ships beyond five kilometres of the relevant baseline as covered under the provisions of the Merchant Shipping Act, 1958 (44 of 1958) and the rules made thereunder and as amended from time to time;

- (c) radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and the rules made thereunder and as amended from time to time;
- (d) bio-medical wastes covered under the Bio-Medical Wastes (Management and Handling) Rules, 1998 made under the Act and as amended from time to time; and
- (e) wastes covered under the Municipal Solid Wastes (Management and Handling) Rules, 2000 made under the Act and as amended from time to time.

3. Definitions. - (1) In these rules, unless the context otherwise requires,-

1. “Act” means the Environment (Protection) Act, 1986 (29 of 1986);
2. “actual user” means an occupier who procures and processes hazardous and other waste for reuse, recycling, recovery, pre-processing, utilisation including co-processing;
3. “authorisation” means permission for generation, handling, collection, reception, treatment, transport, storage, reuse, recycling, recovery, pre-processing, utilisation including co-processing and disposal of hazardous wastes granted under sub-rule (2) of rule 6;
4. “Basel Convention” means the United Nations Environment Programme Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal;
5. “captive treatment, storage and disposal facility” means a facility developed within the premises of an occupier for treatment, storage and disposal of wastes generated during manufacture, processing, treatment, package, storage, transportation, use, collection, destruction, conversion, offering for sale, transfer or the like of hazardous and other wastes;
6. “Central Pollution Control Board” means the Central Pollution Control Board constituted under sub-section (1) of section 3 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974);
7. “common treatment, storage and disposal facility” means a common facility identified and established individually or jointly or severally by the State Government, occupier, operator of a facility or any association of occupiers that shall be used as common facility by multiple occupiers or actual users for treatment, storage and disposal of the hazardous and other wastes;
8. “co-processing” means the use of waste materials in manufacturing processes for the purpose of energy or resource recovery or both and resultant reduction in the use of conventional fuels or raw materials or both through substitution;
9. “critical care medical equipment” means life saving equipment and includes such equipment as specified by the Ministry of Health and Family Welfare from time to time;
10. “disposal” means any operation which does not lead to reuse, recycling, recovery, utilisation including co-processing and includes physico-chemical treatment, biological treatment, incineration and disposal in secured landfill;
11. “export”, with its grammatical variations and cognate expressions, means taking out of India to a place outside India;
12. “exporter” means any person or occupier under the jurisdiction of the exporting country who exports hazardous or other wastes, including the country which exports hazardous or other waste;
13. “environmentally sound management of hazardous and other wastes” means taking all steps required to ensure that the hazardous and other wastes are managed in a manner which shall protect health and the environment against the adverse effects which may result from such waste;
14. “environmentally sound technologies” means any technology approved by the Central Government from time to time;
15. “facility” means any establishment wherein the processes incidental to the generation, handling, collection, reception, treatment, storage, reuse, recycling, recovery, pre-processing, co-processing, utilisation and disposal of hazardous and, or, other wastes are carried out;

16. "Form" means a form appended to these rules;
17. "hazardous waste" means 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;
18. "import", with its grammatical variations and cognate expressions, means bringing into India from a place outside India;
19. "importer" mean any person or occupier who imports hazardous or other waste;
20. "manifest" means transporting document prepared and signed by the sender authorised in accordance with the provisions of these rules;
21. "occupier" in relation to any factory or premises, means a person who has, control over the affairs of the factory or the premises and includes in relation to any hazardous and other wastes, the person in possession of the hazardous or other waste;
22. "operator of disposal facility" means a person who owns or operates a facility for collection, reception, treatment, storage and disposal of hazardous and other wastes;
23. "other wastes" means 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;
24. "pre-processing" means the treatment of waste to make it suitable for co-processing or recycling or for any further processing;
25. "recycling" means reclamation and processing of hazardous or other wastes in an environmentally sound manner for the originally intended purpose or for other purposes;
26. "reuse" means use of hazardous or other waste for the purpose of its original use or other use;
27. "recovery" means any operation or activity wherein specific materials are recovered;
28. "Schedule" means a Schedule appended to these rules;
29. "State Government" in relation to a Union territory means, the Administrator thereof appointed under article 239 of the Constitution;
30. "State Pollution Control Board" means the State Pollution Control Board constituted under section 4 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) and includes, in relation to a Union territory, the Pollution Control Committee;
31. "storage" mean storing any hazardous or other waste for a temporary period, at the end of which such waste is processed or disposed of;
32. "transboundary movement" means any movement of hazardous or other wastes from an area under the jurisdiction of one country to or through an area under the jurisdiction of another country or to or through an area not under the jurisdiction of any country, provided that at least two countries are involved in the movement;
33. "transport" means off-site movement of hazardous or other wastes by air, rail, road or water;
34. "transporter" means a person engaged in the off-site transportation of hazardous or other waste by air, rail, road or water;

35. “treatment” means a method, technique or process, designed to modify the physical, chemical or biological characteristics or composition of any hazardous or other waste so as to reduce its potential to cause harm;
36. “used oil” means any oil-
- (i) derived from crude oil or mixtures containing synthetic oil including spent oil, used engine oil, gear oil, hydraulic oil, turbine oil, compressor oil, industrial gear oil, heat transfer oil, transformer oil and their tank bottom sludges; and
 - (ii) suitable for reprocessing, if it meets the specification laid down in Part A of Schedule V but does not include waste oil;
37. “utilisation” means use of hazardous or other waste as a resource;
38. “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.
- Explanation.- for the purposes of this clause,
- (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;
39. “waste oil” means any oil which includes spills of crude oil, emulsions, tank bottom sludge and slop oil generated from petroleum refineries, installations or ships and can be used as fuel in furnaces for energy recovery, if it meets the specifications laid down in Part-B of Schedule V either as such or after reprocessing.

(2) Words and expressions used in these rules and not defined but defined in the Act shall have the meanings respectively assigned to them in the Act.

CHAPTER II

PROCEDURE FOR MANAGEMENT OF HAZARDOUS AND OTHER WASTES

4. Responsibilities of the occupier for management of hazardous and other wastes.-

- (1) For the management of hazardous and other wastes, an occupier shall follow the following steps, namely:-
 - (a) prevention;
 - (b) minimization;
 - (c) reuse,
 - (d) recycling;
 - (e) recovery, utilisation including co-processing;
 - (f) safe disposal.
- (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes.
- (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorised actual user or shall be disposed of in an authorised disposal facility.
- (4) The hazardous and other wastes shall be transported from an occupier’s establishment to an authorised actual user or to an authorised disposal facility in accordance with the provisions of these rules.
- (5) The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal.
- (6) The occupier shall take all the steps while managing hazardous and other wastes to-
 - (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment;
 - and

- (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.

5. Responsibilities of State Government for environmentally sound management of hazardous and other wastes. – (1) Department of Industry in the State or any other government agency authorised in this regard by the State Government, to ensure earmarking or allocation of industrial space or shed for recycling, pre-processing and other utilisation of hazardous or other waste in the existing and upcoming industrial park, estate and industrial clusters;

(2) Department of Labour in the State or any other government agency authorised in this regard by the State Government shall,-

- (a) ensure recognition and registration of workers involved in recycling, pre-processing and other utilisation activities;
- (b) assist formation of groups of such workers to facilitate setting up such facilities;
- (c) undertake industrial skill development activities for the workers involved in recycling, pre-processing and other utilisation;
- (d) undertake annual monitoring and to ensure safety and health of workers involved in recycling, pre-processing and other utilisation.

(3) Every State Government may prepare integrated plan for effective implementation of these provisions and to submit annual report to the Ministry of Environment, Forest and Climate Change, in the Central Government.

6. Grant of authorisation for managing hazardous and other wastes.- (1) Every occupier of the facility who is engaged in handling, generation, collection, storage, packaging, transportation, use, treatment, processing, recycling, recovery, pre-processing, co-processing, utilisation, offering for sale, transfer or disposal of the hazardous and other wastes shall be required to make an application in **Form 1** to the State Pollution Control Board and obtain an authorisation from the State Pollution Control Board within a period of sixty days from the date of publication of these rules. Such application for authorisation shall be accompanied with a copy each of the following documents, namely:-

- (a) consent to establish granted by the State Pollution Control Board under the Water (Prevention and Control of Pollution) Act, 1974 (25 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (21 of 1981);
- (b) Consent to operate granted by the State Pollution Control Board under the Water (Prevention and Control of Pollution) Act, 1974 (25 of 1974) and/or Air (Prevention and Control of Pollution) Act, 1981, (21 of 1981);
- (c) in case of renewal of authorisation, a self-certified compliance report in respect of effluent, emission standards and the conditions specified in the authorisation for hazardous and other wastes:

Provided that an application for renewal of authorisation may be made three months before the expiry of such authorisation:

Provided further that-

- (i) any person authorised under the provisions of the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008, prior to the date of commencement of these rules, shall not be required to make an application for authorisation till the period of expiry of such authorisation;
- (ii) any person engaged in recycling or reprocessing of the hazardous waste specified in Schedule IV and having registration under the provisions of the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008, shall not be required to make an application for authorisation till the period of expiry of such registration.

(2) On receipt of an application complete in all respects for the authorisation, the State Pollution Control Board may, after such inquiry as it considers necessary, and on being satisfied that the applicant possesses appropriate facilities for collection, storage, packaging, transportation, treatment, processing, use, destruction, recycling, recovery, pre-processing, co-processing, utilisation, offering for sale, transfer or disposal of the hazardous and other waste, as the case may be, and after ensuring technical capabilities and equipment complying with the standard operating procedure or other guidelines specified by the Central Pollution Control Board from time to time and through site inspection, grant within a period of one hundred and twenty days, an authorisation in **Form 2** to the applicant, which shall be valid for a period of five years subject to such conditions as may be laid down therein. For commonly recyclable hazardous waste as given in Schedule IV, the guidelines already prepared by the Central Pollution Control Board shall be followed:

Provided that in the case of an application for renewal of authorisation, the State Pollution Control Board may, before granting such authorisation, satisfy itself that there has been no violation of the conditions specified in the authorisation earlier granted by it and same shall be recorded in the inspection report.

(3) The authorisation granted by the State Pollution Control Board under sub-rule (2) shall be accompanied by a copy of the field inspection report signed by that Board indicating the adequacy of facilities for collection, storage, packaging, transportation, treatment, processing, use, destruction, recycling, recovery, pre-processing, co-processing, utilisation, offering for sale, transfer or disposal of the hazardous and other wastes and compliance to the guidelines or standard operating procedures specified by the Central Pollution Control Board from time to time.

(4) The State Pollution Control Board may, for the reasons to be recorded in writing and after giving reasonable opportunity of being heard to the applicant, refuse to grant any authorisation under these rules.

(5) Every occupier authorised under these rules, shall maintain a record of hazardous and other wastes managed by him in **Form 3** and prepare and submit to the State Pollution Control Board, an annual return containing the details specified in **Form 4** on or before the 30th day of June following the financial year to which that return relates.

(6) The State Pollution Control Board shall maintain a register containing particulars of the conditions imposed under these rules for management of hazardous and other wastes and it shall be open for inspection during office hours to any interested or affected person.

(7) The authorised actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorisation.

(8) Handing over of the hazardous and other wastes to the authorised actual user shall be only after making the entry into the passbook of the actual user.

7. Power to suspend or cancel an authorisation.- (1) The State Pollution Control Board, may, if in its opinion the holder of the authorisation has failed to comply with any of the conditions of the authorisation or with any provisions of the Act or these rules and after giving him a reasonable opportunity of being heard and after recording reasons thereof in writing cancel or suspend the authorisation issued under rule 6 for such period as it considers necessary in the public interest.

(2) Upon suspension or cancellation of the authorisation, the State Pollution Control Board may give directions to the person whose authorisation has been suspended or cancelled for the safe storage and management of the hazardous and other wastes, and such occupier shall comply with such directions.

8. Storage of hazardous and other wastes.- (1) The occupiers of facilities may store the hazardous and other wastes for a period not exceeding ninety days and shall maintain a record of sale, transfer, storage, recycling, recovery, pre-processing, co-processing and utilisation of such wastes and make these records available for inspection:

Provided that the State Pollution Control Board may extend the said period of ninety days in following cases, namely:-

- (i) small generators (up to ten tonnes per annum) up to one hundred and eighty days of their annual capacity;
- (ii) actual users and disposal facility operators up to one hundred and eighty days of their annual capacity,
- (iii) occupiers who do not have access to any treatment, storage, disposal facility in the concerned State; or
- (iv) the waste which needs to be specifically stored for development of a process for its recycling, recovery, pre-processing, co-processing or utilisation;
- (v) in any other case, on justifiable grounds up to one hundred and eighty days.

9. Utilisation of hazardous and other wastes.- (1) The 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), shall be carried out only after obtaining authorisation from the State Pollution Control Board in respect of waste on the basis of standard operating procedures or guidelines provided by the Central Pollution Control Board.

(2) Where standard operating procedures or guidelines are not available for specific utilisation, the approval has to be sought from Central Pollution Control Board which shall be granting approval on the basis of trial runs and thereafter, standard operating procedures or guidelines shall be prepared by Central Pollution Control Board:

Provided, if trial run has been conducted for particular waste with respect to particular utilisation and compliance to the environmental standards has been demonstrated, authorisation may be granted by the State Pollution Control Board with respect to the same waste and utilisation, without need of separate trial run by Central Pollution Control Board and such cases of successful trial run, Central Pollution Control Board shall intimate all the State Pollution Control Board regarding the same.

(3) No trial runs shall be required for co-processing of waste in cement plants for which guidelines by the Central Pollution Control Board are already available; however, the actual users shall ensure compliance to the standards notified under the Environment (Protection) Act, 1986 (29 of 1986), for cement plant with respect to co-processing of waste:

Provided that till the time the standards are notified, the procedure as applicable to other kind of utilisation of hazardous and other waste, as enumerated above shall be followed.

10. Standard Operating Procedure or guidelines for actual users.- The Ministry of Environment, Forest and Climate Change or the Central Pollution Control Board may issue guidelines or standard operating procedures for environmentally sound management of hazardous and other wastes from time to time.

CHAPTER III

IMPORT AND EXPORT OF HAZARDOUS AND OTHER WASTES

11. Import and export (transboundary movement) of hazardous and other wastes.- The Ministry of Environment, Forest and Climate Change shall be the nodal Ministry to deal with the transboundary movement of the hazardous and other wastes in accordance with the provisions of these rules.

12. Strategy for Import and export of hazardous and other wastes.- (1) No import of the hazardous and other wastes from any country to India for disposal shall be permitted.

(2) The import of hazardous and other wastes from any country shall be permitted only for recycling, recovery, reuse and utilisation including co-processing.

(3) The import of hazardous waste in Part A of Schedule III may be allowed to actual users with the prior informed consent of the exporting country and shall require the permission of the Ministry of Environment, Forest and Climate Change.

(4) The import of other wastes in Part B of Schedule III may be allowed to actual users with the permission of the Ministry of Environment, Forest and Climate Change.

(5) The import of other wastes in Part D of Schedule III will be allowed as per procedure given in rule 13 and as per the note below the said Schedule.

(6) No import of the hazardous and other wastes specified in Schedule VI shall be permitted.

(7) The export of hazardous and other wastes from India listed in Part A and Part B of Schedule III and Schedule VI shall be with the permission of Ministry of Environment, Forest and Climate Change. In case of applications for export of hazardous and other waste listed in Part A of Schedule III and Schedule VI, they shall be considered on the basis of prior informed consent of the importing country.

(8) The import and export of hazardous and other wastes not specified in Schedule III, but exhibiting the hazardous characteristics outlined in Part C of Schedule III shall require prior written permission of the Ministry of Environment, Forest and Climate Change before it is imported to or exported from India, as the case may be.

13. Procedure for import of hazardous and other wastes.- (1) Actual users intending to import or transit for transboundary movement of hazardous and other wastes specified in Part A and Part B of Schedule III shall apply in **Form 5** along with the documents listed therein, to the Ministry of Environment, Forest and Climate Change for the proposed import together with the prior informed consent of the exporting country in respect of Part A of Schedule III waste, and shall send a copy of the application, simultaneously, to the concerned State Pollution Control Board for information and the acknowledgement in this respect from the concerned State Pollution Control Board shall be submitted to the Ministry of Environment, Forest and Climate Change along with the application.

(2) For the import of other wastes listed in Part D of Schedule III, the importer shall not require the permission of the Ministry of Environment, Forest and Climate Change. However, the importer shall furnish the required information as per **Form 6** to the Customs authorities, accompanied with the following documents in addition to those listed in Schedule VIII, wherever applicable. For used electrical and electronic assemblies listed at serial numbers 4 (e) to 4(i) of Schedule VIII (Basel No. B1110), there is no specific requirement of documentation under these rules:

(a) the import license from Directorate General of Foreign Trade, if applicable;

(b) the valid consents under the Water (Prevention and Control of Pollution) Act, 1974 (25 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (21 of 1981) and the authorisation under these rules as well as the authorisation under the E-Waste (Management and Handling) Rules, 2011, as amended from time to time, whichever applicable;

(c) importer who is a trader, importing waste on behalf of actual users, shall obtain one time authorisation in **Form 7** and copy of this authorisation shall be appended to **Form 6**.

(3) For Part B of Schedule III, in case of import of any used electrical and electronic assemblies or spares or part or component or consumables as listed under Schedule I of the E-Waste (Management and Handling) Rules, 2011, as amended from time to time, the importer need to obtain extended producer responsibility-authorisation as producer under the said E-Waste (Management and Handling) Rules, 2011.

(4) Prior to clearing of consignment of wastes listed in Part D of Schedule III, the Custom authorities shall verify the documents as given in column (3) of Schedule VIII.

(5) On receipt of the complete application with respect to Part A and Part B of Schedule III, the Ministry of Environment, Forest and Climate Change shall examine the application considering the comments and observations, if any, received from the State Pollution Control Boards, and may grant the permission for import within a period of sixty days subject to the condition that the importer has -

- (i) the environmentally sound facilities;
- (ii) adequate arrangements for treatment and disposal of wastes generated;
- (iii) a valid authorisation and consents from the State Pollution Control Board;
- (iv) prior informed consent from the exporting country in case of Part A of Schedule III wastes.

(6) The Ministry of Environment, Forest and Climate Change shall forward a copy of the permission to the concerned Port and Customs authorities, Central Pollution Control Board and the concerned State Pollution Control Board for ensuring compliance with respect to their respective functions given in Schedule VII.

(7) The importer of the hazardous and other wastes shall maintain records of the hazardous and other waste imported by him in **Form 3** and the record so maintained shall be made available for inspection.

(8) The importer of the hazardous and other wastes shall file an annual return in **Form 4** to the State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates.

(9) Samples of hazardous and other wastes being imported for testing or research and development purposes up to 1000 gm or 1000 ml shall be exempted from need of taking permission for import under these rules.

(10) The Port and Customs authorities shall ensure that shipment is accompanied with the movement document as given in **Form 6** and the test report of analysis of the waste, consignment, wherever applicable, from a laboratory accredited or recognised by the exporting country. In case of any doubt, the customs may verify the analysis.

14. Procedure for Export of hazardous and other wastes from India.- (1) Any occupier intending to export waste specified in Part A of Schedule III, Part B of Schedule III and Schedule VI, shall make an application in **Form 5** along with insurance cover to the Ministry of Environment, Forest and Climate Change for the proposed transboundary movement of the hazardous and other wastes together with the prior informed consent in writing from the importing country in respect of wastes specified in Part A of Schedule III and Schedule VI.

(2) On receipt of an application under sub-rule (1), the Ministry of Environment, Forest and Climate Change may give permission for the proposed export within a period of sixty days from the date of submission of complete application and may impose such conditions as it may consider necessary.

(3) The Ministry of Environment, Forest and Climate Change shall forward a copy of the permission granted under sub-rule (2) to the State Pollution Control Board of the State where the waste is generated and the Pollution Control Board of the State where the port of export is located and the concerned Port and Customs authorities for ensuring compliance of the conditions of the export permission.

(4) The exporter shall ensure that no consignment is shipped before the prior informed consent is received from the importing country, wherever applicable.

(5) The exporter shall also ensure that the shipment is accompanied with movement document in **Form 6**.

(6) The exporter of the hazardous and other wastes shall maintain the records of the hazardous or other waste exported by him in **Form 3** and the record so maintained shall be available for inspection.

15. Illegal traffic.- (1) The export and import of hazardous or other wastes from and into India, respectively shall be deemed illegal, if,-

- (i) it is without permission of the Central Government in accordance with these rules; or
- (ii) the permission has been obtained through falsification, mis-representation or fraud; or
- (iii) it does not conform to the shipping details provided in the movement documents; or
- (iv) it results in deliberate disposal (i.e., dumping) of hazardous or other waste in contravention of the Basel Convention and of general principles of international or domestic law.

(2) In case of illegal import of the hazardous or other waste, the importer shall re-export the waste in question at his cost within a period of ninety days from the date of its arrival into India and its implementation will be ensured by the concerned Port and the Custom authority. In case of disposal of such waste by the Port and Custom authorities, they shall do so in accordance with these rules with the permission of the Pollution Control Board of the State where the Port exists.

(3) In case of illegal import of hazardous or other waste, where the importer is not traceable then the waste either can be sold by the Customs authority to any user having authorisation under these rules from the concerned State Pollution Control Board or can be sent to authorised treatment, storage and disposal facility.

CHAPTER - IV

TREATMENT, STORAGE AND DISPOSAL FACILITY FOR HAZARDOUS AND OTHER WASTES

16. Treatment, storage and disposal facility for hazardous and other wastes.- (1) The State Government, occupier, operator of a facility or any association of occupiers shall individually or jointly or severally be responsible for identification of sites for establishing the facility for treatment, storage and disposal of the hazardous and other waste in the State.

(2) The operator of common facility or occupier of a captive facility, shall design and set up the treatment, storage and disposal facility as per technical guidelines issued by the Central Pollution Control Board in this regard from time to time and shall obtain approval from the State Pollution Control Board for design and layout in this regard.

(3) The State Pollution Control Board shall monitor the setting up and operation of the common or captive treatment, storage and disposal facility, regularly.

(4) The operator of common facility or occupier of a captive facility shall be responsible for safe and environmentally sound operation of the facility and its closure and post closure phase, as per guidelines or standard operating procedures issued by the Central Pollution Control Board from time to time.

(5) The operator of common facility or occupier of a captive facility shall maintain records of hazardous and other wastes handled by him in **Form 3**.

(6) The operator of common facility or occupier of a captive facility shall file an annual return in **Form 4** to the State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates.

CHAPTER - V

PACKAGING, LABELLING, AND TRANSPORT OF HAZARDOUS AND OTHER WASTES.

17. Packaging and Labelling.- (1) Any occupier handling hazardous or other wastes and operator of the treatment, storage and disposal facility shall ensure that the hazardous and other wastes are packaged in a manner suitable for safe handling, storage and transport as per the guidelines issued by the Central Pollution Control Board from time to time. The labelling shall be done as per **Form 8**.

(2) The label shall be of non-washable material, weather proof and easily visible.

18. Transportation of hazardous and other wastes.- (1) The transport of the hazardous and other waste shall be in accordance with the provisions of these rules and the rules made by the Central Government under the Motor Vehicles Act, 1988 and the guidelines issued by the Central Pollution Control Board from time to time in this regard.

(2) The occupier shall provide the transporter with the relevant information in **Form 9**, regarding the hazardous nature of the wastes and measures to be taken in case of an emergency and shall label the hazardous and other wastes containers as per **Form 8**.

(3) In case of transportation of hazardous and other waste for final disposal to a facility existing in a State other than the State where the waste is generated, the sender shall obtain 'No Objection Certificate' from the State Pollution Control Board of both the States.

(4) In case of transportation of hazardous and other waste for recycling or utilisation including co-processing, the sender shall intimate both the State Pollution Control Boards before handing over the waste to the transporter.

(5) In case of transit of hazardous and other waste for recycling, utilisation including co-processing or disposal through a State other than the States of origin and destination, the sender shall give prior intimation to the concerned State Pollution Control Board of the States of transit before handing over the wastes to the transporter.

(6) In case of transportation of hazardous and other waste, the responsibility of safe transport shall be either of the sender or the receiver whosoever arranges the transport and has the necessary authorisation for transport from the concerned State Pollution Control Board. This responsibility should be clearly indicated in the manifest.

(7) The authorisation for transport shall be obtained either by the sender or the receiver on whose behalf the transport is being arranged.

19. Manifest system (Movement Document) for hazardous and other waste to be used within the country only.- (1) The sender of the waste shall prepare seven copies of the manifest in **Form 10** comprising of colour code indicated below and all seven copies shall be signed by the sender:

Copy number with colour code	Purpose
(1)	(2)
Copy 1 (White)	To be forwarded by the sender to the State Pollution Control Board after signing all the seven copies.
Copy 2 (Yellow)	To be retained by the sender after taking signature on it from the transporter and the rest of the five signed copies to be carried by the transporter.
Copy 3 (Pink)	To be retained by the receiver (actual user or treatment storage and disposal facility operator) after receiving the waste and the remaining four copies are to be duly signed by the receiver.
Copy 4 (Orange)	To be handed over to the transporter by the receiver after accepting waste.
Copy 5 (Green)	To be sent by the receiver to the State Pollution Control Board.
Copy 6 (Blue)	To be sent by the receiver to the sender.
Copy 7 (Grey)	To be sent by the receiver to the State Pollution Control Board of the sender in case the sender is in another State.

(2) The sender shall forward copy 1 (white) to the State Pollution Control Board, and in case the hazardous or other wastes is likely to be transported through any transit State, the sender shall intimate State Pollution Control Boards of transit States about the movement of the waste.

(3) No transporter shall accept waste from the sender for transport unless it is accompanied by signed copies 3 to 7 of the manifest.

(4) The transporter shall submit copies 3 to 7 of the manifest duly signed with date to the receiver along with the waste consignment.

(5) The receiver after acceptance of the waste shall hand over copy 4 (orange) to the transporter and send copy 5 (green) to his State Pollution Control Board and send copy 6 (blue) to the sender and the copy 3 (pink) shall be retained by the receiver.

(6) The copy 7 (grey) shall only be sent to the State Pollution Control Board of the sender, if the sender is in another State.

**CHAPTER VI
MISCELLANEOUS**

20. Records and returns.- (1) The occupier handling hazardous or other wastes and operator of disposal facility shall maintain records of such operations in **Form 3**.

(2) The occupier handling hazardous and other wastes and operator of disposal facility shall send annual returns to the State Pollution Control Board in **Form 4**.

(3) The State Pollution Control Board based on the annual returns received from the occupiers and the operators of the facilities for disposal of hazardous and other wastes shall prepare an annual inventory of the waste generated; waste recycled, recovered, utilised including co-processed; waste re-exported and waste disposed and submit to the Central Pollution Control Board by the 30th day of September every year. The State Pollution Control Board shall also prepare the inventory of hazardous waste generators, actual users, and common and captive disposal facilities and shall submit the information to Central Pollution Control Board every two years.

(4) The Central Pollution Control Board shall prepare the consolidated review report on management of hazardous and other wastes and forward it to the Ministry of Environment, Forest and Climate Change, along with its recommendations before the 30th day of December once in every year.

21. Responsibility of authorities. - The authority specified in column (2) of Schedule VII shall perform the duties as specified in column (3) of the said Schedule subject to the provisions of these rules.

22. Accident reporting. - Where an accident occurs at the facility of the occupier handling hazardous or other wastes and operator of the disposal facility or during transportation, the occupier or the operator or the transporter shall immediately intimate the State Pollution Control Board through telephone, e-mail about the accident and subsequently send a report in **Form 11**.

23. Liability of occupier, importer or exporter and operator of a disposal facility.-

(1) The occupier, importer or exporter and operator of the disposal facility shall be liable for all damages caused to the environment or third party due to improper handling and management of the hazardous and other waste.

(2) The occupier and the operator of the disposal facility shall be liable to pay financial penalties as levied for any violation of the provisions under these rules by the State Pollution Control Board with the prior approval of the Central Pollution Control Board.

24. Appeal.- (1) Any person aggrieved by an order of suspension or cancellation or refusal of authorisation or its renewal passed by the State Pollution Control Board may, within a period of thirty days from the date on which the order is communicated to him, prefer an appeal in **Form 12** to the Appellate Authority, namely, the Environment Secretary of the State.

(2) The Appellate Authority may entertain the appeal after expiry of the said period of thirty days, if it is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.

(3) Every appeal filed under this rule shall be disposed of within a period of sixty days from the date of its filing.

SCHEDULE I

[See rule 3 (1) (17) (i)]

List of processes generating hazardous wastes

S.No. (1)	Processes (2)	Hazardous Waste* (3)
1.	Petrochemical processes and pyrolytic operations	1.1 Furnace or reactor residue and debris 1.2 Tarry residues and still bottoms from distillation 1.3 Oily sludge emulsion 1.4 Organic residues 1.5 Residues from alkali wash of fuels 1.6 Spent catalyst and molecular sieves 1.7 Oil from wastewater treatment
2.	Crude oil and natural gas production	2.1 Drill cuttings excluding those from water based mud 2.2 Sludge containing oil 2.3 Drilling mud containing oil
3.	Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1 cargo residue, washing water and sludge containing oil 3.2 cargo residue and sludge containing chemicals 3.3 Sludge and filters contaminated with oil 3.4 Ballast water containing oil from ships

4.	Petroleum refining or re-processing of used oil or recycling of waste oil	4.1 Oil sludge or emulsion 4.2 Spent catalyst 4.3 Slop oil 4.4 Organic residue from processes 4.5 Spent clay containing oil
5.	Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.1 Used or spent oil 5.2 Wastes or residues containing oil 5.3 Waste cutting oils
6.	Secondary production and / or industrial use of zinc	6.1 Sludge and filter press cake arising out of production of Zinc Sulphate and other Zinc Compounds. 6.2 Zinc fines or dust or ash or skimmings in dispersible form 6.3 Other residues from processing of zinc ash or skimmings 6.4 Flue gas dust and other particulates
7.	Primary production of zinc or lead or copper and other non-ferrous metals except aluminium	7.1 Flue gas dust from roasting 7.2 Process residues 7.3 Arsenic-bearing sludge 7.4 Non-ferrous metal bearing sludge and residue. 7.5 Sludge from scrubbers
8.	Secondary production of copper	8.1 Spent electrolytic solutions 8.2 Sludge and filter cakes 8.3 Flue gas dust and other particulates
9.	Secondary production of lead	9.1 Lead bearing residues 9.2 Lead ash or particulate from flue gas 9.3 Acid from used batteries
10.	Production and/or industrial use of cadmium and arsenic and their compounds	10.1 Residues containing cadmium and arsenic
11.	Production of primary and secondary aluminum	11.1 Sludges from off-gas treatment 11.2 Cathode residues including pot lining wastes 11.3 Tar containing wastes 11.4 Flue gas dust and other particulates 11.5 Drosses and waste from treatment of salt sludge 11.6 Used anode butts 11.7 Vanadium sludge from alumina refineries
12.	Metal surface treatment, such as etching, staining, polishing, galvanizing, cleaning, degreasing, plating, etc.	12.1 Acidic and alkaline residues 12.2 Spent acid and alkali 12.3 Spent bath and sludge containing sulphide, cyanide and toxic metals 12.4 Sludge from bath containing organic solvents 12.5 Phosphate sludge 12.6 Sludge from staining bath 12.7 Copper etching residues 12.8 Plating metal sludge
13.	Production of iron and steel including other ferrous alloys (electric furnace; steel rolling and finishing mills; Coke oven and by products plant)	13.1 Spent pickling liquor 13.2 Sludge from acid recovery unit 13.3 Benzol acid sludge 13.4 Decanter tank tar sludge 13.5 Tar storage tank residue 13.6 Residues from coke oven by product plant.
14.	Hardening of steel	14.1 Cyanide-, nitrate-, or nitrite -containing sludge 14.2 Spent hardening salt
15.	Production of asbestos or asbestos-containing materials	15.1 Asbestos-containing residues 15.2 Discarded asbestos 15.3 Dust or particulates from exhaust gas treatment.
16.	Production of caustic soda and chlorine	16.1 Mercury bearing sludge generated from mercury cell process 16.2 Residue or sludges and filter cakes 16.3 Brine sludge
17.	Production of mineral acids	17.1 Process acidic residue, filter cake, dust 17.2 Spent catalyst
18.	Production of nitrogenous and complex fertilizers	18.1 Spent catalyst 18.2 Carbon residue

		18.3 Sludge or residue containing arsenic 18.4 Chromium sludge from water cooling tower
19.	Production of phenol	19.1 Residue or sludge containing phenol 19.2 Spent catalyst
20.	Production and/or industrial use of solvents	20.1 Contaminated aromatic, aliphatic or naphthenic solvents may or may not be fit for reuse. 20.2 Spent solvents 20.3 Distillation residues 20.4 Process Sludge
21.	Production and/or industrial use of paints, pigments, lacquers, varnishes and inks	21.1 Process wastes, residues and sludges 21.2 Spent solvent
22.	Production of plastics	22.1 Spent catalysts 22.2 Process residues
23.	Production and /or industrial use of glues, organic cements, adhesive and resins	23.1 Wastes or residues (not made with vegetable or animal materials) 23.2 Spent solvents
24.	Production of canvas and textiles	24.1 Chemical residues
25.	Industrial production and formulation of wood preservatives	25.1 Chemical residues 25.2 Residues from wood alkali bath
26.	Production or industrial use of synthetic dyes, dye-intermediates and pigments	26.1 Process waste sludge/residues containing acid, toxic metals, organic compounds 26.2 Dust from air filtration system 26.3 Spent acid 26.4 Spent solvent 26.5 Spent catalyst
27.	Production of organic-silicone compound	27.1 Process residues
28.	Production/formulation of drugs/pharmaceutical and health care product	28.1 Process Residue and wastes 28.2 Spent catalyst 28.3 Spent carbon 28.4 Off specification products 28.5 Date-expired products 28.6 Spent solvents
29.	Production, and formulation of pesticides including stock-piles	29.1 Process wastes or residues 29.2 Sludge containing residual pesticides 29.3 Date-expired and off-specification pesticides 29.4 Spent solvents 29.5 Spent catalysts 29.6 Spent acids
30.	Leather tanneries	30.1 Chromium bearing residue and sludge
31.	Electronic Industry	31.1 Process residue and wastes 31.2 Spent etching chemicals and solvents
32.	Pulp and Paper Industry	32.1 Spent chemicals 32.2 Corrosive wastes arising from use of strong acid and bases 32.3 Process sludge containing adsorbable organic halides(AO _x)
33.	Handling of hazardous chemicals and wastes	33.1 Empty barrels/containers/liners contaminated with hazardous chemicals /wastes 33.2 Contaminated cotton rags or other cleaning materials
34.	De-contamination of barrels / containers used for handling of hazardous wastes/chemicals	34.1 Chemical-containing residue arising from decontamination. 34.2 Sludge from treatment of waste water arising out of cleaning / disposal of barrels / containers
35.	Purification and treatment of exhaust air/gases, water and waste water from the processes in this schedule and common industrial effluent treatment plants (CETP's)	35.1 Exhaust Air or Gas cleaning residue 35.2 Spent ion exchange resin containing toxic metals 35.3 Chemical sludge from waste water treatment 35.4 Oil and grease skimming 35.5 Chromium sludge from cooling water
36.	Purification process for organic compounds/solvents	36.1 Any process or distillation residue 36.2 Spent carbon or filter medium

37.	Hazardous waste treatment processes, e.g. pre-processing, incineration and concentration	37.1 Sludge from wet scrubbers 37.2 Ash from incinerator and flue gas cleaning residue 37.3 Concentration or evaporation residues
38.	Chemical processing of Ores containing heavy metals such as Chromium, Manganese, Nickel, Cadmium etc.	38.1 Process residues 38.2 Spent acid

*** The inclusion of wastes contained in this Schedule does not preclude the use of Schedule II to demonstrate that the waste is not hazardous. In case of dispute, the matter would be referred to the Technical Review Committee constituted by Ministry of Environment, Forest and Climate Change.**

Note: The high volume low effect wastes such as fly ash, Phosphogypsum, red mud, jarosite, Slags from pyrometallurgical operations, mine tailings and ore beneficiation rejects are excluded from the category of hazardous wastes. Separate guidelines on the management of these wastes shall be issued by Central Pollution Control Board.

SCHEDULE II

[See rule 3 (1) (17) (ii)]

List of waste constituents with concentration limits

Class A: Based on leachable concentration limits [Toxicity Characteristic Leaching Procedure (TCLP) or Soluble Threshold Limit Concentration (STLC)]

Class	Constituents	Concentration in mg/l
(1)	(2)	(3)
A1	Arsenic	5.0
A2	Barium	100.0
A3	Cadmium	1.0
A4	Chromium and/or Chromium (III) compounds	5.0
A5	Lead	5.0
A6	Manganese	10.0
A7	Mercury	0.2
A8	Selenium	1.0
A9	Silver	5.0
A10	Ammonia	50*
A11	Cyanide	20*
A12	Nitrate (as nitrate-nitrogen)	1000.0
A13	Sulphide (as H ₂ S)	5.0
A14	1,1-Dichloroethylene	0.7
A15	1,2-Dichloroethane	0.5
A16	1,4-Dichlorobenzene	7.5
A17	2,4,5-Trichlorophenol	400.0
A18	2,4,6-Trichlorophenol	2.0
A19	2,4-Dinitrotoluene	0.13
A20	Benzene	0.5
A21	Benzo (a) Pyrene	0.001
A22	Bromodichloromethane	6.0
A23	Bromoform	10.0
A24	Carbon tetrachloride	0.5
A25	Chlorobenzene	100.0
A26	Chloroform	6.0
A27	Cresol (ortho+ meta+ para)	200.0
A28	Dibromochloromethane	10.0
A29	Hexachlorobenzene	0.13
A30	Hexachlorobutadiene	0.5
A31	Hexachloroethane	3.0
A32	Methyl ethyl ketone	200.0

A33	Naphthalene	5.0
A34	Nitrobenzene	2.0
A35	Pentachlorophenol	100.0
A36	Pyridine	5.0
A37	Tetrachloroethylene	0.7
A38	Trichloroethylene	0.5
A39	Vinyl chloride	0.2
A40	2,4,5-TP (Silvex)	1.0
A41	2,4-Dichlorophenoxyacetic acid	10.0
A42	Alachlor	2.0
A43	Alpha HCH	0.001
A44	Atrazine	0.2
A45	Beta HCH	0.004
A46	Butachlor	12.5
A47	Chlordane	0.03
A48	Chlorpyrifos	9.0
A49	Delta HCH	0.004
A50	Endosulfan (alpha+ beta+ sulphate)	0.04
A51	Endrin	0.02
A52	Ethion	0.3
A53	Heptachlor (& its Epoxide)	0.008
A54	Isoproturon	0.9
A55	Lindane	0.4
A56	Malathion	19
A57	Methoxychlor	10
A58	Methyl parathion	0.7
A59	Monocrotophos	0.1
A60	Phorate	0.2
A61	Toxaphene	0.5
A62	Antimony	15
A63	Beryllium	0.75
A64	Chromium (VI)	5.0
A65	Cobalt	80.0
A66	Copper	25.0
A67	Molybdenum	350
A68	Nickel	20.0
A69	Thallium	7.0
A70	Vanadium	24.0
A71	Zinc	250
A72	Fluoride	180.0
A73	Aldrin	0.14
A74	Dichlorodiphenyltrichloroethane (DDT), Dichlorodiphenyldichloroethylene (DDE), Dichlorodiphenyldichloroethane (DDD)	0.1
A75	Dieldrin	0.8
A76	Kepone	2.1
A77	Mirex	2.1
A78	Polychlorinated biphenyls	5.0
A79	Dioxin (2,3,7,8-TCDD)	0.001

Class B: Based on Total Threshold Limit Concentration (TTLC)

Class	Constituent	Concentration in mg/kg
(1)	(2)	(3)
B1	Asbestos	10000
B2	Total Petroleum Hydrocarbons (TPH) (C5 - C36)	5,000

Note:

- (1) The testing method for list of constituents at A1 to A61 in Class-A, shall be based on Toxicity Characteristic Leaching Procedure (TCLP) and for extraction of leachable constituents, USEPA Test Method 1311 shall be used.
- (2) The testing method for list of constituents at A62 to A79 in Class- A, shall be based on Soluble Threshold Limit Concentration (STLC) and Waste Extraction Test (WET) Procedure given in Appendix II of section 66261 of Title 22 of California Code regulation (CCR) shall be used.
- (3) In case of ammonia (A10), cyanide (A11) and chromium VI (A64), extractions shall be conducted using distilled water in place of the leaching media specified in the TCLP/STLC procedures.
- (4) A summary of above specified leaching/extraction procedures is included in manual for characterization and analysis of hazardous waste published by Central Pollution Control Board and in case the method is not covered in the said manual, suitable reference method may be adopted for the measurement.
- (5) In case of asbestos, the specified concentration limits apply only if the substances are in a friable, powdered or finely divided state.
- (6) The hazardous constituents to be analyzed in the waste shall be relevant to the nature of the industry and the materials used in the process.

Wastes which contain any of the constituents listed below shall be considered as hazardous, provided they exhibit the characteristics listed in Class-C of this Schedule :

1.	Acid Amides
2.	Acid anhydrides
3.	Amines
4.	Anthracene
5.	Aromatic compounds other than those listed in Class A
6.	Bromates, (hypo-bromites)
7.	Chlorates (hypo-chlorites)
8.	Carbonyls
9.	Ferro-silicate and alloys
10.	Halogen- containing compounds which produce acidic vapours on contact with humid air or water e.g. silicon tetrachloride, aluminum chloride, titanium tetrachloride
11.	Halogen- silanes
12.	Halogenated Aliphatic Compounds
13.	Hydrazine (s)
14.	Hydrides
15.	Inorganic Acids
16.	Inorganic Peroxides
17.	Inorganic Tin Compounds
18.	Iodates
19.	(Iso- and thio-) Cyanates
20.	Manganese-silicate
21.	Mercaptans
22.	Metal Carbonyls
23.	Metal hydrogen sulphates
24.	Nitrides
25.	Nitriles
26.	Organic azo and azoxy Compounds
27.	Organic Peroxides
28.	Organic Oxygen Compounds
29.	Organic Sulphur Compounds
30.	Organo- Tin Compounds
31.	Organo nitro- and nitroso compounds

32.	Oxides and hydroxides except those of hydrogen, carbon, silicon, iron, aluminum, titanium, manganese, magnesium, calcium
33.	Phenanthrene
34.	Phenolic Compounds
35.	Phosphate compounds except phosphates of aluminum, calcium and iron
36.	Salts of pre-acids
37.	Total Sulphur
38.	Tungsten Compounds
39.	Tellurium and tellurium compounds
40.	White and Red Phosphorus
41.	2-Acetylaminofluorene
42.	4-Aminodiphenyl
43.	Benzidine and its salts
44.	Bis (Chloromethyl) ether
45.	Methyl chloromethyl ether
46.	1,2-Dibromo-3-chloropropane
47.	3,3'-Dichlorobenzidine and its salts
48.	4-Dimethylaminoazobenzene
49.	4-Nitrobiphenyl
50.	Beta-Propiolactone

CLASS C : Based on hazardous Characteristics

Apart from the concentration limit given above, the substances or wastes shall be classified as hazardous waste if it exhibits any of the following characteristics due to the presence of any hazardous constituents:

Class C1: Flammable- A waste exhibits the characteristic of flammability or ignitability if a representative sample of the waste has any of the following properties, namely:-

- (i) flammable liquids, or mixture of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc; but not including substances or wastes otherwise classified on account of their dangerous characteristics), which give off a flammable vapour at temperature less than 60°C. This flash point shall be measured as per ASTM D 93-79 closed-cup test method or as determined by an equivalent test method published by Central Pollution Control Board;
- (ii) it is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns vigorously and persistently creating a hazard;
- (iii) it is an ignitable compressed gas;
- (iv) It is an oxidizer and for the purposes of characterisation is a substance such as a chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily to stimulate the combustion of organic matter.

Class C2: Corrosive- A waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties, namely:-

- (i) it is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5;
- (ii) it is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm per year at a test temperature of 55 °C;
- (iii) it is not aqueous and, when mixed with an equivalent weight of water, produces a solution having a pH less than or equal to 2 or greater than or equal to 12.5;
- (iv) it is not a liquid and, when mixed with an equivalent weight of water, produces a liquid that corrodes steel (SAE1020) at a rate greater than 6.35 mm per year at a test temperature of 55 °C.

Note:

For the purpose of determining the corrosivity, the Bureau of Indian Standard 9040 C method for pH determination, NACE TM 01 69 : Laboratory Corrosion Testing of Metals and EPA 1110A method for corrosivity towards steel (SAE1020) to establish the corrosivity characteristics shall be adopted.

Class C3: Reactive or explosive- A waste exhibits the characteristic of reactivity if a representative sample of the waste it has any of the following properties, namely:-

- (i) it is normally unstable and readily undergoes violent change without detonating;
- (ii) it reacts violently with water or forms potentially explosive mixtures with water;
- (iii) when mixed with water, it generates toxic gases, vapours or fumes in a quantity sufficient to present a danger to human health or the environment;
- (iv) it is a cyanide or sulphide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapours or fumes in a quantity sufficient to present a danger to human health or the environment;
- (v) it is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement;
- (vi) it is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure;
- (vii) it is a forbidden explosive.

Class C4: Toxic- A waste exhibits the characteristic of toxicity, if, :-

- (i) the concentration of the waste constituents listed in Class A and B (of this schedule) are equal to or more than the permissible limits prescribed therein;
- (ii) it has an acute oral LD50 less than 2,500 milligrams per kilogram;
- (iii) it has an acute dermal LD50 less than 4,300 milligrams per kilogram;
- (iv) it has an acute inhalation LC50 less than 10,000 parts per million as a gas or vapour;
- (v) it has acute aquatic toxicity with 50% mortality within 96 hours for zebra fish (*Brachidanio rerio*) at a concentration of 500 milligrams per litre in dilution water and test conditions as specified in BIS test method 6582 – 2001.
- (vi) it has been shown through experience or by any standard reference test- method to pose a hazard to human health or environment because of its carcinogenicity, mutagenicity, endocrine disruptivity, acute toxicity, chronic toxicity, bio-accumulative properties or persistence in the environment.

Class C5: Substances or Wastes liable to spontaneous combustion - Substances or Wastes which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up on contact with air, and being then liable to catch fire.

Class C6: Substances or Wastes which, in contact with water emit flammable gases- Substances or Wastes which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

Class C7: Oxidizing - Substances or Wastes which, while in themselves not necessarily combustible, may, generally by yielding oxygen cause, or contribute to, the combustion of other materials.

Class C8: Organic Peroxides - Organic substances or Wastes which contain the bivalent O–O structure, which may undergo exothermic self-accelerating decomposition.

Class C9: Poisons (acute) - Substances or Wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact.

Class C10: Infectious substances - Substances or Wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animals or humans.

Class C11: Liberation of toxic gases in contact with air or water - Substances or Wastes which, by interaction with air or water, are liable to give off toxic gases in dangerous quantities.

Class C12: Eco-toxic- Substances or Wastes which if released, present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation or toxic effects upon biotic systems or both.

Class C13: Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above.

SCHEDULE III

[See rules 3 (1) (17) (iii), 3 (23), 12, 13 and 14]

Part A**List of hazardous wastes applicable for import and export with Prior Informed Consent [Annexure VIII of the Basel Convention*]**

Basel No.	Description of Hazardous Wastes
(1)	(2)
A1	Metal and Metal bearing wastes
A1010	Metal wastes and waste consisting of alloys of any of the following but excluding such wastes specifically listed in Part B and Part D
	- Antimony
	- Cadmium
	- Lead
	- Tellurium
A1020	Waste having as constituents or contaminants, excluding metal wastes in massive form, any or the following:
	- Antimony, antimony compounds
	- Cadmium, cadmium compounds
	- Lead, lead compounds
	- Tellurium, tellurium compounds
A1040	Waste having metal carbonyls as constituents
A1050	Galvanic sludges
A1070	Leaching residues from zinc processing, dust and sludges such as jarosite, hematite, etc.
A1080	Waste zinc residues not included in Part B, containing lead and cadmium in concentrations sufficient to exhibit hazard characteristics indicated in Part C
A1090	Ashes from the incineration of insulated copper wire
A1100	Dusts and residues from gas cleaning systems of copper smelters
A1120	Waste sludges, excluding anode slimes, from electrolyte purification systems in copper electrorefining and electrowinning operations
A1140	Waste cupric chloride and copper cyanide catalysts not in liquid form note the related entry in Schedule VI
A1150	Precious metal ash from incineration of printed circuit boards not included in Part B
A1160	Waste lead acid batteries, whole or crushed
A1170	Unsorted waste batteries excluding mixtures of only Part B batteries. Waste batteries not specified in Part B containing constituents mentioned in Schedule II to an extent to render them hazardous
A2	Wastes containing principally inorganic constituents, which may contain metals and organic materials
A2010	Glass waste from cathode-ray tubes and other activated glasses
A2030	Waste catalysts but excluding such wastes specified in Part B
A3	Wastes containing principally organic constituents, which may contain metals and inorganic materials
A3010	Waste from the production or processing of petroleum coke and bitumen
A3020	Waste mineral oils unfit for their originally intended use
A3050	Wastes from production, formulation and use of resins, latex, plasticizers, glues or adhesives excluding such wastes specified in Part B (B4020)
A3120	Fluff-light fraction from shredding
A3130	Waste organic phosphorus compounds
A4	Wastes which may contain either inorganic or organic constituents
A4010	Wastes from the production, preparation and use of pharmaceutical products but excluding such waste specified in Part B
A4040	Wastes from the manufacture, formulation and use of wood-preserving chemicals (does not include wood treated with wood preserving chemicals)
A4070	Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers, varnish excluding those specified in Part B (B4010)
A4100	Wastes from industrial pollution control devices for cleaning of industrial off-gases but excluding such wastes specified in Part B
A4120	Wastes that contain, consist of or are contaminated with peroxides.
A4130	Wastes packages and containers containing Schedule II constituents in concentration sufficient to exhibit Part C of Schedule III hazard characteristics.

A4140	Waste consisting of or containing off specification or outdated chemicals (unused within the period recommended by the manufacturer) corresponding to constituents mentioned in Schedule II and exhibiting Part C of Schedule III hazard characteristics.
A4160	Spent activated carbon not included in Part B, B2060

*This List is based on Annexure VIII of the Basel Convention on Transboundary Movement of Hazardous Wastes and comprises of wastes characterized as hazardous under Article I, paragraph 1(a) of the Convention. Inclusion of wastes on this list does not preclude the use of hazard.

Characteristics given in Annexure VIII of the Basel Convention (Part C of this Schedule) to demonstrate that the wastes are not hazardous. **Hazardous wastes in Part-A are restricted and cannot be allowed to be imported without permission from the Ministry of Environment, Forest and Climate Change and the Directorate General of Foreign Trade license, if applicable.**

Part B

List of other wastes applicable for import and export and not requiring Prior Informed Consent [Annex IX of the Basel Convention*]

Basel No.	Description of wastes
(1)	(2)
B1	Metal and metal-bearing wastes
B1010	Metal and metal-alloy wastes in metallic, non-dispersible form: <ul style="list-style-type: none"> - Thorium scrap - Rare earths scrap
B1020	Clean, uncontaminated metal scrap, including alloys, in bulk finished form (sheet, plates, beams, rods, etc.), of: <ul style="list-style-type: none"> - Antimony scrap - Beryllium scrap - Cadmium scrap - - - Lead scrap (excluding lead acid batteries) - Selenium scrap - Tellurium scrap
B1030	Refractory metals containing residues
B1031	Molybdenum, tungsten, titanium, tantalum, niobium and rhenium metal and metal alloy wastes in metallic dispersible form (metal powder), excluding such wastes as specified in Part A under entry A1050, Galvanic sludges
B1040	Scrap assemblies from electrical power generation not contaminated with lubricating oil, PCB or PCT to an extent to render them hazardous
B1050	Mixed non-ferrous metal, heavy fraction scrap, containing cadmium, antimony, lead & tellurium mentioned in Schedule II in concentrations sufficient to exhibit Part C characteristics
B1060	Waste selenium and tellurium in metallic elemental form including powder
B1070	Waste of copper and copper alloys in dispersible form, unless they contain any of the constituents mentioned in Schedule II to an extent that they exhibit Part C characteristics
B1080	Zinc ash and residues including zinc alloys residues in dispersible form unless they contain any of the constituents mentioned in Schedule II in concentration such as to exhibit Part C characteristics
B1090	Waste batteries conforming to a standard battery specification, excluding those made with lead, cadmium or mercury
B1100	Metal bearing wastes arising from melting, smelting and refining of metals: <ul style="list-style-type: none"> - Slags from copper processing for further processing or refining containing arsenic, lead or cadmium - Slags from precious metals processing for further refining - Wastes of refractory linings, including crucibles, originating from copper smelting - Tantalum-bearing tin slags with less than 0.5% tin
B1110	Used Electrical and electronic assemblies other than those listed in Part D of Schedule III <ul style="list-style-type: none"> Electronic assemblies consisting only of metals or alloys Waste electrical and electronic assemblies or scrap (including printed circuit boards) not containing components such as accumulators and other batteries included in Part A of Schedule III, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or not

	contaminated with Schedule II constituents such as cadmium, mercury, lead, polychlorinated biphenyl) or from which these have been removed, to an extent that they do not possess any of the characteristics contained in Part C of Schedule III (note the related entry in Schedule VI, A1180)
B1120	Spent catalysts excluding liquids used as catalysts, containing any of: Transition metals, excluding waste catalysts (spent catalysts, liquid used catalysts or other catalysts) in Part A and Schedule VI: <ul style="list-style-type: none"> - Scandium - Titanium - Vanadium - Chromium - Manganese - Iron - Cobalt - Nickel - Copper - Zinc - Yttrium - Zirconium - Niobium - Molybdenum - Hafnium - Tantalum - Tungsten - Rhenium Lanthanides (rare earth metals): <ul style="list-style-type: none"> - Lanthanum - Cerium
	<ul style="list-style-type: none"> - Praseodymium - Neodymium - Samarium - Europium - Gadolinium - Terbium - Dysprosium - Holmium - Erbium - Thulium - Ytterbium - Lutetium
B1130	Cleaned spent precious metal bearing catalysts
B1140	Precious metal bearing residues in solid form which contain traces of inorganic cyanides
B1150	Precious metals and alloy wastes (gold, silver, the platinum group but not mercury) in a dispersible form, non-liquid form with appropriate packaging and labelling
B1160	Precious metal ash from the incineration of printed circuit boards (note the related entry in Part A A1150)
B1170	Precious metal ash from the incineration of photographic film
B1180	Waste photographic film containing silver halides and metallic silver
B1190	Waste photographic paper containing silver halides and metallic silver
B1200	Granulated slag arising from the manufacture of iron and steel
B1210	Slag arising from the manufacture of iron and steel including slags as a source of Titanium dioxide and Vanadium
B1220	Slag from zinc production, chemically stabilised, having a high iron content (above 20%) and processed according to industrial specifications mainly for construction
B1230	Mill scale arising from the manufacture of iron and steel
B1240	Copper Oxide mill-scale
B2	Wastes containing principally inorganic constituents, which may contain metals and organic materials
B2010	Wastes from mining operations in non-dispersible form: <ul style="list-style-type: none"> - Natural graphite waste - Slate wastes - Mica wastes - Leucite, nepheline and nepheline syenite waste - Feldspar waste - Fluorspar waste - Silica wastes in solid form excluding those used in foundry operations
B2020	Glass wastes in non-dispersible form: <ul style="list-style-type: none"> - Cullet and other waste and scrap of glass except for glass from cathode-ray tubes and other activated glasses
B2030	Ceramic wastes in non-dispersible form: <ul style="list-style-type: none"> - Cermet wastes and scrap (metal ceramic composites) - Ceramic based fibres
B2040	Other wastes containing principally inorganic constituents: <ul style="list-style-type: none"> - Partially refined calcium sulphate produced from flue gas desulphurization (FGD) - Waste gypsum wallboard or plasterboard arising from the demolition of buildings - Slag from copper production, chemically stabilized, having a high iron content (above

	<p>20%) and processed according to industrial specifications mainly for construction and abrasive applications</p> <ul style="list-style-type: none"> - Sulphur in solid form - Limestone from production of calcium cyanamide (pH<9) - Sodium, potassium, calcium chlorides - Carborundum (silicon carbide) - Broken concrete - Lithium-tantalum and lithium-niobium containing glass scraps
B2060	Spent activated carbon not containing any of Schedule II constituents to the extent they exhibit Part C characteristics, for example, carbon resulting from the treatment of potable water and processes of the food industry and vitamin production (note the related entry in Part A A4160)
B2070	Calcium fluoride sludge
B2080	Waste gypsum arising from chemical industry processes not included in Schedule VI (note the related entry in A2040)
B2090	Waste anode butts from steel or aluminium production made of petroleum coke or bitumen and cleaned to normal industry specifications (excluding anode butts from chlor alkali electrolyses and from metallurgical industry)
B2100	Waste hydrates of aluminium and waste alumina and residues from alumina production, excluding such materials used for gas cleaning, flocculation or filtration processes
B2130	Bituminous material (asphalt waste) from road construction and maintenance, not containing tar (note the related entry in Schedule VI, A3200)
B3	Wastes containing principally organic constituents, which may contain metals and inorganic materials
B3027	Self-adhesive label laminate waste containing raw materials used in label material production
B3030	<p>Textile wastes</p> <p>The following materials, provided they are not mixed with other wastes and are prepared to a specification:</p> <ul style="list-style-type: none"> - Silk waste (including cocoons unsuitable for reeling, yarn waste and garnetted stock) <ul style="list-style-type: none"> • not carded or combed • other - Waste of wool or of fine or coarse animal hair, including yarn waste but excluding garnetted stock <ul style="list-style-type: none"> • noils of wool or of fine animal hair • other waste of wool or of fine animal hair • waste of coarse animal hair - Cotton waste (including yarn waste and garnetted stock) <ul style="list-style-type: none"> • yarn waste (including thread waste) • garnetted stock • other - Flax tow and waste - Tow and waste (including yarn waste and garnetted stock) of true hemp (<i>Cannabis sativa</i> L.) - Tow and waste (including yarn waste and garnetted stock) of jute and other textile bast fibres (excluding flax, true hemp and ramie) - Tow and waste (including yarn waste and garnetted stock) of sisal and other textile fibres of the genus <i>Agave</i> - Tow, noils and waste (including yarn waste and garnetted stock) of coconut - Tow, noils and waste (including yarn waste and garnetted stock) of abaca (<i>Manila hemp</i> or <i>Musa textilis</i> Nee) - Tow, noils and waste (including yarn waste and garnetted stock) of ramie and other vegetable textile fibres, not elsewhere specified or included - Waste (including noils, yarn waste and garnetted stock) of man-made fibres <ul style="list-style-type: none"> • of synthetic fibres • of artificial fibres - Worn clothing and other worn textile articles - Used rags, scrap twine, cordage, rope and cables and worn out articles of twine, cordage, rope or cables of textile materials <ul style="list-style-type: none"> • sorted • other
B3035	Waste textile floor coverings, carpets
B3040	Rubber Wastes

	The following materials, provided they are not mixed with other wastes: <ul style="list-style-type: none"> - Waste and scrap of hard rubber (e.g., ebonite) - Other rubber wastes (excluding such wastes specified elsewhere)
B3050	Untreated cork and wood waste: <ul style="list-style-type: none"> - Wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms - Cork waste: crushed, granulated or ground cork
B3060	Wastes arising from agro-food industries provided it is not infectious: <ul style="list-style-type: none"> - Wine lees - Dried and sterilized vegetable waste, residues and by-products, whether or not in the form of pellets, of a kind used in animal feeding, not elsewhere specified or included - Degras: residues resulting from the treatment of fatty substances or animal or vegetable waxes - Waste of bones and horn-cores, unworked, defatted, simply prepared (but not cut to shape), treated with acid or degelatinised - Fish waste - Cocoa shells, husks, skins and other cocoa waste - Other wastes from the agro-food industry excluding by-products which meet national and international requirements and standards for human or animal consumption
B3070	The following wastes: <ul style="list-style-type: none"> - Waste of human hair - Waste straw - Deactivated fungus mycelium from penicillin production to be used as animal feed
B3080	Waste parings and scrap of rubber
B3090	Paring and other wastes of leather or of composition leather not suitable for the manufacture of leather articles, excluding leather sludges, not containing hexavalent chromium compounds and biocides (note the related entry in Schedule VI, A3100)
B3100	Leather dust, ash, sludges or flours not containing hexavalent chromium compounds or biocides (note the related entry in Schedule VI, A3090)
B3110	Fellmongery wastes not containing hexavalent chromium compounds or biocides or infectious substances (note the related entry in Schedule VI, A3110)
B3120	Wastes consisting of food dyes
B3130	Waste polymer ethers and waste non-hazardous monomer ethers incapable of forming peroxides
B3140	Waste pneumatic and other tyres, excluding those which do not lead to resource recovery, recycling, reclamation but not for direct reuse
B4	Wastes which may contain either inorganic or organic constituents
B4010	Wastes consisting mainly of water-based or latex paints, inks and hardened varnishes not containing organic solvents, heavy metals or biocides to an extent to render them hazardous (note the related entry in Part A, A4070)
B4020	Wastes from production, formulation and use of resins, latex, plasticizers, glues or adhesives, not listed in Part A, free of solvents and other contaminants to an extent that they do not exhibit Part C characteristics (note the related entry in Part A, A3050)
B4030	Used single-use cameras, with batteries not included in Part A

* This list is based on Annexure IX of the Basel Convention on Transboundary Movement of Hazardous Wastes and comprises of wastes not characterized as hazardous under Article-I of the Basel Convention. **The wastes in Part- B are restricted and cannot be allowed to be imported without permission from the Ministry of Environment, Forest and Climate Change and the Directorate General of Foreign Trade license, if applicable.**

Note:

(1) **Copper dross containing copper greater than 65% and lead and Cadmium equal to or less than 1.25% and 0.1% respectively; spent cleaned metal catalyst containing copper; and copper reverts, cake and residues containing lead and cadmium equal to or less than 1.25% and 0.1% respectively are allowed for import without Director General of Foreign Trade license to units (actual users) authorised by State Pollution Control Board and with the Ministry of Environment, Forest and Climate Change's permission. Copper reverts, cake and residues containing lead and cadmium greater than 1.25% and 0.1% respectively are under restricted category for which import is permitted only against Director General of Foreign Trade license for the purpose of processing or reuse by units permitted with the Ministry of Environment, Forest and Climate Change (actual users).**

- (2) Zinc ash or skimmings in dispersible form containing zinc more than 65% and lead and cadmium equal to or less than 1.25% and 0.1% respectively and spent cleaned metal catalyst containing zinc are allowed for import without Director General of Foreign Trade license to units authorised by State Pollution control Board, Ministry of Environment, Forest and Climate Change's permission (actual users) upto an annual quantity limit indicated in registration letter. Zinc ash and skimmings containing less than 65% zinc and lead and cadmium equal to or more than 1.25% and 0.1% respectively and hard zinc spelter and brass dross containing lead greater than 1.25% are under restricted category for which import is permitted against Director General of Foreign Trade license and only for purpose of processing or reuse by units registered with the Ministry of Environment Forest and Climate Change (actual users).

Part C

List of Hazardous Characteristics

<u>Code</u>	<u>Characteristic</u>
H 1	Explosive An explosive substance or waste is a solid or liquid substance or waste (or mixture of substances or wastes) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surrounding.
H 3	Flammable liquids The word "flammable" has the same meaning as "inflammable". Flammable liquids are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc. but not including substances or wastes otherwise classified on account of their dangerous characteristics) which give off a flammable vapour at temperatures of not more than 60.5°C, closed-cup test, or not more than 65.6°C, open-cup test. (Since the results of open-cups tests and of closed-cup tests are not strictly comparable and even individual results by the same test are often variable, regulations varying from the above figures to make allowance for such differences would be within the spirit of this definition).
H 4.1	Flammable solids Solids, or waste solids, other than those classed as explosives, which under conditions encountered in transport are readily combustible, or may cause or contribute to fire through friction.
H 4.2	Substances or wastes liable to spontaneous combustion Substances or wastes which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up on contact with air, and being then liable to catch fire.
H 4.3	Substances or wastes which, in contact with water emit flammable gases Substances or wastes which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.
H 5.1	Oxidizing Substances or wastes which, while in themselves not necessarily combustible, may, generally by yielding oxygen cause, or contribute to, the combustion of other materials.
H 5.2	Organic Peroxides Organic substances or wastes which contain the bivalent-o-o-structure are thermally unstable substances which may undergo exothermic self-accelerating decomposition.
H 6.1	Poisons (acute) Substances or wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact.
H 6.2	Infectious substances Substances or wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animals or humans.
H 8	Corrosives Substances or wastes which, by chemical action, will cause severe damage when in contact with living tissue, or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport; they may also cause other hazards.
H 10	Liberation of toxic gases in contact with air or water Substances or wastes which, by interaction with air or water, are liable to give off toxic gases in dangerous quantities.
H 11	Toxic (delayed or chronic) Substances or wastes which, if they are inhaled or ingested or if they penetrate the skin, may involve delayed or chronic effects, including carcinogenicity).
H 12	Eco-toxic Substances or wastes which if released, present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation or toxic effects upon biotic systems or both.

H 13 **Capable**, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above.

Part D

List of other wastes applicable for import and export without permission from Ministry of Environment, Forest and Climate Change [Annex IX of the Basel Convention*]

Basel No. (1)	Description of wastes (2)
B1	Metal and metal-bearing wastes
B1010	Metal and metal-alloy wastes in metallic, non-dispersible form : <ul style="list-style-type: none"> - Precious metals (gold, silver, platinum but not mercury) * * - Iron and steel scrap * * - Nickel scrap * * - Aluminium scrap* * - Zinc scrap * * - Tin scrap * * - Tungsten scrap * * - Molybdenum scrap * * - Tantalum scrap * * - Cobalt scrap * * - Bismuth scrap * * - Titanium scrap * * - Zirconium scrap * * - Manganese scrap * * - Germanium scrap * * - Vanadium scrap * * - Hafnium scrap * * - Indium scrap * * - Niobium scrap * * - Rhenium scrap * * - Gallium scrap * * - Magnesium scrap * * - Copper scrap * * - Chromium scrap * *
B1050	Mixed non-ferrous metal, heavy fraction scrap, containing metals other than specified in Part B1050 and not containing constituents mentioned in Schedule II in concentrations sufficient to exhibit Part C characteristics* *
B1100	Metal bearing wastes arising from melting, smelting and refining of metals: <ul style="list-style-type: none"> - Hard Zinc spelter * * - Zinc-containing drosses * *: <ul style="list-style-type: none"> ~ Galvanizing slab zinc top dross (>90% Zn) ~ Galvanizing slab zinc bottom dross (>92% Zn) ~ Zinc die casting dross (>85% Zn) ~ Hot dip galvanizers slab zinc dross (batch) (>92% Zn) ~ Zinc skimmings - Aluminium skimmings (or skims) excluding salt slag
B1110	Electrical and electronic assemblies (including printed circuit boards, electronic components and wires) destined for direct reuse and not for recycling or final disposal <ul style="list-style-type: none"> - Used electrical and electronic assemblies imported for repair and to be re-exported back after repair within one year of import * * * - Used electrical and electronic assemblies imported for rental purpose and re-exported back within one year of import * * * - Used electrical and electronic assemblies exported for repair and to be re-import after repair - Used electrical and electronic assemblies imported for testing, research and development, project work purposes and to be re-exported back within a period of three years from the date of import * * *

	<ul style="list-style-type: none"> - Spares imported for warranty replacements provided equal number of defective or non-functional parts are exported back within one year of the import * * * - Used electrical and electronic assemblies imported by Ministry of Defence, Department of Space and Department of Atomic Energy * * * - Used electrical and electronic assemblies (not in bulk; quantity less than or equal to three) imported by the individuals for their personal uses - Used Laptop, Personal Computers, Mobile, Tablet up to 01 number each imported by organisations in a year - Used electrical and electronic assemblies owned by individuals and imported on transfer of residence - Used multifunction print and copying machines (MFDs)* * * * - Used electrical and electronic assemblies imported by airlines for aircraft maintenance and remaining either on board or under the custodianship of the respective airlines warehouses located on the airside of the custom bonded areas.
B3	Wastes containing principally organic constituents, which may contain metals and inorganic materials
B3020	<p>Paper, paperboard and paper product wastes * *</p> <p>The following materials, provided they are not mixed with hazardous wastes: Waste and scrap of paper or paperboard of:</p> <ul style="list-style-type: none"> - unbleached paper or paperboard or of corrugated paper or paperboard - other paper or paperboard, made mainly of bleached chemical pulp, not coloured in the mass - paper or paperboard made mainly of mechanical pulp (for example newspapers, journals and similar printed matter) - other, including but not limited to <ol style="list-style-type: none"> (1) laminated paperboard (2) unsorted scrap
B3140	Aircraft Tyres exported to Original Equipment Manufacturers for re-treading and re-imported after re-treading by airlines for aircraft maintenance and remaining either on board or under the custodianship of the respective airlines warehouses located on the airside of the custom bonded areas

Note:

* This list is based on Annexure IX of the Basel Convention on Transboundary Movement of Hazardous Wastes and comprises of wastes not characterized as hazardous under Article-I of the Basel Convention.

* * Import permitted in the country to the actual user or to the trader on behalf of the actual users authorised by SPCB on one time basis and subject to verification of documents specified in Schedule VIII of these rules by the Custom Authority.

* * * Import permitted in the country only to the actual users from Original Equipment Manufacturers (OEM) and subject to verification of documents specified in Schedule VIII of these rules by the Custom Authority.

* * * * Import permitted in the country to the actual users or trader on behalf of the actual user in accordance with the documents required and verified by the Custom Authority as specified under Schedule VIII of these rules. The policy for free trade for multifunction print and copying machine to be reviewed once the MFDs are domestically manufactured.

All other wastes listed in Part D of Schedule III having no “Stars” are permitted without any documents from MoEF&CC subject to compliance of the conditions of the Customs Authority, if any.

SCHEDULE IV
[See rules 6 (1) (ii) and 6 (2)]

List of commonly recyclable hazardous wastes

S.No.	Wastes
(1)	(2)
1.	Brass Dross
2.	Copper Dross
3.	Copper Oxide mill scale
4.	Copper reverts, cake and residue
5.	Waste Copper and copper alloys in dispersible form
6.	Slags from copper processing for further processing or refining
7.	Insulated Copper Wire Scrap or copper with PVC sheathing including ISRI-code material namely "Druid"
8.	Jelly filled Copper cables
9.	Spent cleared metal catalyst containing copper
10.	Spent catalyst containing nickel, cadmium, Zinc, copper, arsenic, vanadium and cobalt
11.	Zinc Dross-Hot dip Galvanizers SLAB
12.	Zinc Dross-Bottom Dross
13.	Zinc ash/Skimmings arising from galvanizing and die casting operations
14.	Zinc ash/Skimming/other zinc bearing wastes arising from smelting and refining
15.	Zinc ash and residues including zinc alloy residues in dispersible form
16.	Spent cleared metal catalyst containing zinc
17.	Used Lead acid battery including grid plates and other lead scrap/ashes/residues not covered under Batteries (Management and Handling) Rules, 2001. [Battery scrap, namely: Lead battery plates covered by ISRI, Code word "Rails" Battery lugs covered by ISRI, Code word "Rakes". Scrap drained/dry while intact, lead batteries covered by ISRI, Code word "rains".
18.	Components of waste electrical and electronic assemblies comprising accumulators and other batteries included in Part A of Schedule III, mercury-switches, activated glass cullets from cathode-ray tubes and other activated glass and PCB-capacitors, or any other component contaminated with Schedule II constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they exhibit hazard characteristics indicated in part C of Schedule III.
19.	Paint and ink Sludge/residues
20.	Used oil and waste oil

SCHEDULE V
[See rules 3 (36) and 3 (39)]

PART A
Specifications of Used Oil Suitable for recycling

S.No.	Parameter	Maximum permissible Limits
(1)	(2)	(3)
1.	Polychlorinated biphenyls (PCBs)	< 2ppm *
2.	Lead	100 ppm
3.	Arsenic	5 ppm
4.	Cadmium+Chromium+Nickel	500 ppm
5.	Polyaromatic hydrocarbons (PAH)	6%

Part B
Specification of fuel derived from waste oil

S.No.	Parameter	Maximum permissible limits
(1)	(2)	(3)
1.	Sediment	0.25%
2.	Lead	100 ppm
3.	Arsenic	5 ppm
4.	Cadmium+Chromium+Nickel	500 ppm

5.	Polyaromatic hydrocarbons (PAH)	6%
6.	Total halogens	4000 ppm
7.	Polychlorinated biphenyls (PCBs)	<2 ppm *
8.	Sulfur	4.5%
9.	Water Content	1%

*The detection limit is 2 ppm by gas Liquid Chromatography (GLC) using Electron Capture detector (ECD)

SCHEDULE VI

[See rules 12 (6), 12 (7) and 14(1)]

Hazardous and Other wastes prohibited for import

Basel No. (1)	Description of hazardous and other wastes (2)
A1	Metal and Metal bearing wastes
A1010	Metal wastes and waste consisting of alloys of any of the following but excluding such wastes specifically listed in Part B and Part D of Schedule III - Arsenic - Beryllium - Mercury - Selenium - Thallium
A1020	Wastes having as constituents or contaminants, excluding metal wastes in massive form, any of the following: - Beryllium; beryllium compounds - Selenium; selenium compounds
A1030	Wastes having as constituents or contaminants any of the following: - Arsenic; arsenic compounds - Mercury; mercury compounds - Thallium; thallium compounds
A1040	Waste having hexavalent chromium compounds as constituents
A1140	Waste cupric chloride and copper cyanide catalysts in liquid form (note the related entry in Part A of Schedule III)
A1060	Wastes liquors from the pickling of metals
A1110	Spent electrolytic solutions from copper electrorefining and electrowinning operations
A1130	Spent etching solutions containing dissolved copper
A1180	Waste electrical and electronic assemblies or scrap (does not include scrap assemblies from electric power generation) containing components such as accumulators and other batteries included in Part A of Schedule III, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or contaminated with Schedule II constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they exhibit hazard characteristics indicated in Part C of Schedule III (note the related entry in Part B B1110)
A1190	Waste metal cables coated or insulated with plastics containing or contaminated with coal tar, PCB, lead, cadmium, other organohalogen compounds or other constituents as mentioned in Schedule II to the extent that they exhibit hazard characteristics indicated in Part C of Schedule III
A2	Wastes containing principally inorganic constituents, which may contain metals and organic materials
A2020	Waste inorganic fluorine compounds in the form of liquids or sludges but excluding such wastes specified in Part B
A2040	Waste gypsum arising from chemical industry processes, if it contains any of the constituents mentioned in Schedule 2 to the extent that they exhibit hazard characteristics indicated in Part C of Schedule III (note the related entry in Part B B2080)
A2050	Waste asbestos (dusts and fibres)
A2060	Coal-fired power plant fly-ash containing Schedule II constituents in concentrations sufficient to exhibit Part C characteristics

A3	Wastes containing principally organic constituents, which may contain metals and inorganic materials
A3030	Wastes that contain, consist of or are contaminated with leaded anti-knock compounds sludges.
A3040	Waste thermal (heat transfer) fluids
A3060	Waste nitrocellulose
A3070	Waste phenols, phenol compounds including chlorophenol in the form of liquids or sludges
A3080	Waste ethers not including those specified in Part B
A3090	Waste leather dust, ash, sludges and flours when containing hexavalent chromium compounds or biocides (note the related entry in Part B B3100)
A3100	Waste paring and other waste of leather or of composition leather not suitable for the manufacture of leather articles, containing hexavalent chromium compound and biocides (note the related entry in Part B B3090)
A3110	Fellmongery wastes containing hexavalent chromium compounds or biocides or infectious substances (note the related entry in Part B B3110)
A3140	Waste non-halogenated organic solvents but excluding such wastes specified in Part B
A3150	Waste halogenated organic solvents
A3160	Waste halogenated or unhalogenated non-aqueous distillation residues arising from organic solvent recovery operations
A3170	Waste arising from the production of aliphatic halogenated hydrocarbons (such as chloromethane, dichloro-ethane, vinyl chloride, vinylidene chloride, allyl chloride and epichlorhydrin)
A3180	Wastes, substances and articles containing, consisting of or contaminated with polychlorinated biphenyl (PCB), polychlorinated terphenyl (PCT), polychlorinated naphthalene (PCN) or polybrominated biphenyl (PBB) or any other polybrominated analogues of these compounds
A3190	Waste tarry residues (excluding asphalt cements) arising from refining, distillation and any pyrolytic treatment of organic materials
A3200	Bituminous material (asphalt waste) from road construction and maintenance, containing tar (note the related entry in Part B, B2130)
A4	Wastes which may contain either inorganic or organic constituents
A4020	Clinical and related wastes; that is wastes arising from medical, nursing, dental, veterinary, or similar practices, and wastes generated in hospitals or other facilities during the investigation or treatment of patients, or research projects.
A4030	Waste from the production, formulation and use of biocide and phyto-pharmaceuticals, including waste pesticides and herbicides which are off-specification, out-dated (unused within the period recommended by the manufacturer), or unfit for their originally intended use,
A4050	Wastes that contain, consist of, or are contaminated with any of the following: <ul style="list-style-type: none"> - Inorganic cyanides, excepting precious-metal-bearing residues in solid form containing traces of inorganic cyanides. - Organic cyanides
A4060	Waste oils/water, hydrocarbons/water mixtures, emulsions
A4080	Wastes of an explosive nature (but excluding such wastes specified in Part B)
A4090	Waste acidic or basic solutions, other than those specified at B2120 of this Schedule
A4110	Wastes that contain, consist of or are contaminated with any of the following: <ul style="list-style-type: none"> - Any congener of polychlorinated dibenzo-furan. - Any congener of polychlorinated dibenzo-P-dioxin.
A4150	Waste chemical substances arising from research and development or teaching activities which are not identified and /or are new and whose effects on human health and /or the environment are not known
B1	Metal and Metal bearing wastes
B 1110	Used critical care medical equipment for re-use
B1115	Waste metal cables coated or insulated with plastics, not included in A1190 of this schedule, excluding those destined for operations which do not lead to resource recovery, recycling, reclamation, direct re-use or alternative uses or any other disposal operations involving, at any stage, uncontrolled thermal processes, such as open-burning.
B1250	Waste end-of-life motor vehicles, containing neither liquids nor other hazardous components
B2	Wastes containing principally inorganic constituents, which may contain metals and organic materials
B2050	Coal-fired power plant fly-ash, note the related entry at A2060 of this Schedule
B2110	Bauxite residue (red mud) (pH moderated to less than 11.5)
B2120	Waste acidic or basic solutions with a pH greater than 2 and less than 11.5, which are not corrosive or otherwise hazardous (note the related entry at A4090 of this schedule)
B3	Wastes containing principally organic constituents, which may contain metals and inorganic

materials	
B3010	<p>Solid plastic waste</p> <p>The following plastic or mixed plastic waste, prepared to a specification:</p> <ul style="list-style-type: none"> - Scrap plastic of non-halogenated polymers and co-polymers, including but not limited to the following: Ethylene, Styrene, Polypropylene, polyethylene terephthalate, Acrylonitrile, Butadiene, Polyacetals, Polyamides, polybutylene tere-phthalate, Polycarbonates, Polyethers, polyphenylene sulphides, acrylic polymers, alkanes C10-C13 (plasticiser), polyurethane (not containing CFC's), Polysiloxanes, polymethyl methacrylate, polyvinyl alcohol, polyvinyl butyral, Polyvinyl acetate - Cured waste resins or condensation products including the following: urea formaldehyde resins, phenol formaldehyde resins, melamine formaldehyde resins, epoxy resins, alkyd resins, polyamides - The following fluorinated polymer wastes (excluding post-consumer wastes): perfluoroethylene/ propylene, perfluoro alkoxy alkane, tetrafluoroethylene/per fluoro vinyl ether (PFA), tetrafluoroethylene/per fluoro methylvinyl ether (MFA), polyvinylfluoride , polyvinylidene fluoride
B3026	<p>The following waste from the pre-treatment of composite packaging for liquids, not containing constituents mentioned in Schedule II in concentrations sufficient to exhibit Part C characteristics:</p> <ul style="list-style-type: none"> - Non-separable plastic fraction - Non-separable plastic-aluminium fraction -
B3065	Waste edible fats and oils of animal or vegetable origin (e.g. frying oil)
B3140	Waste pneumatic tyres for direct reuse
Y 46	Wastes collected from household/municipal waste
Y 47	Residues arising from the incineration of household wastes

SCHEDULE VII

[See rules 13 (6) and 21]

List of authorities and corresponding duties

S. No.	Authority	Corresponding Duties
(1)	(2)	(3)
1.	Ministry of Environment, Forests and Climate Change under the Environment (Protection) Act, 1986	<ul style="list-style-type: none"> (i) Identification of hazardous and other wastes (ii) Permission to exporters of hazardous and other wastes (iii) Permission to importer of hazardous and other wastes (iv) Permission for transit of hazardous and other wastes through India. (v) Promote environmentally sound management of hazardous and other waste. (vi) Sponsoring of training and awareness programme on Hazardous and Other Waste Management related activities.
2.	Central Pollution Control Board constituted under the Water (Prevention and Control of Pollution) Act, 1974	<ul style="list-style-type: none"> (i) Co-ordination of activities of State Pollution Control Boards (ii) Conduct training courses for authorities dealing with management of hazardous and other wastes (iii) Recommend standards and specifications for treatment and disposal of wastes and leachates, recommend procedures for characterisation of hazardous wastes.

		<ul style="list-style-type: none"> (iv) Inspection of facilities handling hazardous waste as and when necessary. (v) Sector specific documentation to identify waste for inclusion in these rules. (vi) Prepare and update guidelines to prevent or minimise the generation and handling of hazardous and other wastes. (vii) Prepare and update guidelines/ Standard Operating Procedures (SoPs) for recycling, utilization, pre-processing, co-processing of hazardous and other wastes. (viii) To prepare annual review report on management of hazardous waste. (ix) Any other function assigned by the Ministry of Environment, Forest and Climate Change, from time to time.
3.	State Government/Union Territory Government/Administration	<ul style="list-style-type: none"> (i) Identification of site (s) for common Hazardous and Other Waste Treatment Storage and Disposal Facility (TSDF) (ii) Asses Environment Impact Assessment (EIA) reports and convey the decision of approval of site or otherwise Acquire the site or inform operator of facility or occupier or association of occupiers to acquire the site (iii) Notification of sites. (iv) Publish periodically an inventory of all potential or existing disposal sites in the State or Union Territory
4.	State Pollution Control Boards or Pollution Control Committees constituted under the Water (Prevention and Control of Pollution) Act, 1974	<ul style="list-style-type: none"> (i) Inventorisation of hazardous and other wastes (ii) Grant and renewal of authorisation (iii) Monitoring of compliance of various provisions and conditions of permission including conditions of permission for issued by Ministry of Environment, Forest and Climate Change for exports and imports (iv) Examining the applications for imports submitted by the importers and forwarding the same to Ministry of Environment, Forest and Climate Change (v) Implementation of programmes to prevent or reduce or minimise the generation of hazardous and other wastes. (vi) Action against violations of these rules. (vii) Any other function under these Rules assigned by Ministry of Environment, Forest and Climate Change from time to time.
5.	Directorate General of Foreign Trade constituted under the Foreign Trade (Development and Regulation) Act, 1992	<ul style="list-style-type: none"> (i) Grant of licence for import of hazardous and other wastes (ii) Refusal of licence for hazardous and other wastes prohibited for imports and export
6.	Port authority under Indian Ports Act, 1908 (15 of 1908) and Customs Authority under the Customs Act, 1962 (52 of 1962)	<ul style="list-style-type: none"> (i) Verify the documents (ii) Inform the Ministry of Environment, Forests and Climate Change of any illegal traffic (iii) Analyse wastes permitted for imports and exports, wherever required. (iv) Train officials on the provisions of these rules and in the analysis of hazardous and other wastes (v) Take action against exporter or importer for violations under the Indian Ports Act, 1908 or Customs Act, 1962

SCHEDULE VIII

[See rules 13(2) and 13 (4)]

List of documents for verification by Customs for import of other wastes specified in Part D of Schedule III

S. No.	Basel No.	Description of other wastes	List of Documents
(1)	(2)	(3)	(4)
1	B1010	Metal and metal-alloy wastes in metallic, non-dispersible form: - Precious metals (gold, silver, platinum) - Iron and steel scrap - Nickel scrap - Aluminium scrap - Zinc scrap - Tin scrap - Tungsten scrap - Molybdenum scrap - Tantalum scrap - Cobalt scrap - Bismuth scrap - Titanium scrap - Zirconium scrap - Manganese scrap - Germanium scrap - Vanadium scrap - Hafnium scrap - Indium scrap - Niobium scrap - Rhenium scrap - Gallium scrap - Magnesium scrap - Copper scrap - Chromium scrap	(a) Duly filled up Form 6 - Movement document; (b) The import license from Directorate General of Foreign Trade, wherever applicable; (c) Pre-shipment inspection certificate issued by the inspection agency of the exporting country or the inspection and certification agency approved by Directorate General of Foreign Trade; (d) The valid consents to operate under the Air and Water Acts and the authorisation under these rules, for actual users. For traders, only valid one time authorisation from concerned SPCB is required; (e) The chemical analysis report of the waste being imported; (f) an acknowledged copy of the annual return filed with concerned State Pollution Control Board for import in the last financial year.
2	B1050	Mixed non-ferrous metal, heavy fraction scrap, containing metals other than specified in Part B1050 and not containing constituents mentioned in Schedule II in concentrations sufficient to exhibit Part C characteristics* *	(a) Duly filled up Form 6 - Movement document; (b) The import license from Directorate General of Foreign Trade, wherever applicable; (c) Pre-shipment inspection certificate issued by the inspection agency of the exporting country or the inspection and certification agency approved by Directorate General of Foreign Trade; (d) The valid consents to operate under the Air and Water Acts and the authorisation under these rules, for actual users. For traders, only valid authorisation from concerned SPCB is required; (e) The chemical analysis report of the waste being imported; (f) An acknowledged copy of the annual return filed with concerned SPCB for import in the last financial year.
3	B1100	Metal bearing wastes arising from melting, smelting and refining of metals: - Hard Zinc spelter - Zinc-containing drosses: ~ Galvanizing slab zinc top dross (>90% Zn) ~ Galvanizing slab zinc bottom dross (>92% Zn) ~ Zinc die casting dross (>85% Zn) ~ Hot dip galvanizers slab zinc dross (batch) (>92% Zn)	(a) Duly filled up Form 6 - Movement document; (b) The import license from Directorate General of Foreign Trade, wherever applicable; (c) Pre-shipment inspection certificate issued by the inspection agency of the exporting country or the inspection and certification agency approved by Directorate General of Foreign Trade; (d) The valid consents to operate under the Air and Water Acts and the authorisation under these rules, for actual users. For traders, only valid authorisation from concerned SPCB is

		<p>~ Zinc skimmings</p> <p>- Aluminium skimmings (or skims) excluding salt slag</p>	<p>required;</p> <p>(e) The chemical analysis report of the waste being imported;</p> <p>(f) An acknowledged copy of the annual return filed with concerned SPCB for import in the last financial year.</p>
4	B1110	Electrical and electronic assemblies (including printed circuit boards, electronic components and wires) destined for direct reuse and not for recycling or final disposal	
(a)		Used electrical and electronic assemblies imported for repair and to be re-exported after repair within one year of import	<p>(a) Duly filled up Form 6 - Movement document;</p> <p>(b) Undertaking for re-export;</p> <p>(c) Details of previous import, if there has been any and confirmation regarding their re-export;</p> <p>(d) An acknowledged copy of the annual return filed with concerned SPCB for import in the last financial year</p> <p>(e) Certificate from exporting company for accepting the repaired and unrepairable electrical and electronic assemblies and the spares or part or component or consumables being re-exported.</p>
(b)		Used electrical and electronic assemblies imported for rental purpose and re-exported back within one year of import	<p>(a) Duly filled up Form 6 - Movement document;</p> <p>(b) Undertaking for re-export;</p> <p>(c) Details of previous import, if there has been any and confirmation regarding their re-export;</p> <p>(d) An acknowledged copy of the annual return filed with concerned SPCB for import in the last financial year</p>
(c)		Used electrical and electronic assemblies exported for repair and to be re-imported after repair	<p>(a) Duly filled up Form 6 - Movement document;</p> <p>(b) Proof of export of the defective electrical and electronic assemblies i.e. shipping or airway document authenticated by Customs</p>
(d)		Used electrical and electronic assemblies imported for testing, research and development, project work purposes and to be re-exported back within a period of three years from the date of import	<p>(a) Duly filled up Form 6 - Movement document;</p> <p>(b) Undertaking for re-export;</p> <p>(c) Details of previous import, if there has been any and confirmation regarding their re-export;</p> <p>(d) Chartered Engineer Certificate or certificate from accredited agency of exporting country indicating the functionality, manufacturing date, residual life and serial number;</p> <p>(e) an acknowledged copy of the annual return filed with concerned SPCB for import in the last financial year;</p> <p>(f) Certificate from exporting company for accepting the second hand functional or non-functional electrical and electronic assemblies and/or the spares or part or component or consumables being re-exported at the end of three years.</p>
(e)		Spares imported for warranty replacements provided equal number of defective / non-functional parts are exported back within one year of the import.	<p>(a) Duly filled up Form 6 - Movement document;</p> <p>(b) if refurbished components being imported as replacement to defective component then undertaking for export of equivalent numbers of defective components;</p> <p>(c) Details of previous import, if there has been any and confirmation regarding their re-export;</p> <p>(d) Certificate from exporting company for accepting the re-export of defective or non-functional spares or part or component or consumables being re-exported;</p> <p>(e) Documents on the declared policy regarding the use of second hand or refurbished spare</p>

			parts for repair of electrical and electronic assemblies during warranty period.
(f)		Used electrical and electronic assemblies imported by Ministry of Defence, Department of Space and Department of Atomic Energy.	---
(g)		Used electrical and electronic assemblies (not in bulk; quantity less than or equal to three) imported by the individuals for their personal uses.	---
(h)		Used Laptop, Personal Computers, Mobile, Tablet up to 03 number each imported by organisations in a year.	---
(i)		Used electrical and electronic assemblies owned by individuals and imported on transfer of residence.	As per existing guidelines of Custom Authority
(j)		Used electrical and electronic assemblies, spares, imported by airlines for aircraft maintenance and remaining either on board or under the custodianship of the respective airlines warehouses located on the airside of the custom bonded areas.	----
(j)		Used multifunction print and copying machines (MFDs)*	<p>(a) The country of Origin Certificate along with bill of lading and packaging;</p> <p>(b) The certificate issued by the inspection agency as certified by the exporting country or the inspection and certification agency approved by Directorate General Foreign Trade (DGFT) for functionality, having residual life of not less than five years and serial number;</p> <p>(c) Extended Producer Responsibility-Authorisation under e-waste (Management and Handling) Rules, 2011 as amended from time to time as Producer;</p> <p>(d) The MFDs shall be for printing A 3 size and above;</p> <p>(e) An acknowledged copy of the annual return filed with concerned SPCB for import in the last financial year.</p>
5	B3020	<p>Paper, paperboard and paper product wastes</p> <p>The following materials, provided they are not mixed with hazardous wastes:</p> <p>Waste and scrap of paper or paperboard of:</p> <ul style="list-style-type: none"> - unbleached paper or paperboard or of corrugated paper or paperboard - other paper or paperboard, made mainly of bleached chemical pulp, not coloured in the mass - paper or paperboard made mainly of mechanical pulp (for example newspapers, journals and similar printed matter) - other, including but not limited to <ol style="list-style-type: none"> (1) laminated paperboard (2) unsorted scrap 	<p>(a) Duly filled up Form 6 – Movement document;</p> <p>(b) The import license from Directorate General of Foreign Trade, wherever applicable;</p> <p>(c) Pre-shipment inspection certificate issued by the inspection agency of the exporting country or the inspection and certification agency approved by Directorate General of Foreign Trade;</p> <p>(d) The valid consents to operate under the Air and Water Acts and the authorisation under these rules, for actual users. For traders, only valid authorisation from concerned SPCB is required;</p> <p>(e) The chemical analysis report of the waste being imported;</p> <p>(f) an acknowledged copy of the annual return filed with concerned State Pollution Control Board for import in the last financial year.</p>

6.	B3140	Aircraft Tyres exported to Original Equipment Manufacturers for re-treading and re-imported after re-treading by airlines for aircraft maintenance and remaining either on board or under the custodianship of the respective airlines warehouses located on the airside of the custom bonded areas	As per existing guidelines of Custom Authority
----	-------	---	--

Note: * The policy for free trade for multifunction print and copying machine to be reviewed once the MFDs are domestically manufactured.

FORM 1

[See rule 6 (1)]

Application required for grant/renewal of authorisation for generation or collection or storage or transport or reception or recycling or reuse or recovery or pre-processing or co-processing or utilisation or treatment or disposal of hazardous and other waste

Part A: General (to be filled by all)

1. (a) Name and address of the unit and location of facility :
 (b) Name of the occupier of the facility or operator of disposal facility with designation, Tel, Fax and e-mail:
 (c) Authorisation required for (Please tick mark appropriate activity or activities):

- | | |
|---------------------|--------------------------|
| (i) Generation | <input type="checkbox"/> |
| (ii) Collection | <input type="checkbox"/> |
| (iii) Storage | <input type="checkbox"/> |
| (iv) Transportation | <input type="checkbox"/> |
| (v) Reception | <input type="checkbox"/> |
| (vi) Reuse | <input type="checkbox"/> |
| (vii) Recycling | <input type="checkbox"/> |
| (viii) Recovery | <input type="checkbox"/> |
| (ix) Pre-processing | <input type="checkbox"/> |
| (x) Co-processing | <input type="checkbox"/> |
| (xi) Utilisation | <input type="checkbox"/> |
| (xii) Treatment | <input type="checkbox"/> |
| (xiii) Disposal | <input type="checkbox"/> |
| (xiv) Incineration | <input type="checkbox"/> |

(d) In case of renewal of authorisation previous authorisation numbers and dates and provide copies of annual returns of last three years including the compliance reports with respect to the conditions of Prior Environmental Clearance, wherever applicable:

2. (a) Nature and quantity of waste handled per annum (in metric tonne or kilo litre)
 (b) Nature and quantity of waste stored at any time (in metric tonne or kilo litre)

3. (a) Year of commissioning and commencement of production:

(b) Whether the industry works:

- | | |
|-----------------------|--------------------------|
| (i) 01 Shift | <input type="checkbox"/> |
| (ii) 02 Shifts | <input type="checkbox"/> |
| (iii) Round the clock | <input type="checkbox"/> |

4. Provide copy of the Emergency Response Plan (ERP) which should address procedures for dealing with emergency situations (viz. Spillage or release or fire) as specified in the guidelines of Central Pollution Control Board. Such ERP shall comprise the following, but not limited to:

- Containing and controlling incidents so as to minimise the effects and to limit danger to the persons, environment and property;
- Implementing the measures necessary to protect persons and the environment;
- Description of the actions which should be taken to control the conditions at events and to limit their consequences, including a description of the safety equipment and resources available;
- Arrangements for training staff in the duties which they are expected to perform;
- Arrangements for informing concerned authorities and emergency services; and
- Arrangements for providing assistance with off-site mitigatory action.

5. Provide undertaking or declaration to comply with all provisions including the scope of submitting bank guarantee in the event of spillage, leakage or fire while handling the hazardous and other waste.

Part B: To be filled by hazardous waste generators

1. (a) Products and by-products manufactured (names and product wise quantity per annum):

(b) Process description including process flow sheet indicating inputs and outputs (raw materials, chemicals, products, by-products, wastes, emissions, waste water etc.) Please attach separate sheets:

(c) Characteristics (waste-wise) and Quantity of waste generation per annum:

(d) Mode of management of (c) above:

- i. Capacity and mode of secured storage within the plant;
- ii. Utilisation within the plant (provide details);
- iii. If not utilised within the plant, please provide details of what is done with this waste;
- iv. Arrangement for transportation to actual users/ TSDF;

(e) Details of the environmental safeguards and environmental facilities provided for safe handling of all the wastes at point (c) above;

2. Hazardous and other wastes generated as per these rules from storage of hazardous chemicals as defined under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989

Part C: To be filled by Treatment, storage and disposal facility operators

1. Provide details of the facility including:

- (i) Location of site with layout map;
- (ii) Safe storage of the waste and storage capacity;
- (iii) The treatment processes and their capacities;
- (iv) Secured landfills;
- (v) Incineration, if any;
- (vi) Leachate collection and treatment system;
- (vii) Fire fighting systems;
- (viii) Environmental management plan including monitoring; and
- (ix) Arrangement for transportation of waste from generators.

2. Provide details of any other activities undertaken at the Treatment, storage and disposal facility site.

3. Attach a copy of prior Environmental Clearance.

Part D: To be filled by recyclers or pre-processors or co-processors or users of hazardous or other wastes

1. Nature and quantity of different wastes received per annum from domestic sources or imported or both:
2. Installed capacity as per registration issued by the District Industries Centre or any other authorised Government agency. Provide copy:
3. Provide details of secured storage of wastes including the storage capacity:
4. Process description including process flow sheet indicating equipment details, inputs and outputs (input wastes, chemicals, products, by-products, waste generated, emissions, waste water, etc.). Attach separate sheets:
5. Provide details of end users of products or by-products:
6. Provide details of pollution control systems such as Effluent Treatment Plant, scrubbers, etc. including mode of disposal of waste:
7. Provide details of occupational health and safety measures:
8. Has the facility been set up as per Central Pollution Control Board guidelines? If yes, provide a report on the compliance with the guidelines:
9. Arrangements for transportation of waste to the facility:

**Signature of the Applicant
Designation**

Date.....

Place.....

FORM 2
[See rule 6(2)]

FORM FOR GRANT OR RENEWAL OF AUTHORISATION BY STATE POLLUTION CONTROL BOARD TO THE OCCUPIERS, RECYCLERS, REPROCESSORS, REUSERS, USER AND OPERATORS OF DISPOSAL FACILITIES

1. Number of authorisation and date of issue :
2. Reference of application (No. and date) :
3.ofis hereby granted an authorisation based on the enclosed signed inspection report for generation, collection, reception, storage, transport, reuse, recycling, recovery, pre-processing, co-processing, utilisation, treatment, disposal or any other use of hazardous or other wastes or both on the premises situated at.....

Details of Authorisation

Sl. No.	Category of Hazardous Waste as per the Schedules I, II and III of these rules	Authorised mode of disposal or recycling or utilisation or co-processing, etc.	Quantity (ton/annum)

- (1) The authorisation shall be valid for a period of
- (2) The authorisation is subject to the following general and specific conditions (Please specify any conditions that need to be imposed over and above general conditions, if any):

A. General conditions of authorisation:

1. The authorised person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.

2. The authorisation or its renewal shall be produced for inspection at the request of an officer authorised by the State Pollution Control Board.
3. The person authorised shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorisation.
4. Any unauthorised change in personnel, equipment or working conditions as mentioned in the application by the person authorised shall constitute a breach of his authorisation.
5. The person authorised shall implement Emergency Response Procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
6. The person authorised shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty"
7. It is the duty of the authorised person to take prior permission of the State Pollution Control Board to close down the facility.
8. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
9. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
10. The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilisation of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorisation.
11. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
12. An application for the renewal of an authorisation shall be made as laid down under these Rules.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14. Annual return shall be filed by June 30th for the period ensuring 31st March of the year.

B. Specific conditions:

Date:

**Signature of Issuing Authority
Designation and Seal**

FORM 3

[See rules 6(5), 13(7), 14(6), 16(5) and 20 (1)]

FORMAT FOR MAINTAINING RECORDS OF HAZARDOUS AND OTHER WASTES

1. Name and address of the facility :
2. Date of issuance of authorisation and its reference number :
3. Description of hazardous and other wastes handled (Generated or Received)

Date	Type of waste with category as per Schedules I, II and III of these rules	Total quantity (Metric Tonnes)	Method of Storage	or Destined to or received from

* Fill up above table separately for indigenous and imported waste.

4. Date wise description of management of hazardous and other wastes including products sent and to whom in case of recyclers or pre-processor or utiliser:
5. Date of environmental monitoring (as per authorisation or guidelines of Central Pollution Control Board):

Signature of occupier

Date.....

Place.....

FORM 4*[See rules 6(5), 13(8), 16(6) and 20 (2)]***FORM FOR FILING ANNUAL RETURNS**[To be submitted to State Pollution Control Board by 30th day of June of every year for the preceding period April to March]

1. Name and address of facility:
2. Authorisation No. and Date of issue:
3. Name of the authorised person and full address with telephone, fax number and e-mail:
4. Production during the year (product wise), wherever applicable

Part A. To be filled by hazardous waste generators

1. Total quantity of waste generated category wise
2. Quantity dispatched
 - (i) to disposal facility
 - (ii) to recycler or co-processors or pre-processor
 - (iii) others
3. Quantity utilised in-house, if any -
4. Quantity in storage at the end of the year -

Part B. To be filled by Treatment, storage and disposal facility operators

1. Total quantity received -
2. Quantity in stock at the beginning of the year -
3. Quantity treated -
4. Quantity disposed in landfills as such and after treatment -
5. Quantity incinerated (if applicable) -
6. Quantity processed other than specified above -
7. Quantity in storage at the end of the year -

Part C. To be filled by recyclers or co-processors or other users

1. Quantity of waste received during the year -
 - (i) domestic sources
 - (ii) imported (if applicable)
2. Quantity in stock at the beginning of the year -
3. Quantity recycled or co-processed or used -

4. Quantity of products dispatched (wherever applicable) –
5. Quantity of waste generated -
6. Quantity of waste disposed -
7. Quantity re-exported (wherever applicable)-
8. Quantity in storage at the end of the year -

**Signature of the Occupier or
Operator of the disposal facility**

Date.....

Place.....

FORM 5

[See rules 13 (1) and 14 (1)]

**APPLICATION FOR IMPORT OR EXPORT OF HAZARDOUS AND OTHER WASTE FOR REUSE
OR RECYCLING OR RECOVERY OR CO-PROCESSING OR UTILISATION**

TO BE FILLED IN BY APPLICANT

S. No.	Description	Details to be furnished by the importer or exporter
(1)	(2)	(3)
1.	Importer or Exporter (name and address) in India	
	Contact person	
	Tel, fax and e-mail	
	Facility location/address	
	Reason for import or export	
2.	Importer or exporter (name and address) outside of India	
3.	Details of waste to be imported or exported	
	(a) Quantity	
	(b) Basel No.	
	(c) Single/multiple movement	
	(d) Chemical composition of waste (attach details), where applicable	
	(e) Physical characteristics	
	(f) Special handling requirements, if applicable	
4.	For Schedule III A hazardous waste whether Prior Informed Consent has been obtained	
5.	For importer	
	(a) Process details along with environmental safeguard measures (attach separate sheet)	
	(b) Capacity of recycling or co-processing or recovery or utilization	
	Enclose a copy each of valid authorisation and valid consent to operate from SPCB	
6.	Details of import against the Ministry of Environment, Forest and Climate Change permission in the previous three years	
7.	Port of entry	

9. Undertaking : _____

I hereby solemnly undertake that:

- (i) The information is complete and correct to the best of my knowledge and legally-enforceable written contractual obligations have been entered into and that my applicable insurance or other financial guarantees are or shall be in force covering the transboundary movement.
- (ii) The waste permitted shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
- (iii) The record of consumption and fate of the imported waste shall be recorded and report sent to the SPCB every quarter.
- (iv) The hazardous or other waste which gets generated in our premises by the use of imported hazardous or other wastes in the form of raw material shall be treated and disposed of as per conditions of authorisation.
- (v) I agree to bear the cost of export and mitigation of damages if any.
- (vi) I am aware that there are significant penalties for submitting a false certificate/ undertaking/ disobedience of the rules and lawful orders including the possibility of fine and imprisonment.
- (vii) The exported wastes shall be taken back, if it is not acceptable to the importer.

**Signature of the Applicant
Designation**

Date.....

Place.....

FORM – 6

[See rules 13(2), 13 (10) and 14 (5)]

TRANSBOUNDARY MOVEMENT- MOVEMENT DOCUMENT

S.No	Description	Details to be furnished by the exporter or importer
(1)	(2)	(3)
1	Exporter (Name and Address) Contact Person Tele, Fax and email	: : :
2.	Generator(s) of the waste (Name and Address) ¹ Contact Person Tele, Fax and email Site of generation	: : : :
3.	Importer or Actual user (Name and Address) Contact person Tele, Fax and email	: : :
4.	Trader (Name and Address) Contact person Tele, Fax and email Details of actual user (Name, Address, Telephone and email)	: : : :
5.	Corresponding to applicant Ref. No., If any	:
6.	Bill of lading (attach copy)	:
7.	Country of import/export	:
8.	General description of waste (a) Quantity (b) Physical characteristics (c) Chemical composition of waste (attach details), where applicable (d) Basel No. (e) UN Shipping name (f) UN Class (g) UN No (h) H Number (i) Y Number (j) ITC (HS)	: : : : : : : : : : :

	(k) Customs Code (H.S.) (l) Other (specify)		
9.	Type of packages Number	:	
10.	Special handling requirements including emergency provision in case of accidents	:	
11.	Movement subject to single/multiple consignment In case of multiple movement- (a) Expected dates of each shipment or expected frequency of the shipments (b) Estimated total quantity and quantities for each individual shipment	:	
12.	Transporter of waste (Name and Address) ¹ Contact Person Tele, Fax and email Registration number Means of transport (road, rail, inland waterway, sea, air) ² Date of Transfer Signature of Carrier's representative	:	
13.	Exporter's declaration for hazardous and other waste: I certify that the information in Sl. Nos. 1 to 12 above are complete and correct to my best knowledge. I also certify that legally-enforceable written contractual obligations have been entered into and are in force covering the transboundary movement regulations/rules. Date:..... Signature:..... Name:.....		
TO BE COMPLETED BY IMPORTER (ACTUAL USER OR TRADER)			
14.	Shipment received by importer/ actual user/trader ^{2/3} Quantity received.....Kg/litres Date: Name: Signature:		
15.	Methods of recovery R code* Technology employed (Attached details if necessary)		
16.	I certify that nothing other than declared goods covered as per these rules is intended to be imported in the above referred consignment and will be recycled /utilized. Signature: Date:		
17.	SPECIFIC CONDITIONS ON CONSENTING TO THE MOVEMENT if applicable.		(attach details)
Notes:- (1) Attach list, if more than one; (2) Select appropriate option; (3) Immediately contact competent authority in case of any emergency; (4) If more than one transporter carriers, attach information as required in SL. No. 12.			

List of abbreviations used in the Movement Document

Recovery Operations (*)

- R1** Use as a fuel (other than in direct incineration) or other means to generate energy.
R2 Solvent reclamation/regeneration.
R3 Recycling/reclamation of organic substances which are not used as solvents.

- R4** Recycling/reclamation of metals and metal compounds.
R5 Recycling/reclamation of other inorganic materials.
R6 Regeneration of acids or bases.
R7 Recovery of components used for pollution abatement.
R8 Recovery of components from catalysts.
R9 Used oil re-refining or other reuses of previously used oil.
R10 Land treatment resulting in benefit to agriculture or ecological improvement
R11 Uses of residual materials obtained from any of the operations numbered R 1 to R 10

Date:**Signature:****Place:****Designation:****FORM 7**

[See rule 13 (2) (c)]

APPLICATION FORM FOR ONE TIME AUTHORISATION OF TRADERS FOR PART- D OF SCHEDULE III, WASTE

[To be submitted by trader to the State Pollution Control Board]

1.	Name and address of trader with Telephone, Fax Number and e-mail	:	
2.	TIN/VAT Number/Import/ Export Code	:	
3.	Description and quantity of other waste to be imported	:	
4.	Details of storage, if any	:	
5.	Names and address of authorised actual user (s)	:	

Signature of the authorised person**Date:****Place:****FORM 8**

[See rules 17 (1) and 18 (2)]

LABELLING OF CONTAINERS OF HAZARDOUS AND OTHER WASTE

Handle with care

Waste category and characteristics as per Part C of Schedules II and III of these rules	Incompatible wastes and substances
Total quantity	Date of storage
Physical State of the waste (Solid/Semi-solid/liquid):	
Sender's name and address	Receiver's name and address
Phone.....	Phone.....
E-mail.....	E-mail.....
Tel. and Fax No.....	Tel. and Fax No.....
Contact person.....	Contact person.....
In case of emergency please Contact	

Note:

1. Background colour of label - *fluorescent yellow*.
2. The word, 'HAZARDOUS WASTES' and 'HANDLE WITH CARE' to be prominent and written in red, in Hindi, English and in vernacular language.
3. The word 'OTHER WASTES' to be written prominently in orange, in Hindi, English and in vernacular language.

4. Label should be of non-washable material and weather proof.

FORM 9

[See rule 18 (2)]

TRANSPORT EMERGENCY (TREM) CARD

[To be carried by the transporter during transportation of hazardous and other wastes, provided by the sender of waste]

1. Characteristics of hazardous and other wastes:

S. No.	Type of waste	Physical properties/	Chemical constituents	Exposure hazards	First Aid requirements

2. Procedure to be followed in case of fire :
3. Procedure to be followed in case of spillage/accident/explosion :
4. For expert services, please contact :
- (i) Name and Address :
- (ii) Telephone No. :

(Name, contact number and signature of sender)

Date.....

Place.....

FORM 10

[See rule 19 (1)]

MANIFEST FOR HAZARDOUS AND OTHER WASTE

1.	Sender's name and mailing address (including Phone No. and e-mail)	:	
2.	Sender's authorisation No.	:	
3.	Manifest Document No.	:	
4.	Transporter's name and address: (including Phone No. and e-mail)	:	
5.	Type of vehicle	:	(Truck/Tanker/Special Vehicle)
6.	Transporter's registration No.	:	
7.	Vehicle registration No.	:	
8.	Receiver's name and mailing address (including Phone No. and e-mail)	:	
9.	Receiver's authorisation No.	:	
10.	Waste description	:	
11.	Total quantity	:m ³ or MT
	No. of Containers	:Nos.
12.	Physical form	:	(Solid/Semi-Solid/Sludge/Oily/Tarry/Slurry/Liquid)
13.	Special handling instructions and additional information	:	
14.	Sender's Certificate	:	I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorised, packed, marked, and labelled, and are in all respects in proper conditions for transport by road according to applicable national government regulations.
	Name and stamp:	Signature:	Month Day Year
			<input type="text"/>
15.	Transporter acknowledgement of receipt of Wastes	:	
	Name and stamp:	Signature:	Month Day Year
			<input type="text"/>
16.	Receiver's certification for receipt of hazardous and other waste	:	
	Name and stamp:	Signature:	Month Day Year
			<input type="text"/>

FORM 11
[See rule 22]

FORMAT FOR REPORTING ACCIDENT

[To be submitted by the facility or sender or receiver or transporter to the State Pollution Control Board]

- | | | |
|----|---|---|
| 1. | The date and time of the accident | : |
| 2. | Sequence of events leading to accident | : |
| 3. | Details of hazardous and other wastes involved in accident | : |
| 4. | The date for assessing the effects of the accident on health or the environment | : |
| 5. | The emergency measures taken | : |
| 6. | The steps taken to alleviate the effects of accidents | : |
| 7. | The steps take to prevent the recurrence of such an accident | : |

Date:

Signature:

Place:

Designation:

FORM 12
[See rule 24 (1)]

**APPLICATION FOR FILING APPEAL
AGAINST THE ORDER PASSED BY STATE POLLUTION CONTROL BOARD**

- | | | |
|----|---|---|
| 1. | Name and address of the person making the appeal | : |
| 2. | Number, date of order and address of the authority which passed the order, against which appeal is being made | : (certified copy of the order be attached) |
| 3. | Ground on which the appeal is being made | : |
| 4. | Relief sought for | : |
| 5. | List of enclosures other than the order referred in point 2 against which the appeal is being filed. | : |

Signature.....

Name and address.....

Date:

-----X-----X-----

[23-16/2009- HSMD]

BISHWANATH SINHA, Jt. Secy.

F. No. 22-13/2019-IA.III

Government of India

Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

Indira Paryavaran Bhawan
Aliganj, Jorbagh Road
New Delhi-110 003Dated: 28th August, 2019**Office Memorandum****Sub: Change in conditions stipulated in the Environmental Clearances of Thermal Power Plants and Coal Mines in line with the Fly Ash Notification and subsequent amendments - reg.**

The Environment Impact Assessment (EIA) Notification, 2006 under the Environment (Protection) Act, 1986 mandates the requirement of prior environmental clearance to the projects/activities listed in the schedule to the said Notification. These projects/activities have been categorized under category A or B and require appraisal/and approval by the respective regulatory authorities (MoEF&CC/SEIAAs) at the Central/State level.

2. As per the provisions of the EIA Notification, 2006, read with subsequent amendments, mining of minerals is covered under Category A/B of the Schedule to the EIA Notification, 2006 based on their areal extent, and thus requiring prior environmental clearance from the concerned regulatory authority.

3. Based on the proposals submitted by the project proponent and recommendations of the sectoral Expert Appraisal Committee, mining projects and thermal power plants were granted Environmental Clearance by the Ministry/State Environment Impact Assessment Authorities (SEIAAs) from time to time, subject to compliance of certain terms and conditions as environmental safeguards necessitated at that stage, which also included the condition for backfilling of mines voids, use/disposal of fly ash in low lying areas, etc.

4. In order to address the environmental concerns of fly ash and to improve its utilization, MoEF&CC has issued a Notification on 14th September, 1999 and subsequent amendments issued vide Notifications dated 27th August, 2003, 3rd November, 2009 and 25th January, 2016 from time to time.

The Fly Ash Notification issued vide S.O.2804 (E) dated 3rd November, 2009 provides for mandatory use of fly ash in the external overburden dump, backfilling or stowing of mines. The main concern is poor fly ash utilization by the pithead power plants mainly because of limited potential in cement industries/road projects and non-utilization of fly ash in stowing and overburden in coal mines.

5. An Expert Committee was constituted for developing a focussed strategy for best utilization of flyash to manufacture end products. The Committee has made recommendations for enhanced utilization of flyash in various sectors viz. mines, roads, bricks manufacturing, cement manufacturing, etc. During an Inter-ministerial consultation held on 21st January, 2019 under the Chairmanship of Secretary (EF&CC), recommendations of the Expert Committee were accepted, which *inter-alia* included the following:-

- a) MoEF&CC should revisit the conditions stipulated in the existing environmental clearances of Thermal Power Plants for flyash utilization and modify them in consonance with the flyash notification.
- b) Appropriate conditions need to be incorporated in the environmental clearances for utilization of flyash in mines backfilling/stowing.

6. The matter has been examined in the Ministry. Further, the matter has been also been referred to the EAC (Thermal Power Projects) in its meeting held on 28.5.2019 and 12.7.2019. The EAC mentioned that though the Flyash Notification, 1999 and subsequent amendments allow the unrestricted use of flyash in abandoned mines, low lying areas, soil conditioner in agriculture, there are no specific guidelines/methodology available for safe disposal of flyash so as to minimize the damage to the environment. In absence of methodology, EAC has been examining the proposals on case to case basis and recommending for disposal of flyash in abandoned mines. Further, the EAC has also expressed the concerns over the long term impacts of flyash disposal on groundwater, soil quality and impact on associated flora and fauna. Now, the guidelines for disposal of fly ash utilisation in low lying areas and mine voids have been prepared by the Central Pollution Control Board and placed before the EAC (Thermal Power and Coal Mining) in its meeting held on 12.7.2019.

7. In view of the recommendations of the EAC (Thermal Power) in its meeting held on 12.7.2019, after careful examination of the matter and to meet the objectives of the Fly Ash Notification, 1999 & its amendments, the Ministry hereby stipulates the following conditions in the existing Environmental Clearances of Thermal Power Plants and Coal mines which have valid Environmental Clearance accorded by the Ministry/SEIAA, that will replace the existing conditions (Specific & General) which prohibited the use of fly ash in abandoned mines/low lying areas/soil conditioner in agriculture:

- i. The guidelines prepared by CPCB for disposal of flyash for reclamation of low lying areas and in stowing/backfilling of abandoned mines/quarries shall be followed during disposal of ash in abandoned or working mines, as annexed.
- ii. There should at least be clearance of 500 m of safe distance be maintained from River and water body in case of ash disposal in abandoned mines to prevent embankment failures and flyash flowing into the nearby water body.
- iii. The top layer of the flyash disposal area in the abandoned mines shall be kept moist during disposal.
- iv. Top layer of the disposed area should have 70 cm overburden or gravels/stones and then 30 cm sweet soil cover. Subsequently, the vegetation shall be raised on the soil cover.
- v. Bioaccumulation and bio-magnification tests shall be conducted on surrounding flora and fauna (tree leaves, vegetation, crop yields and cattle population) during pre-monsoon and post monsoon to find out any trace metals escaped through groundwater or runoff.
- vi. Surface runoff and supernatant water, in any case shall not be let into the surrounding areas. It shall be collected by providing adequate drains around the mine. The supernatant water along with surface runoff shall be treated and re-used for mixing ash and plant operations.
- vii. To the extent possible, only decanted water from mine, make up water from treated effluents such as cooling tower blow down and treated sewage water shall be used for making ash slurry.

- viii. Flyash to be used as soil conditioner in agriculture needs and to be applied in controlled manner to limit excessive application so as to prevent soil degradation. The optimize proportion of ash to be applied which is to be certified by the State Agricultural Universities/Colleges based on the soil testing.
 - ix. Approval from DGMS shall be obtained before disposing the ash in the mine voids.
 - x. Technology for conversion of fly ash into coarse granules for stowing in the underground mines to be explored.
 - xi. All the power plants should install different silos for dry collection of flyash.
 - xii. Records pertaining to details of month-wise quantity of flyash disposed and water consumption along with nature/source of water shall be maintained and submitted to Ministry/Regional Office annually.
 - xiii. Before starting the disposal of ash into mine voids, the NOC/Permission from the mine owner is to be obtained incase the mine closure activities are not completed or State Government incase the mine has been handed over to the State Govt. after its closure. A copy of such NOC/Permission is to be submitted to the Ministry and its Regional Offices.
8. This issues with the approval of the Competent Authority.



(Dr. S. Kerketta)
Director, IA Division

To

1. The Chairman, Central Pollution Control Board (CPCB)
2. The Chairman/Member Secretaries all the Expert Appraisal Committees
3. The Chairman /Member Secretaries of all the SEIAAs/SEACs
4. The Chairman/Member Secretaries of all SPCBs/UTPCCs
5. All the Power Plant Operators/ Coal Mining Operators who were accorded Environmental Clearance.
6. All the ROs of MoEF&CC.
7. All the Officers of I.A. Division

Copy for information to:

1. PS to Hon'ble Minister for Environment, Forest and Climate Change
2. PS to Hon'ble MoS (EF&CC)
3. PPS to Secretary(EF&CC)
4. PPS to SS(AKJ) / AS (RSP)
5. Sr.PPS to JS (GM)/ JS(NK)
6. Website of MoEF&CC.
7. Guard file.

**Guidelines for disposal/utilisation of Fly Ash for
reclamation of Low Lying Areas and in stowing of
Abandoned mines/Quarries**



**Central Pollution Control Board
March, 2019**

I N D E X

Sr No.	Chapter
1.0	Introduction
2.0	Status of flyash utilisation
3.0	Need of guidelines
4.0	Loading/unloading and transportation of flyash
4.1	Current Practice for Handling & Disposal of Flyash & Bottom ash (within the power plant)
4.2	Guidelines for loading, unloading, storage, transportation of flyash
4.2.1	Maximise dry collection of fly ash and bottom ash
4.2.1	Loading, unloading and storage
4.2.3	Transportation
4.2.4	Code of Practices for general maintenance of roads, vehicles and conditioning of flyash
5.0	Reclamation of Low Lying area using Ash
6.0	Disposal of flyash in voids of abandoned mines
6.1	Study requirements
6.2	Mode of ash transportation to mine void area
6.3	Monitoring
6.4	Reclamation of land post-filling
7.0	Precaution
8.0	Regulatory Procedure for Processing the Application
Appendix	Guidelines for disposal of flyash in open cast mines along with Over Burden (OB)
References	1.Guidelines for Reclamation of Low Lying Areas and Abandoned Quarries with Ash , August 2017, Odisha Pollution control board

- 2.Guidelines for Low Lying area development using Ash, ash Policy 2015, NTPC Ltd.
- 3.Permission of DGMS to M/s JSPL & JPL for disposing ash in coal mines

Guidelines for disposal/utilisation of flyash for reclamation of Low Lying Areas and in stowing of Abandoned mines/Quarries

1.0 Introduction:

Management of huge quantity of ash (fly ash, bottom ash and pond ash) generated from coal fired Thermal Power Plants (TPPs) is a serious environmental challenge. Ash generation from coal or lignite based thermal power plants, has increased from 40 Million tonne per year in 1993-94, to more than 200 Million tonne per year in 2017-18 and is projected to increase to 275 Million Tons / year by 2032.

The ash generation in coal and lignite based thermal power plants in various forms such as dry ash, bottom ash, pond ash and mound ash that are required to be managed in such a manner that it does not affect the environment. Utilisation of ash for reclamation of low lying areas and abandoned quarries is recognised as an alternate option and therefore, MoEF&CC has issued a notification to address utilisation of ash for various purposes including these two options

The Ministry of Environment, Forest and Climate Change (MoEF&CC) issued the Fly Ash notification on 14th September, 1999, which has subsequently been amended in 2003, 2009 and 2016. The Fly Ash notification (1999) mandates the use of fly ash for the purpose of manufacturing ash-based products such as cement, concrete blocks, bricks, panels or any other material and for construction of roads, embankments, dams or for any other construction activity within a radius of 300 km from thermal power stations (TPPs). Besides, it also mandates use of fly ash in mines backfilling or stowing of mines within a distance of 50 km.

2.0 Status of fly ash utilisation:

Since 1999 when flyash utilisation was made mandatory, the utilization of fly ash has increased from 6.64 million-ton in 1996-97 to 147.7 million-ton in 2017-18. Fly ash generation and utilization in 2017-18 from 182 coal/lignite based TPPs of various power utilities in the country was 220.7 and 147.7 million-ton, respectively. The percentage of fly ash utilization during 2017-18 has been 66.9%. During 2017-18, out of total fly ash generation, 35.6 % of total fly ash was used in the cement sector, followed by 14.28 % in making bricks & tiles, 11.57 % stored in ash dyke raising,

7.99% in mine filling, 16.85 % in reclamation of low lying area, 5.43 % in roads & embankments, 1.34% in concrete making, 0.21 % in agriculture, 6.73 % in others and 33.1% remained as unutilized fly ash.

Mine reclamation represents a potential beneficial use of flyash that has been receiving increased attention in recent years. Coal mining operations have produced both open pits and deep underground mine voids that can be filled by flyash. Placement of flyash into deep mines can provide structural support to abate subsidence, and placement of flyash in surface mines or other open pits can aid in restoring mined land to beneficial use. The use of flyash as mine backfill may provide the additional benefit of limiting impacts of acid mine drainage (AMD). Mostly flyashe is alkaline material that can neutralize acidic water and/or inhibit production of acid. Placement of fly ash may also reduce the permeability of mine strata and divert water away from acid-generating materials. Although flyash possess these beneficial physical and chemical properties, there are concerns regarding potential for release of toxic chemicals in the leachates from the fly ash. Therefore, scientifically sound fly ash management is needed so that environmental concerns can be adequately and reliably identified and addressed.

3.0 Need of Guidelines:

Ministry of Environment and Forests and Climate Change (MoEF&CC) vide Notification No. S.O. 763 (E) dated 14th September 1999, last amended on 25th January, 2016 issued following directions for reclamation low lying area and stowing of mines;

- i. No agency, person or organization shall within a radius of three hundred Kilometres of a coal or lignite based thermal power plant undertake or approve or allow reclamation and compaction of low-lying areas with soil; only ash shall be used for compaction and reclamation.
- ii. Soil required for top or side covers of embankments of roads or flyovers shall be excavated from the embankment site and if it is not possible to do so, only the minimum quantity of soil required for the purpose shall be excavated from soil borrow area. In either case, the topsoil should be kept or stored separately. Voids created at soil borrow area shall be filled up with fly ash with proper compaction and covered with topsoil kept separately as above and this would be done as an integral part of embankment project.

- iii. No person or agency shall within fifty kilometers (by road) from coal or lignite based Thermal Power Plants, undertake or approve stowing of mine without using at least 25 % of fly ash on weight to weight basis, of the total stowing materials used and this shall be done under the guidance of the Director General of Mines Safety (DGMS).
- iv. No person or agency shall within fifty kilometers (by road) from coal or lignite based Thermal Power Plants, undertake or approve external dump of mining Over Burden (OB) without using at least 25 % of ash on volume to volume basis of the total materials used for external dump of overburden and same percentage in upper benches of back filling of opencast mines and this shall be done under the guidance of the Director General of Mines Safety (DGMS);
- v. All agencies undertaking construction of roads of flyover bridges and reclamation and compaction of low lying areas, including Department of Road Transport and Highways (DORTH), National Highways Authority of India (NHAI), Central Public Works Department (CPWD), State Public Works Department and other State Government Agencies, shall within a period of four months from the publication of this Notification " make provisions in their tender documents, schedules of approved materials and rates as well as technical documents for implementation of this Notification, including those relating to soil borrow area or pit".
- vi. The pond ash should be made available free of any charge as is as where basis to manufacturers of bricks, blocks, tiles including clay flyash bricks production manufacturer's units, farmers, central and the state road construction agencies, Public Works Department and to agencies engaged in backfilling or stowing of mines.

Though, flyash utilisation has gained momentum progressively over the years, further efforts are required to explore new areas of ash utilisation. With suitable safeguards, mine backfilling including disposal of flyash in abandoned quarries and road construction specially in the construction of National Highways and Expressways could be the major mode of flyash utilisation in the near future as these areas have vast potential. It would perhaps be desirable that the concerned Ministries should take steps in sorting out the bottlenecks such as declaring a list of abandoned mines, making adequate provisions in respective schedules for flyash utilisation by the Indian Road Congress & construction agencies etc.

MoEF & CC vide letter dated 01.03.2019 asked CPCB to come out with guidelines based on Odisha Pollution Control Board experience for reclamation of low lying areas and abandoned quarries with ash as recommended by the Expert Committee that was constituted by Niti Aayog vide O.M. No. 25 (11)/2014-Minerals dated 12.06.2018 for developing a focus strategy for best utilisation of fly ash to manufacture end products recommended.

The scope of guidelines covers transportation and disposal of flyash in low lying areas and abandoned quarries in an environmentally friendly manner.

4.0 Loading/unloading and transportation of flyash

4.1 Current Practice for Handling & Disposal of Flyash & Bottom ash (within the power plant)

Flyash is collected in dry form from ESP hopper and disposed either in dry form or through wet slurry form. While, bottom ash collected at the bottom of boiler and is disposed in wet slurry form into the ash ponds.

Following technologies are conventionally used for handling & disposal of flyash and bottom ash collected from ESPs hoppers and boiler bottom respectively within the plant or upto the ash pond area:

- I. Dry Pneumatic conveying
- II. Dry (moist) Conveying system through belt conveyor/tube belt conveyor
- III. High concentration slurry disposal system
- IV. Medium concentration slurry disposal system
- V. Lean concentration slurry disposal system

Amongst the above technologies, Dry Pneumatic conveying, Medium concentration slurry disposal system, High concentration slurry disposal system, and Dry (moist) Conveying system through belt conveyor/tube belt conveyor are preferable as compared to Lean concentration slurry disposal system.

The dry ash is typically conveyed pneumatically from the ESP or filter fabric hoppers to storage silos where it is kept dry, pending utilization or further processing, or to a system where the dry ash is mixed with water and conveyed (sluiced) to an on-site storage pond. Fly ash is stored in silos, domes and other bulk storage facilities. Fly ash can be transferred using air

slides, bucket conveyors and screw conveyors, or it can be pneumatically conveyed through pipelines under positive or negative pressure conditions.

Dry fly ash collected is also be suitably moistened with water and wetting agents, as applicable, using specialized equipment (conditioned) and hauled in covered dump trucks for special applications such as structural fills. Water conditioned fly ash can also be suitably stockpiled at jobsites. Exposed stockpiled material must be kept moist or suitably covered to prevent fugitive emission.

The dry bottom ash removal and its transportation is certainly more environment friendly, compared to that of wet ash removal and transport system.

4.2 Guidelines for loading, unloading, storage, transportation of flyash

The power plants need to maximise dry collection of fly ash & bottom ash and also adopt adequate measures to prevent fugitive dust emission during loading, unloading, storage, transportation and various uses of dry as well as ash bottom ash and pond ash. Following guidelines are, therefore, suggested for prevention of pollution and augmentation of flyash utilisation

4.2.1 Maximise dry collection of fly ash and bottom ash

- a. Coarse fly ash from first field of ESP hoppers need to be collected and stored separately.
- b. Fine fly ash from second field onwards of ESP Hoppers should be collected separately. For some specific usage, fine fly ash may be passed through Classifier for further separation of fine fly ash and stored in separate silo.
- c. Bottom ash which is not utilised presently could also be collected in dry form and converted into a valuable resource if processed to match the end use specification. Wet collection & disposal of bottom ash should be minimised as far as possible

4.2.2 Loading, Unloading and Storage

Installation of Bag Filters with dry flyash collection and storage in Silos at loading and unloading points are standard practices at both locations i.e loading at power plant site as well as at the unloading point at user's site. Suggestions for further improvement in existing practices are as under:

- a. Current practice of loading of fly ash in Bulklers/Tankers requires improvement at the stage of loading of fly ash in Tankers. The opening of telescopic chutes at the loading end should be air tight and confined to avoid fugitive dust emission.
- b. The Pollution Control Equipment / Cascade Filters, attached with fly ash loading chute should be periodically cleaned along with regular scheduled maintenance of bag filter to avoid choking and malfunctioning of Bag Filter. It would mitigate the dust emission during loading of fly ash.
- c. Malfunctioning of level sensors can be avoided, with regular maintenance, to prevent over filling of fly ash in Tankers .
- d. The Weigh Bridge to be installed under fly ash loading chute to fill just the required quantity of fly ash in tankers so that overflow/spillage of fly ash in open areas is avoided which otherwise results in heavy fugitive emission all around.
- e. Opening of tankers need to be properly locked during transportation of fly ash. Automatic opening / closing system need to be installed without fail.
- f. Current practice of unloading of fly ash from tanker to storage hopper through pneumatic system is fairly good. Otherwise, the leakage of fly ash will occur at bends and joints of transportation pipe line. The fly ash being abrasive in nature causes damage at bends and joint locations. Fly ash should, therefore be transported through PVC coated pipes to avoid abrasion otherwise it may lead to leakage of flyash. The mechanical unloading system should be envisaged to avoid high pressure and dust leakage from unloading pipe lines. As far as possible, number of bends should be minimised.
- g. The fly ash storage silo should be of or coated with anti-abrasive or anti-corrosive material. It is better to provide concrete silo/hopper to avoid leakages.

- h. Proper functioning of all the level sensor of Storage Hopper to be ensured to avoid any possible spillage from Hopper opening.
- i. The Bag Filter made of anti-abrasive material/cloth be provided with telescopic chute.
- j. Dumping of ash in Ash pond should be done mechanically in moist condition so that ash does not get air borne and pose fugitive dust problem.
- k. The bottom ash discharged from boiler bed, may be transported pneumatically in dry form / in slurry form to the ash pond

4.2.3 Transportation

Fly ash transportation has many challenges like distance to be transported, form of ash i.e. dry or wet ash, user's requirement, economic feasibility, requirement of surrounding vicinity and many other site specific issues. In any case, control of dust emission during transportation is prime concern and more challenging being a non-point source of pollution and larger area coverage due to movement from one place to other passing through various receptors. As flyash is used by different users for different purposes such as cement manufacturing, brick manufacturing, mine back filling, road construction and filling of low lying area, the handling and transportation have to accordingly decided. Following modes of transportation and precautions are suggested for mine back filling and development of low lying areas by disposal of flyash or bottom ash to avoid fugitive dust emission:

a. Transportation for abandoned mine back filling

- I. Pipe conveyors, wherever feasible, based on the topography of the area should be used.
- II. Tankers/ railway wagons/ bulkers or mechanically designed covered trucks need to be used
- III. Thermal Power Plants using wet ash disposal, if permitted can transport ash slurry directly to abandoned mine through ash slurry pipe line.

b. Transportation for filling of low lying area

- I. Tankers/ bulkers or mechanically designed covered Trucks need to be used.

In no case, flyash or bottom ash shall be transported by open trucks / trollies irrespective of distance or end use. Thermal power plants and fly ash user agency shall collectively ensure that fly ash or bottom ash is transported in environmentally sound manner by following the guidelines mentioned in para 4.2.3 & 4.2.4.

4.2.4 General Code of Practices for Maintenance of roads, vehicles and conditioning of flyash

- a. Roads inside power plant and that of flyash user agency should be paved and plantation of adequate width should be done at both sides. Mechanised road sweepers should be deployed. In addition, adequate arrangements for water sprinkling should be made to suppress fugitive dust emission, if any.
- b. Thermal power plants and user agencies should make arrangements (two stages) for washing of wheels of the vehicles (bulkiers/trucks) before deployed for fly ash transportation.
- c. Fly ash to be transported should be conditioned with water to maintain minimum of 15% moisture at the disposal point so that ash does not get air borne and cause fugitive emission.
- d. Adequate free board in trucks should be kept to avoid overflow/spillage during transportation.
- e. In case of any spillage enroute during transportation of fly ash, the agency shall ensure that spilled ash is collected and transported to the disposal/usage site immediately.
- f. All the bulkiers and trucks responsible for carrying fly ash should be with valid Pollution Under Control certificates.
- g. Provision should be preferably made for weighing of fly ash loaded into tankers/ railway wagons/bulkiers etc under the silo.
- h. The speed limit of vehicles carrying flyash should be strictly enforced and it should not exceed 40 km per hour.

- i. State Pollution Control Boards shall clearly indicate mode of transportation and method of loading and unloading while granting the consent.
- j. Transportation of flyash through thickly populated areas should be avoided as far as possible.
- k. General awareness/ training programmes be organised regularly for tanker operating staff like drivers and cleaners on the impact of hazards of fly ash.

5.0 Reclamation of Low Lying area using Ash

Filling of Low lying areas inside the plant premises and outside within 300 km. of power plant may be taken up using ash. Low lying area reclamation with ash should be taken up adopting standard practices as per 2015 technical specification mentioned in NTPC Policy. Following steps should be taken up prior to initiate low lying area developmental activities.

5.1 Preconditions:

- 5.1.1 **Consent from land owner:** Consent/ permission should be obtained in writing from the land owner before start of work.
- 5.1.2 **Permission from Regulatory authority:** Power plant/ land owner/ agency shall obtain statutory permission from regulatory authorities such as SPCB as per the requirement.
- 5.1.3 **Prevention of pollution:** Suitable methods should be adopted and necessary arrangement should be made to prevent pollution during excavation of pond ash at ash pond, filling area and during transportation of ash.
- 5.1.4 **Soil Cover on the top of ash fill:** As per the MOEF&CC gazette notification of ash utilization dated 14-09-1999 and as amendment on dated 27-08-2003 and 03-11-2009, the soil required for soil cover shall be excavated from land fill site itself and kept separately before taking for ash filling. If it is not possible to do so, only the minimum quantity of soil required for the purpose of cover shall be excavated from the soil borrow area. The voids so created due to removal of soil shall be filled up with ash with proper compaction and covered at top with soil cover. About 300-500 mm thick soil layer shall be placed over the ash fill area. This should be done as an integral part of low lying area development work.

5.1.6 Restrictions :

Reclamation of area by ash shall not be permitted in the following areas :

- i. Flood plain area/Ecologically Sensitive Areas.
- ii. Agriculture land / area.
- iii. Reclamation of Forest land / area is permissible only if clearance from MoEF&CC as per Forest Conservation Act, 1980 is available.
- iv. Gochar Kisan Land.

5.2 Preparation of filling area

5.2.1 The entire area meant to receive the ash and earth filling shall be stripped by minimum 150 mm. The exact depth of stripping shall be decided by the Engineer-in-Charge depending upon nature of top soil and the vegetation present. All organic matter, vegetation, roots, stumps, bushes, rubbish, swamp materials, etc. shall be removed from the site. The stripping material and other unsuitable materials as referred above shall be kept away from the area to be filled up so that these do not get mixed up with filling material and disposed off to a place as decided by the Engineer-in-Charge.

5.2.2 Levelling

All existing undulations, holes, cavities and excavations made for plate load rests and other soil investigations, etc. shall be filled with pond ash having requisite moisture content. The ash thus filled shall be compacted with the help of vibratory rollers so as to achieve dry density of not less 95% as per I.S-2720 (Part-VII). This would result in a levelled surface upon which layer wise filling of compacted ash can be done.

5.2.3 Protection of pond or water body adjoining or within the working site: If any pond or water body exists within or adjoining the low lying area /quarry then an earthen embankment of the cross-section as given in the Figure below be constructed around the pond or water body to protect it from
spilling of ash or ingress of surface runoff into it.



Cross- section of water body protection embankment

The soil used for the embankment should neither be granular nor black cotton soil. It should be of good quality for geo-technical application. Soil should be compacted to 95% proctor by Vibratory Roller of 15 T minimum capacity, in the layers of 25-30 cm and the optimum moisture content determined before execution of work. After attaining the desired height, the disposal area should be thoroughly compacted, graded followed by soil cover at least 15 cm thickness for proper reclamation of the land by grass turving or appropriate plantation.

5.3 Excavation of pond ash from borrow area

5.3.1 Borrow Area-location

The location and permissible depth of excavation of the Borrow areas for pond ash shall be got specifically approved from concerned Thermal Power Station. The boundaries and permissible depth of excavation so approved shall be strictly followed and no deviation shall be allowed. Similarly, routes for movement of all ash transportation vehicles, water tankers, equipment, etc. shall be got approved from Thermal Power Station. These shall be strictly followed and no deviation shall be allowed.

The excavation surfaces and surface of waste materials shall be left in a reasonably smooth and even condition. All the excavations within the ash pond shall be at a minimum slope of 4 (Horizontal): 1(Vertical)

5.3.2 Site Clearance

All areas required for borrowing shall be cleared of all trees and stumps, roots, bushes, rubbish and other objectionable material. Particular care shall be taken to exclude all organic matter from the ash to be placed in the fill. The cleared areas shall be maintained free of vegetation growth during the progress of the work.

5.3.3 Stripping

Borrow area shall be stripped of top layer by a depth of minimum 150 mm. The exact depth of stripping shall be decided by the Engineer-in-charge depending upon nature of top layer and the vegetation present.

5.3.4 Borrow area watering & dewatering

The natural moisture content of material in the borrow areas as well as the optimum moisture corresponding to the Proctor's maximum dry density for the material in the particular borrow area shall be obtained from laboratory tests. Additional moisture, if required, shall be introduced into the borrow area by watering well in advance of excavation to ensure uniformity of moisture content. If in any borrow area before or during excavation there is excess moisture, steps shall be taken to reduce the moisture by the selective excavation to secure the materials of required moisture content by excavating drainage ditches, by allowing adequate time for drying or by other means. To avoid formation of pools in the borrow areas during excavation operations, drainage ditches from borrow areas to the nearest outlets shall be excavated so as to obtain homogeneous mix. In general, all materials from a particular borrow area shall be mixture of materials obtained for the full depth of cut.

5.3.5 Earth cover in Borrow Area

It shall be the responsibility of Thermal Power plant to arrange sweet soil from approved external borrows areas. The earth cover material shall consist of sandy loam free of admixture of stiff clay, refuse, stumps, roots, rock, bushes, weeds or any other material which would be detrimental to the proper development of vegetation growth. It shall not contain stone of size 25 mm and over. The loamy top soil shall be of healthy crops, grass or other plant growth, that is of good quality and reasonably free draining. Other specifications for Borrow area e.g. site clearance, stripping, Borrow area watering/De-watering etc. shall be as per relevant clauses of Borrow area for ash as outlined above i.e clause nos. 5.3.1 to 5.3.4.

5.4 Filling with pond ash

5.4.1 Placement

After the area has been prepared and levelled, pond ash excavated from Borrow areas having required moisture content shall be placed in layers not exceeding 300 mm in compacted thickness. The placing operations shall be such that in strips of 10-15 m of the material when compacted in the fill will be blended sufficiently to produce specified degree of compaction and stability. No stones, cobbles or rock fragments, having maximum dimensions more than 100 mm shall be placed in the fill. Stones and

cobbles shall be removed either at the borrow pit site before it is used as soil cover.

5.4.2 Procedure

The material shall be placed in the fill in continuous horizontal layers, stretching right across the whole section, not more than 300 mm in compacted thickness and rolled as herein specified. The length of one layer shall not exceed 150 meters at one stretch. The layers shall be compacted in strips overlapping not less than 600 mm, if the rolled surface of any fill is found to be too wet for proper compaction, it shall be raked up, allowed to dry, or shall be worked with a harrow or any other approved equipment to reduce the moisture content to the required amount and then it shall be re-compacted before the next layer of ash is placed. Ash surfaces are likely to become dry in short intervals especially during hot and dry weather and hence enough moisture shall be added between difference passes to ensure proper compaction

5.4.3 Compaction

The compaction of each layer shall be carried out so as to achieve maximum in-situ dry density 95% of maximum dry density (MDD) of the material found out as per I.S 2720 (Part VII). To achieve maximum compaction level use of vibratory rollers shall be made. Required number of passes shall be made so as to achieve desired compaction. Number of passes required shall be verified through trials tests before actual execution of work. The broad specifications of vibratory rollers required for the purpose is as follows:

- a) Static Weight = 6 to 10 t
- b) Static Linear Load = 20 – 35 kg/cm
- c) Frequency = 18 – 30 Hz (1100 to 1800 vibrations/ minute)
- d) Amplitude of vibrations = 0.5 mm to 1.5 mm

5.4.4 Moisture control

So far as practicable, the materials shall be brought to the proper moisture content in the borrow area before excavation. If additional moisture is required, it shall be added at the fill site by sprinkling water before rolling the layer. Thermal Power Plant shall make arrangements for supply of water to the borrow areas as well as to the fill area. If the moisture content is more than requirement, the material shall be spread and allowed to dry

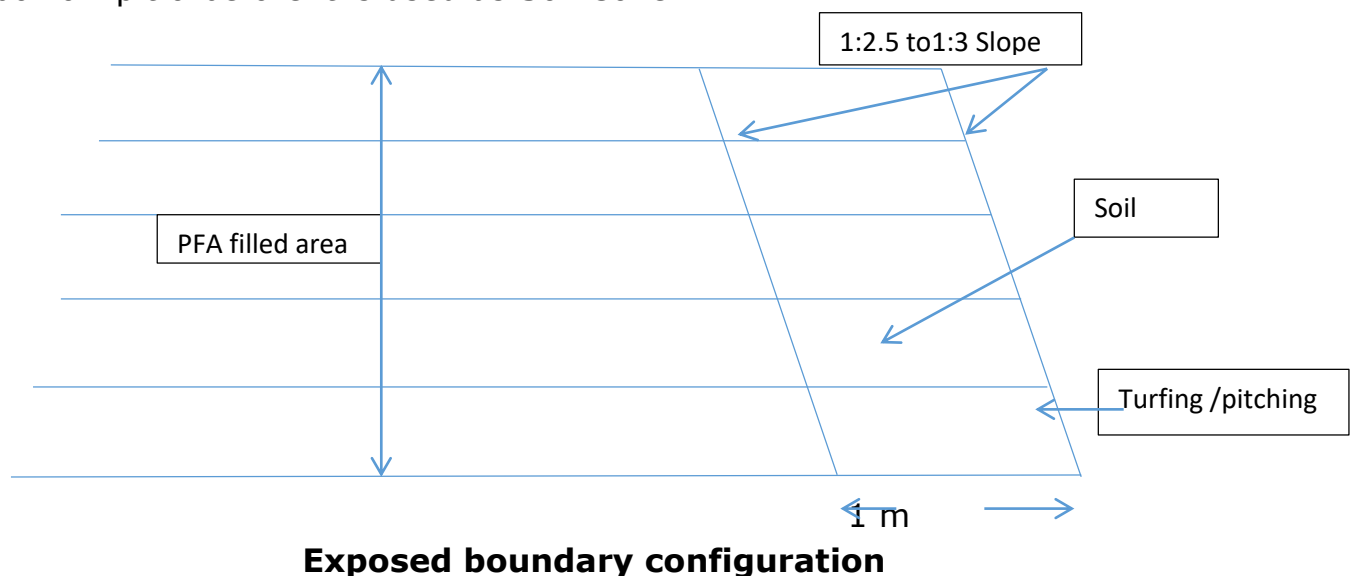
before rolling. The moisture content shall be at most uniform throughout the layer of material and ploughing or other methods of mixing to obtain uniform distribution. If the moisture content is more or less than the range of the required moisture content, or if it is not uniformly distributed throughout the layer, rolling shall be stopped, and shall be started again only when the above conditions are met with.

Fill materials shall be placed only when the weather conditions are satisfactory to permit accurate control of the moisture content in the materials.

5.4.5 Placement of earth cover in filing area

Earth cover shall be laid simultaneously with the laying of compacted ash layers and on side slopes. As in the case of ash layers, compacted thickness of earth layers shall not be exceeding 300 mm. As far as top cover of earth is concerned, after the area has been covered with compacted ash up to 500 mm below the required finished level of the area, a compacted layer of 500 mm thickness of suitable earth shall be placed over ash surface. This cover shall be placed in layers, each layer shall be of 250 mm in compacted thickness.

The combined excavation and placing operations shall be such that the materials when compacted in the fill will be blended sufficiently to produce specified degree of compaction on stability. No stones, cobbles or rock fragments, having maximum dimensions more than 25 mm shall be placed in the earth cover. Such stones or cobbles shall be removed either at the borrow pit or before it is used as Soil Cover.



Other requirements of earth cover laying shall be similar to those of ash laying i.e. as outlined in 5.4.1 to 5.4.4 above.

5.5 Prevention of Pollution

It shall be responsibility of thermal power plant or his contractor that no air borne and water borne pollution shall occur during all stages of operations such as in Borrow areas, during transportation of ash/ earth, during placement of fill material etc. All measures such as water sprinkling covering moist ash/ earth with tarpaulins in open trucks, etc., shall be taken to done care of above.

6.0 Disposal of flyash in voids of abandoned mines

As per notifications 1999 and 2009, power plant shall undertake or approve stowing of mines without using at least 25% of fly ash on weight to weight basis, of the total stowing materials used. Mine void filling on pilot basis is being carried out at the power plants of NTPC Ltd., Bhushan Steel and NALCO in Odisha with prior permission from MoEF & CC and OSPCB. Based on their experience and study conducted by CMPDIL, Ranchi for NTPC Talcher, following methodology is suggested for filling of mine voids with flyash.

6.1 The power plant authority shall carry out following study prior to taking up ash disposal activities in mine void to ensure no change/damage/deterioration in water quality and hydrology in and around the proposed area:

- Ash Characterisation and Leachate Study (Table 1.1)
- Techno-Economic Feasibility Study for disposal of ash into the Quarry
- Topographical Survey of Pipeline Corridor & Mine Void area
- Feasibility of transportation of ash to mine void
- Geotechnical study of the Pipeline Corridor & Mine Void area
- Pre and post filling mine water quality including leachability of metals (Table 1.1)

6.2 Mode of ash transportation to mine void area

One of flowing mode of transport actions of flyash shall be used depending upon the topography of the area:

1. Pipeline using pneumatic conveying system

2. Dumpers/ Trucks
3. Merry Go Round (MGR) System
4. Belt Conveyors in case of dry ash disposal
5. Wet ash (lean slurry or high concentration slurry) through pipeline

6.3 Monitoring:

6.3.1 Regular environmental monitoring to be undertaken during the period of disposal of ash into mine void as well as after the reclamation of mine void. The detailed monitoring programme is given in Tables below:

Table 1.1 : Proposed Monitoring Programme during Disposal of Ash

Samples	Parameters to be Analysed	Frequency
Ash Samples	Chemical Parameters (%): SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , K ₂ O, TiO ₂ , CaO, MgO, Na ₂ O, P ₂ O ₅ , SO ₃ Trace Elements (mg/kg, using TCLP Test): As, Ba, Cd, Co, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Zn Radio-activity (Bq/kg): ²³⁸ U, ²³⁶ Ra, ²³² Th, ²²⁸ Ra, ²³⁰ Pb, ⁴⁰ K, ¹³⁷ Cs	Once before initiation of filling
Ash Leachate Analysis	Trace Elements (mg/kg, using TCLP Test): As, Ba, Cd, Co, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Zn	Once a year
Piezometer Water Samples	Chemical Parameters (mg/l, except, pH and EC): pH, EC, TDS, Total Alkalinity, Ca, Mg, Na, K, Cl, SO ₄ , NO ₃ , PO ₄ , Trace Elements (mg/l): As, Ba, Cd, Co, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Zn	Monthly
Mine Water Sample	Same as above	Monthly
Ground Water	Same as above	Twice a year - Pre-monsoon and Post-monsoon
Surface Water Samples	Same as above	Twice a year - Pre-monsoon and Post-monsoon
Soil Samples	Texture, type, pH & cation exchange capacity. Trace Elements (mg/l): As, Ba, Cd, Co, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Zn	Once a year

Survey of Flora and Fauna	<ul style="list-style-type: none"> • Listing of Flora (herbs, shrubs and trees) and Fauna (soil invertebrates and other animals) based on field observations and review of information available • Analysis of trace elements in plants (herbs, shrubs and trees), the invertebrates • Analysis of trace elements in aquatic fauna from the mine void filled with fly ash • Bio-accumulation and Bio-magnification tests 	Once in two years
---------------------------	--	-------------------

Table 1.2: Proposed Monitoring Programme After Reclamation of Mine void

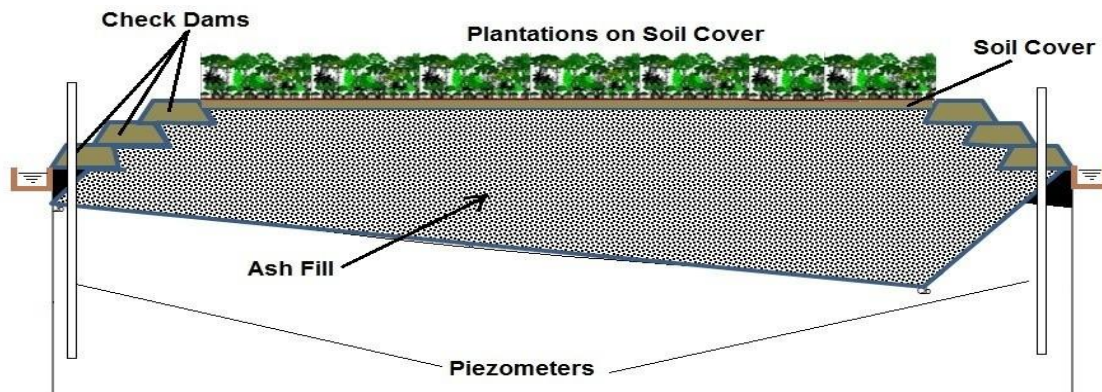
Samples	Parameters to be Analysed	Frequency
Piezometer Water Samples	Chemical Parameters (mg/l, except, pH and EC): pH, EC, TDS, Total Alkalinity, Ca, Mg, Na, K, Cl, SO ₄ , NO ₃ , PO ₄ , Trace Elements (mg/l): As, Ba, Cd, Co, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Zn	Twice a year - Pre-monsoon and Post-monsoon
Ground Water Samples	Same as above	Once a year - Pre-monsoon
Surface Water Samples	Same as above	Once a year - Pre-monsoon
Survey of Flora and Fauna	<ul style="list-style-type: none"> • Listing of Flora (herbs, shrubs and trees) and Fauna (soil invertebrates and other animals) based on field observations and review of information available • Analysis of trace elements in plants (herbs, shrubs and trees), the invertebrates • Analysis of trace elements in aquatic fauna from the mine void filled with fly ash • Bio-accumulation and Bio-magnification tests 	Once in five years

In the event of deterioration of environmental quality, the same will be reported to concerned SPCB immediately and suitable preventive/corrective action will be undertaken.

6.4 Reclamation of Land filled site

After the quarry is filled to the permitted height as per DGMS, the same shall be provided with a soil cover and plantation shall be done with local fast growing species (preferably trees), to make it a part of the overall

post-mining land use pattern envisaged in the mine closure plan. The design of surface contours and land profile will be in consonance with the surrounding features. A three tier plantation approach (consisting of large trees, smaller trees and shrubs) will be followed for overall eco-restoration of the area. This will also help in checking the surface run-off, preventing the water from percolation and maintaining the aesthetics beauty of the surrounding in general. A conceptual diagram of the reclaimed mine void is presented below.



**Conceptual Plan for Reclamation of Mine Void
(Drawing not to Scale)**

During the mine void reclamation, the following measures are to be undertaken:

- i. Storm water drains shall be constructed for channelizing the run-off water away from the disposal site.
- ii. A 30 cm thick soil cover shall be provided to promote vegetation growth.
- iii. For plantation purpose, preference shall be given to both native species and mixed culture. The species will be selected carefully from the following groups for quick reclamation under the guidance of a taxonomist:
 - Tree species for fuel wood and timber
 - Forestry type tree species.
 - Tree species with dense foliage for shade.
 - Native species.
- iv. However, fruit bearing species shall be avoided.

7.0 Precaution

The following precautionary measures are required for safe working during the reclamation activity:

- (i) Appropriate measures should be taken to prevent entry of cattle/livestock inside the disposal area during execution period.
- (ii) Care shall be taken to avoid any kind of nuisance / inconvenience to the public due to such dumping / filling activities.
- (iii) Water sprinkling for dust suppression during handling of Ash shall be ensured from being air borne.
- (iv) After complete reclamation of the site, sign board shall be kept indicating the low lying land / abandoned quarry has been reclaimed with ash. This will help to propagate the message of mine void using ash.

8.0 Regulatory Procedure for Processing the Application for consideration of grant of permission for Reclamation of Low Lying Areas / Abandoned Quarries :

8.1 The activity of reclamation of Low Lying Areas / Abandoned Quarries will be regulated under the provisions of Water (Prevention and Control of Pollution) Act, 1974 and Air Water (Prevention and Control of Pollution) Act, 1981. The stipulations specified in this guideline is consistent with the provisions of Fly Ash Notification, 1999 and amended thereafter which should be a special condition mentioned in consent order issued under the Water (Water (Prevention and Control of Pollution) Act, 1974 and the Air Water (Prevention and Control of Pollution) Act, 1981. Thereafter any deviations from the guidelines shall be treated as violation of both Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 and action as deemed proper shall be taken under Consent Administration by the Board.

8.2 Necessary clearances shall be obtained from the concerned agencies such as DGMS, SPCB, IBM, MoC, etc .

Appendix

Guidelines for disposal of flyash in open cast mines along with Over Burden (OB)

As per notifications 1999 and 2009, "No person or agency shall within fifty kilometres (by road) from coal or lignite based Thermal Power Plants, undertake or approve without using at least 25 % of ash on volume to volume basis of the total materials used for external dump of overburden (OB) and same percentage in upper benches of back filling of opencast mines and this ***shall be done under the guidance of the Director General of Mines Safety (DGMS).***

The methodology as approved by Directorate General of Mine Safety (DGMS) in case of M/s JSPL & JPL (RGR/JPL/P-98(1) &(3)/Flyash/18/2014/1518 dated 31.07.2014) may be referred for filling ash in coal mines. **However, for each case separate approval of methodology from DGMS shall be sought.** Following methodology for disposal of flyash in open cast mines along with Over Burden in case of JSPL was approved by DGMS.

- 1.1 Distance of the internal/overburden dump area from the working faces of mine shall not be less than 100 m.
- 1.2 The area of filling ash shall be specifically earmarked and the same shall be marked on the plan and dumping fly ash shall be carried out accordingly.
- 1.3 Height of each deck shall not be more than 30 m and the total height of the dump shall not exceed 90 m.
- 1.4 The road leading to the dump site for transportation of fly ash shall be independent from the main haul road for transporting OB to the dump site from the mine.

1.5 Method of dumping fly ash

- 1.5.1 The fly ash shall be dumped in alternate layers/stages, of height not exceeding 5.0 m in each layer/stage.

1.5.2 Initially a row of OB dumps not less than 15.0 m width shall be dumped having height of 5.0 m all around the area proposed for ash dump over a deck (of 30.0 m height) of only overburden dump adequately compacted. A number of such areas shall be formed in a layer/stage wherein the fly ash shall be dumped so that one dump of fly ash is separated by another with 15 m wide over burden dump.

1.5.3 Thereafter, fly ash (25%) and overburden shall be dumped within the area surrounded by such OB dumps. In this manner, the dumping shall be laid in the section/layer of 5.0 m height containing both over burden as well as fly ash so as to form a deck of height not more than 30.0 m , distance between two consecutive decks shall not be less than 30.0 m.

1.5.4 In the next section i.e. immediately above bottom section/stage, only OB dumping shall be made to ensure that the Ash is totally covered and protected from the OB dumps all around.

1.5.5 In the same manner as explained above the alternate layer/section of the over burden and over burden with fly ash shall be dumped. Each layer/stage shall be adequately compacted by dozing.

1.5.6 At the top of the dump i.e. at the final stage, the dump shall be covered with 2.0 m thick soil and adequately compacted by dozing. Adequate precaution against rain fall shall be taken by way of plantation, geo-synthetic, or jute/coir reinforcement and formation of gully drains along the slope of the dump and formation of toe walls and peripheral drains as suggested by the scientific agency conducting geo-technical study. The precaution measures shall periodically be checked for its efficacy.

1.5.7 Plan and section in suitable scale (1:2000) shall be maintained showing the details of the dump both external and interval, height of each deck and dump, distance between the dumps containing fly ash and also the distance from the active working faces, plantation done, gully drains, peripheral drains, toe walls, etc. Such plan shall be signed by the Surveyor and countersigned by the Manager as prescribed in the statute.

1.5.8 Code of practices for transportation, dumping compaction of fly ash as mentioned in para 5(4.2.3 & 5.4.3 of main guidelines), shall be implemented.

1.5.9 **1.6 Dump slope management**

1.6.1 The sides of the OB dumps shall be kept benched and height thereof shall not exceed 30.0 m at an angle of slope not exceeding the angle of repose of the dumped material or 28° whichever is less.

1.6.2 Width of the OB dump shall not be less than 40.0 m which shall also be compacted. The benches shall be laid in such a manner that the overall slope of the dump shall not exceed 21° from horizontal.

1.6.3 The toe of the OB dumps shall be protected or armored in such a manner that the sludge does not flow down into the working faces.

1.6.4 A geotechnical study shall be conducted to assess the stability of the dump and the monitoring of various parameters during the course of dumping and also thereafter till the mine is closed permanently.

1.7 Dust control measures: The fly ash dumping including the OB dumps shall be kept moist all the time to prevent ash getting airborne. The quality of the Ash shall be chemically and physically tested at least once in every quarter.

1.8 Surface and ground water quality monitoring

1.8.1 The surface and ground water measurement (Chemical Parameters (mg/l): pH, EC, TDS, Total Alkalinity, Ca, Mg, Na, K, Cl, SO₄, NO₃, PO₄, Trace Elements (mg/l): As, Ba, Cd, Co, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Zn) shall be carried out once in a year (post monsoon) in consultation with the State Pollution Control Board in order to ensure that no harmful heavy metals or any other chemicals pollute the surface or ground water sources or any other water sources present in the area.

1.9 Provision of check drains Proper Check Drains/garland drains having width of adequate size and section shall be made around the OB dumps to ensure that the sludge or waste materials along with the ash does not go into any river, nullah, water streams or any other surface water bodies.

1.10 Impact assessment of flora, fauna, aquatic lives and habitat, water & air quality:

1.10.1 A scientific study shall be carried out by an independent scientific organization to study the impact of Ash filling on Flora, Fauna, Aquatic Life and Habitation (once during the filling and at the end of filling).

1.10.2 The Monitoring of all the aforementioned parameters shall be carried out through any accredited institute/organization/Labs and monitoring report shall be submitted to SPCB and DGMS.

1.10.3 A dedicated team of qualified persons headed by senior officer at the level of General Manager shall be established in the mine level, who shall be responsible for the entire ash filling operation, conducting different studies and shall maintain all records as prescribed.

1.10.4 Record of every analysis and study shall be maintained in a bound page register kept for the purpose and the same shall be signed by the person in-charge of the operation and countersigned by the manager of the mine. Records shall also be maintained showing the details about the slope of each dump, quantity of ash filled, quantity of overburden removed, etc.

1.10.5 Risk Analysis about the risk arising out of ash filling operation shall specifically be conducted at regular intervals and Safety Management Plan including the control mechanism shall be prepared as per the guideline contained in DGMS(Tech)(S&T) Circular No.13 of 2002 dated 31.12.2002 and implemented and the same shall be reviewed time to time

1.10.6 In case, any adverse impact is observed, it should be brought to the notice of the DGMS and also to the State Pollution Control Board including the Environment and Forest Ministries of the State and Central Government. No further use of fly ash shall be done in the mine till permitted in writing afresh from DGMS.

Guidelines on Management of Pyro-metallurgical Slags
(Copper Smelters)



August 2023



Central Pollution Control Board

(Ministry of Environment, Forest and Climate Change)

Parivesh Bhawan, Shahdara

Delhi - 110032

Table of Contents

1.0 Introduction.....	2
2.0 Copper Smelters - Manufacturing Process.....	3
2.1 Process Overview:.....	3
2.2 Refining/ Purification of Copper.....	4
2.3 Casting.....	6
2.4 Copper Manufacturing units In India.....	6
3.0 Generation and Characteristics of Slag.....	6
3.1 Properties of Copper Slag	8
4.0 Current Practices for Handling and Management of Pyro-Metallurgical Slags	10
4.1 Utilization of Slags in road construction and as Aggregates in Concrete	10
5.0 Guidelines for management of pyro-metallurgical copper slags:.....	10
Annexure - I.....	13
Some of the international practices for utilization of Copper Slag	13
Annexure - II	14
Format for Reporting Annual Generation, Storage, Utilization and Disposal	14

1.0 Introduction

The Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 notified by Ministry of Environment, Forest and Climate Change, Government of India for the management of hazardous and other wastes define the hazardous waste as below:

“hazardous waste” means 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;*

Pyro-metallurgical slags are defined as “High Volume Low Effect Waste” (herein referred as HVLE wastes) under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules 2016) and were similarly defined earlier under Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008. The relevant provision given as note at the end of Schedule-I of the HOWM Rules 2016 is as follow:

“The high volume low effect wastes such as fly ash, Phosphogypsum, Red Mud, Jarosite, Slags from pyro-metallurgical operations, mine tailings and ore beneficiation rejects are excluded from the category of hazardous wastes. Separate guidelines on the management of these wastes shall be issued by Central Pollution Control Board.”

NITI Aayog constituted a Committee on Circular Economy, which recommended to promote initiatives for circular economy in the metal sector (ferrous and non-ferrous) through an Action Plan. The said action plan includes issuance of SOPs

for utilization of resource material from pyro-metallurgical slags generated from Iron and Copper smelters of Iron and steel slags, which is already stipulated under Hazardous and Waste Management Rules 2016.

These guidelines will facilitate Copper Smelters units in handling and management of large volumes of slags generated from pyro-metallurgical operations due to increased processing of copper concentrates.

2.0 Copper Smelters - Manufacturing Process

The process of extracting copper from copper ore varies according to the type of ore and the desired purity of the final product. Each process consists of several steps in which unwanted materials are physically or chemically removed, and the concentration of copper is progressively increased. Some of these steps are conducted at the mine site itself, while others may be conducted at separate facilities. The steps used to process the sulfide ores are mining, grinding and concentration of ore.

As per Indian Minerals Year Book 2020, the production of copper ore was 3.95 million tonnes in 2019-2020 and production of copper concentrates was 124692 tonnes in 2019-2020. The production of copper concentrates was carried in Madhya Pradesh, Rajasthan and Jharkhand. The percentage of average metal content in copper concentrate was 21.58 % while the average concentration of copper metal was about 0.8%. The state-wise concentration of copper metal in ores is as below:

1.	Madhya Pradesh	0.70 % Cu
2.	Rajasthan	0.87 % Cu
3.	Jharkhand	0.78 % Cu

Source: Indian Minerals Year Book 2020

2.1 Process Overview:

The copper concentrates after beneficiation at mine site are transferred to copper smelters for processing. The copper concentrate is fed into a furnace along with silica flux. Most copper smelters utilize oxygen-enriched flash furnace smelter in which preheated, oxygen-enriched air is forced into the furnace to combust with

3

fuel oil to produce copper metal (in the form of matte) along with production of sulphur dioxide gas and pyro-metallurgical slag (flash furnace slag). Much of the iron in the concentrate chemically combines with the flux to form a **slag**, which is skimmed off the surface of the molten material.

Much of the sulfur in the concentrate combines with the oxygen to form sulfur dioxide, which is exhausted from the furnace as a gas and is further treated in an acid plant to produce sulfuric acid through double conversion and double absorption. The slag is tapped out from furnace and transferred to slag handling plant. The molten material in the bottom of the smelting furnace is called the matte. It is a mixture of copper sulfides and iron sulfides and contains 60% copper by weight. The matte is drawn from the furnace and transferred to a second furnace called a converter.

In converter furnace, additional silica flux is added and oxygen is blown through the molten material. The silica flux reacts with the remaining iron to form a slag, and the oxygen reacts with the remaining sulfur to form sulfur dioxide. The slag may be fed back into the flash furnace to act as a flux, and the sulfur dioxide is processed through the acid plant. After the slag is removed, a final injection of oxygen removes all but a trace of sulphur. The resulting molten material is called the blister (ingot) and contains about 99% copper by weight. Slag contains materials like iron, alumina, calcium oxide, silica, etc.

The third stage is production of copper anode from blister copper to reach copper percentage from approx. 98.5 % to approx. 99.5 %. The fourth stage is transfer of copper anode to production of copper cathode through electrolytic refining with copper percentage from approx. 99.5 % to approx. 99.9% purity.

2.2 Refining / Purification of Copper

Copper blister still contains trace levels of sulfur, oxygen, and other impurities to hamper further refining. To remove or adjust the levels of these materials, the blister copper is first fire refined before it is sent to the final electro-refining process.

The blister copper is heated in a refining furnace. Air is blown into the molten blister to oxidize some impurities. A sodium carbonate flux may be added to remove traces of arsenic and antimony. After this stage, the molten copper, with more than 99.5% purity is moulded to form large electrical anodes, which act as the positive terminals for the electro-refining process.

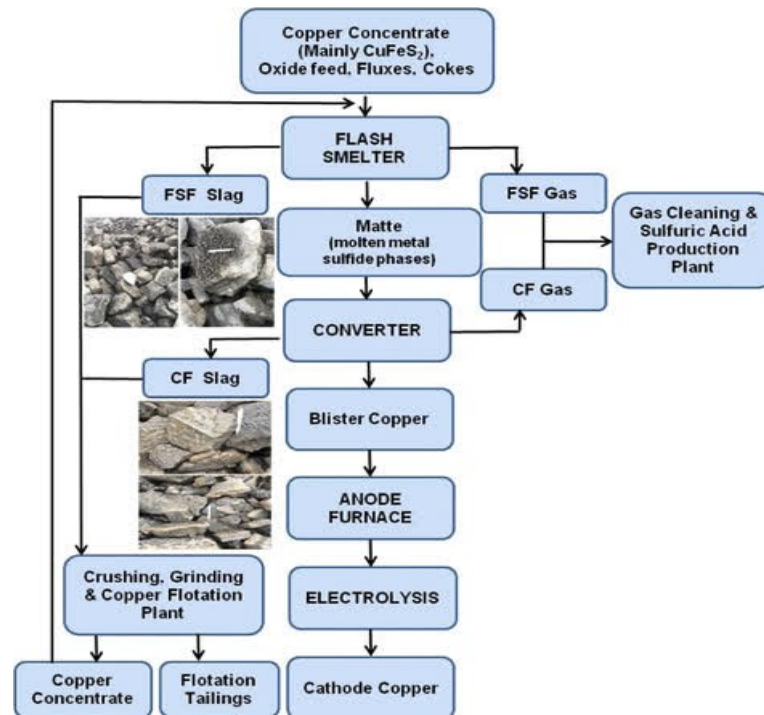


Fig-1: Flowchart for copper smelting process (Seyrankaya,A.2022)

Slabs of impure copper (blister copper) sheets are refined by electrolysis process, where thin sheets of pure copper metal or stainless steel or titanium are immersed in a solution of copper(II) sulfate and sulfuric acid, where thin sheets acts as cathode, and the impure slabs are the anode. When an electrical current is passed, the copper is stripped off the anode and is deposited on the cathode. Most of the remaining impurities fall out of the copper sulfate solution and form a slime at the bottom of the tank. After about 9-15 days, the cell is turned off and pure copper in the form of the cathodes 99.95-99.99% purity is produced.

The slime that collects at the bottom of the tank contains gold, silver, selenium, and tellurium. It is collected and processed to recover these precious metals. The overall process flow diagram is shown in fig-1.

2.3 Casting

After refining, the copper cathodes are melted and cast into ingots, cakes, billets, or rods depending on the final application. Ingots are also re-melted along with other metals to make brass and bronze products. They are rolled to make copper plate, strip, sheet, and foil products. Billets are cylindrical logs that are extruded or drawn to make copper tubing and pipe. Rods are usually cast into very long lengths, which are coiled. This coiled material is then drawn down further to make copper wire.

2.4 Copper Manufacturing units In India

In India, Rajasthan, Madhya Pradesh and Jharkhand are the only states involved in production of copper ore in the country. However, copper concentrates are imported by the M/s Birla Copper of M/s Hindalco Industries Limited and M/s Sterlite Copper of M/s Vedanta Limited that produces copper metal in smelters located in the States of Gujarat and Tamil Nadu, respectively. The total installed capacity of copper smelting in the country is about 01 Million Tonnes per annum, which includes primary smelters, secondary smelters and continuous casting plant.

Major copper mines are the Khetri copper belt in Rajasthan, Singhbhum copper belt in Jharkhand and Malanjkhand copper belt in Madhya Pradesh. Major mining operators are M/s HCL, Khetri, M/s Indian Copper Complex, Singhbhum, M/s Hutti Gold Mines Ltd, Ingeldhal and M/s Sikkim Mining Corporation (SMC), Dikchu.

3.0 Generation and Characteristics of Slag

As discussed above, copper slag is generated during copper extraction through smelting furnaces. In smelting, impurities become part of slag which floats on the molten metal. Light density floating slag is separated and channelized for recovery, utilization or disposal. Hot liquid slag is granulated by quenching with

water to facilitate cooling and crystallization. The slag generated from primary smelters - flash smelters and converters generally have recoverable copper content.

Copper from slag is recovered by pulverising and gravity separation.



Granulated Copper Slag

After recovery of copper, the slag is required to be handled further for possible utilization and storage prior to disposal. Due to presence of Iron and silica, granulated copper slag is also called ferro-sand. It is estimated that for every tonne of copper produced, about 1.6-1.9 tonnes of copper slag is generated as a waste. Since large quantities of slag is getting accumulated with the increase in the production capacities, smelter units are required to explore various options for recovery of resource material, storage and disposal. Improper storage of slag in huge quantities over a long period may consume land resource and also there is risk of seepage of heavy metals from unlined open disposal sites. Globally, various options for utilization of copper slag are being explored. Status of slag generation, utilization and storage of 3 smelter units in the country is given below.

Slag generation, utilisation and storage data*

Plant	Slag Type	Slag stored on 31.03.2021 (in MT)	Generated (2021-22) (in MT)	Utilised (2021-22) (in MT)	Slag stored on 31.03.2022 (in MT)
A	Granulated Slag	325837	693128	695141	323824

Plant	Slag Type	Slag stored on 31.03.2021 (in MT)	Generated (2021-22) (in MT)	Utilised (2021-22) (in MT)	Slag stored on 31.03.2022 (in MT)
	Converter Slag	22625	3726	806	25544
B	Granulated Slag	344189	0	23661	320528
C	Granulated Slag	30000	0	0	30000
		For 2017-18			
			666007	684152	

*as per industry response

3.1 Properties of Copper Slag

Copper smelter slag is a black coloured glassy, shiny and granular material. Main constituents of copper slag are iron, copper, sulphur, lime and silica. The elements in copper slag are present in the form of FeO, Fe₃O₄, CaO, Al₂O₃, SiO₂, Cu, MgO, S, Zn and others. The particle size of granulated slag is similar to the range of size of sand particles used in construction. The chemical composition, physical and geo-technical properties of slag is presented in Tables below.

Chemical composition of Ferro sand (copper slag)

Elements	Ferro Sand or Copper slag	Industry A (Dry Basis)	Industry B
Copper (%)	0.4 - 0.5	0.7 - 1.3	0.31
Iron (%)	55 - 65	40 - 46	52.55
Sulphur (%)	0.5 - 1.5	0.20 - 0.46	--
Silica (%)	28 - 35	26 - 30	26.60
Lime-CaO (%)	3 - 5	0.015 - 0.032	3.00
Arsenic (ppm)	10 - 250	--	--
Cadmium	5 - 8 ppm	0.0002 - 0.0006 %	--
Chromium	0.5 - 1.0 ppm	0.018 - 0.04 %	--
Cobalt	100 - 200 ppm	0.020 - 0.069 %	--
Nickel	25 - 50 ppm	0.020 - 0.028 %	--
Lead	200 - 250 ppm	0.01 - 0.032 %	613 ppm

Guidelines on Management of Pyro-metallurgical Slags (Copper Smelters)

Elements	Ferro Sand or Copper slag	Industry A (Dry Basis)	Industry B
Zinc	500 - 1500 ppm	0.05 - 0.14 %	--

Source: Industry

Physical properties of Ferro sand (copper slag)

Specific gravity	3.58
Bulk density	1.7-1.8
Loss on ignition	NIL
Proportion of coarse sand size particles, 2mm-4.75mm	28%

Source: Industry

Geotechnical characteristics of Copper slag

Property	Ferro Sand or Copper Slag
Grain size analysis	
Gravel (%)	2
Sand (%)	98
Silt (%)	0
Clay (%)	0
Atterberg limit test	
Liquid limit (%)	-
Plastic limit (%)	NP
Plasticity index (%)	-
Modified Proctor test	
MDD (kN/m ²)	23.2
OMC (%)	7
Direct shear test (saturated)	
c (kN/m ²)	0
(degree)	35

Property	Ferro Sand or Copper Slag
Permeability (m/sec)	1.7x10 ⁻⁴
CBR (%)	35

Source: Industry

4.0 Current Practices for Handling and Management of Pyro-Metallurgical Slags

Copper slag can be used for several purposes, most value added product from the slag is the production of abrasive tools and blasting material. This utilization option can consume up to about 15% to 20% of the slag generated. Rest of the copper slag can be utilised as construction material and aggregate of cement. Some of the international practices for utilization of Copper Slag are given at Annexure-I.

4.1 Utilization of Slags in road construction and as Aggregates in Concrete

Indian Road Congress has published "Guidelines for Use of Iron, Steel and Copper Slag in Construction of Rural Roads-2018". These guidelines provide detailed information on engineering properties of these slags along with the possible utilization options.

The Indian Standards IS-383: 2016 of the Bureau of Indian Standards on "Specifications of Coarse and Fine Aggregates for Concretes" permits use of aggregates other than natural sources including slags as given at Annexure-A of said standards. Engineering quality requirements of aggregates are specified in main document.

5.0 Guidelines for management of pyro-metallurgical copper slags:

- i.) Smelter units shall use best available options for maximising internal use and recovery of resource material from slags.
- ii.) Smelter units shall adopt appropriate cooling/quenching/treatment techniques to maximise recovery of resource material from slag. Further, the unit shall install facilities for recovery of copper and other metals from slags such as grinding, gravity separation, flotation based separation, hydro-metallurgical process etc.

- iii.) The residual copper in slags prior to disposal or further utilization shall preferably be less than 0.8% by dry-weight and shall not exceed 1.2%.

If the slag is processed for recovery of remaining metals by adopting hydrometallurgical/chemical processes, the residual material shall undergo TCLP test as per Schedule-II of Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016 to determine disposal pathways.

- iv.) Smelter units shall adopt environmental friendly practices in collection, handling, storage and transportation of copper slag.
- v.) Smelter units shall have environmental policy for continuous improvement by adopting cleaner / new techniques. Environment management should be supervised by senior management.
- vi.) Un-utilizable waste slag shall be stored in captive landfill having impermeable base and garland drain, to prevent the soil and water/groundwater contamination. Units shall not store un-utilised or waste slag in unlined landfills beyond one year from date of issuance of these guidelines.
- vii.) A new landfill for waste slag storage having a single layer of geomembrane of thickness 1.5 mm over a compacted clay along with drainage and leachate collection system is recommended.
- viii.) All units shall monitor the ground water quality around storage area during pre and post monsoon seasons through a recognised laboratory (under the Environment (Protection) Act, 1986 or any NABL Accredited) for assessment of the contamination (if any) and such assessment reports shall be submitted to respective SPCB/PCC annually.
- ix.) After recovery of copper, slag from pyro-metallurgical route may be used in following areas subject to meeting the quality requirement/standards.
- i. Abrasive materials
 - ii. Aggregate in cement-concrete
 - iii. Cement-concrete blocks/bricks/tiles
 - iv. Cement Production
 - v. Construction of subsurface for Construction of roads / railways

- x.) Industry intending to utilise copper slag for any other purpose, not mentioned above may submit the proposal along with relevant details to CPCB through the respective SPCB/PCC with their assessment and recommendations for permitting the same by SPCB/PCC.
- xi.) Industry shall maximize external use or recycling of slag which cannot be used or recycled internally. Industry shall take steps to achieve 100% slag utilization for current generation, with effective from the F/Y 2024-25. Thereafter, the maximum allowable storage of fresh slag at any point of time shall not be more than 03 months' generation.
- xii.) Smelter units shall take steps to utilise the legacy slag stored in industry premises within two years.
- xiii.) Industry should submit the annual report on generation, quantity stored, quantity utilized and the concerned usage, and disposal as per format given in Annexure-II, or on online waste reporting portal as and when developed by CPCB, by 30th June of the following year to SPCB/PCC and CPCB.

Annexure - I**Some of the international practices for utilization of Copper Slag**

1. Transportation Research Board, Washington (Collins and Cielieski, 1994) used fine copper slag in hot mix asphalt pavements built in California. The use of granulated copper slag into asphalt mixes in Georgia to improve stability.
2. Michigan Department of Transportation Specifications indicate about the use of reverberatory copper slag for hot mix asphalt pavement as coarse and fine aggregate.
3. American Concrete Institute studied about use of copper slag as construction materials and characteristics observed to be equivalent to traditional ones.
4. Building and Construction Authority, Singapore mentions about use of washed copper slag as recycled materials for construction.
5. US Department of Transportation: (User Guidelines for Waste and By-product Materials in Pavement Construction) - mentions about use of air-cooled and granulated copper slag for granular road base and reverberatory copper slag for granular aggregate in Michigan.
6. Minerals Research and Recovery, Arizona, USA prepared a grained abrasive through use of copper slag and product found to be consistent in composition and physical properties and environmentally safe.

Source:

[1, 2, 3, 6] - B. Gorai et al. | Resources, Conservation and Recycling 39 (2003) 299-313.

[4] - Guidelines for management, handling, utilisation and disposal of slag generated from copper manufacturing plants.

[5] - User Guidelines for Waste and By-product Materials in Pavement Construction

Annexure - II

Format for Reporting Annual Generation, Storage, Utilization and Disposal

1. Name and Address of the Plant
2. Contact Person Responsible for Management of Copper Slag
 - a) Name and Designation:
 - b) Mobile Number:
 - c) Email ID:

Financial year	Slag Type*	Opening Stock(in MT)	Quantity Generated after Cu recovery during the F/Y (in MT)	Utilised during the financial year (in MT)		Slag stored at the end of the financial year (in MT)
				Quantity	Usage Type	
	(a) Primary smelter Slag					
	(b) Flash Smelter slag					
	(c) Converter Slag / Dore Furnace slag					
	d) Other slag (pl specify)					

*As applicable

Guidelines on Management of Pyro-metallurgical Slags (Iron & Steel Slags)

Ver 1.0



December, 2023

Central Pollution Control Board

(Ministry of Environment, Forest and Climate Change)

Parivesh Bhawan, Shahdara, Delhi - 110032

Contents

1.0 Introduction	3
2.0 Manufacturing Process - Iron & Steel plants	3
2.1 Production of Slag in India	6
2.2 Iron and Steel manufacturing in the Country	6
3.0 Pyro-metallurgical Slags Generation and its Properties - Iron & Steel Plants	8
3.1 Slag from Blast Furnace	9
3.2 Slag from Desulphurisation Process	10
3.3 Slag from Basic Oxygen Furnace	10
3.4 Slag from Ladle Furnace Process	11
3.5 Slag from Electric Arc Furnace process	11
4.0 Current Practices for Handling and Management of Pyro-metallurgical Slag	12
4.1 Iron making slag from Blast Furnace/ Corex /Midrex	12
4.2 Slag Granulation	12
4.3 Air Cooling in Dry Pit	13
4.4 Steel making slags from LD- Convertors/EAF/Conarc/Induction Furnaces	13
5.0 Utilization of slags in road construction and as aggregates in concrete	13
6.0 Guidelines for management of pyro-metallurgical slags of iron and steel plants	14
Annexure - I	16
Filled up questionnaires received from units	16
Annexure-II	25
International Practices in management of Iron and Steel Slags	25
Annexure - III	27
Format for submission of annual report on slag generation, utilization and storage	27

1.0 Introduction

The Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 notified by Ministry of Environment, Forest and Climate Change, Government of India for the management of hazardous and other wastes define the hazardous waste as below:

“hazardous waste” means 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;*

Pyro-metallurgical slags are defined as “High Volume Low Effect Waste” (herein referred as HVLE wastes) under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules 2016) and were similarly defined earlier under Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008. The relevant provision given as note at the end of Schedule-I of the HOWM Rules 2016 is as follow:

*“The high volume low effect wastes such as fly ash, Phosphogypsum, Red Mud, jarosite, **Slags from pyro-metallurgical operations**, mine tailings and ore beneficiation rejects are excluded from the category of hazardous wastes. Separate guidelines on the management of these wastes shall be issued by Central Pollution Control Board.”*

NITI Aayog constituted a Committee on Circular Economy which recommended to promote initiatives for Circular Economy in the metal sector (ferrous and non-ferrous) through an action plan. The said action plan includes issuance of SOP for utilisation of resource material from Iron and steel slag, which is stipulated under Hazardous and Waste Management Rules 2016.

The increased processing of iron concentrates, and constraints in handling large volume of iron and steel slags would require iron & steel plants to explore the possible options for utilization or disposal including the need for studying the options. The guidelines are prepared to deal with the handling and management of slags generated from pyro-metallurgical operations in Iron & Steel Industries.

2.0 Manufacturing Process - Iron & Steel plants

The manufacturing process in integrated Iron and Steel plants includes iron making followed by steel making. In an Integrated Iron and Steel plant, the iron making is achieved through operation of blast furnace (BF) and the steel making is done

through LD (Linz-Donawitz) steel making shop (SMS) operations. The Integrated steel networks of iron and steel making comprises of various production units such as coke ovens, sinter plant, palletisation plant, blast furnaces and basic oxygen furnace (BOF) for steel making followed by casting house operations.

In an Integrated Iron and Steel Plant the main operational unit is the blast furnace where the iron ores are primarily converted to liquid iron (also term as hot metal). The iron ores for blast furnace are prepared in two agglomeration units – the sinter plant and the pellet plant. Sintering is a process of agglomeration of fines of iron ores into small round products from a pre-designed mixture of fine ores, residues and additives, followed by high temperature sintering of finished products and palletisation is a process of agglomeration of micro fines of iron oxide ores (concentrate) into small round balls. The finished products from sinter plant and pellet plant are taken to blast furnace for feed. In addition to iron ores, coke and pulverised coal are added in blast furnace as reducing agents. The coke used in blast furnace is produced in coke oven through distillation of coal.

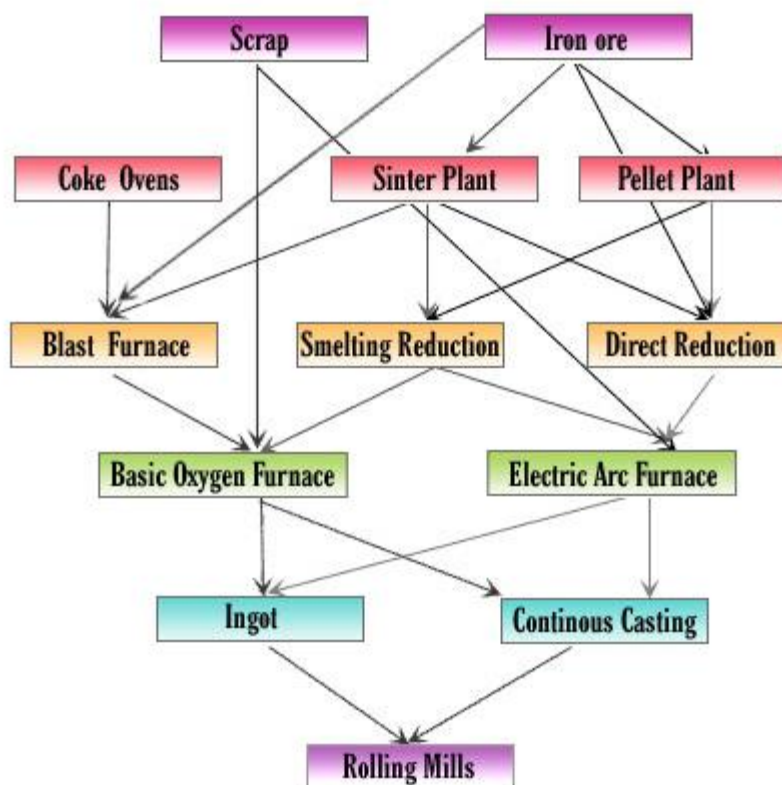


Fig: Technological options for converting iron ore to steel products

(Source: <https://sail.co.in/en/learning-center/manufacturing-process>)

The raw materials such as coke, mixture of sinter and/or pellets, lump ore, fluxes etc., are charged into blast furnace from the top and hot blast is provided to supply the necessary oxygen required for carbon monoxide (CO) formation. As the feed of blast furnace moves down, the iron ores get reduced and the liquid iron along with

slag is collected from the bottom of the blast furnace. The liquid iron and slag are tapped (collected) separately from the furnace and processed for further requirements.

The liquid iron tapped in container is transported through torpedo ladle-system to Steel manufacturing units consisting of de-sulphurisation unit, LD converter and Ladle furnace unit. The de-sulphurisation process is deployed to ensure removal of sulphur from Hot Metal. This is followed by Basic Oxygen Furnace unit where removal such of undesired elements as C, P, Si, etc. is carried out through charging, blowing and tapping method. The carbon content in the hot metal (liquid iron) is lowered to less than 1% from approx. 4% carbon content in hot metal. The hot metal from basic oxygen furnace is taken to Ladle Furnace Unit for raising the temperature and adjustment of chemical composition of hot metal and refining of steel products as per required quality. The liquid metal is processed to cast house where liquid metal is poured in pre-defined moulds and allowed to cooled and solidify as ingots. The ingots are re-heated and rolled into cold rolling mill and/or hot rolling mill to produce the final desired steel products. In steel making process slag is generated from de-sulphurisation, LD convertor and ladle furnace.

The other steel making processes include the iron making from rotary kiln (DRI) furnace, Gas based vertical shaft (Midrex, HYL) furnace, Corex furnace, etc and steel making from Electric Arc Furnace, Conarc furnace, Induction furnace.

The process of iron making from rotary kiln or gas based vertical shaft furnace (Midrex) is termed as Direct Reduction process where oxygen is removed from iron ores to produce high metallic solid iron product. In the rotary kiln process, the raw materials namely iron ores, dolomite and coal are fed into rotary kiln and heated in range of 700-1200°C for reduction of iron oxides. In the gas based vertical shaft furnace process, the iron ore pellets and calibrated lump ore are fed into the gas based vertical shaft furnace to produce high metallic solid iron products in the form of Cold DRI or Hot DRI or DRI briquettes and heated in the range of 600-1050°C.

The process of iron making without coke and using two stage reduction process is termed as Smelting Reduction (Corex furnaces) where, in first stage iron ore is heated and reduced by gases generated from the second unit, which is a smelter-gasifier supplied with coal and oxygen. The partially reduced ore is then smelted in the second unit, and liquid hot metal or (in some cases) liquid steel is produced.

For steel making from Electric Arc Furnace (EAF) or Conarc furnace, Induction furnace (IF), the reduced iron along with coal/metallurgical coke, lime, dolime and scraps (if required) are fed into electric arc furnace or Conarc furnace for reduction of oxides for further refining process and formation of alloy/iron products as per required conditions. Slag is generated from electric arc furnace and Conarc furnace which is known as EAF slag or Conarc slag having different physical, chemical and metallurgical properties compared to Converter (LD/BOF) slag.

2.1 Production of Slag in India

About 24 million tonnes of blast furnace slag and 12 million tonnes of steel slag is generated annually in steel industry. It is expected to reach 45-50 million tonnes of BF slag and 15-20 million tonnes of BOF slag by 2030.

EAF and IF slag generation is around 5 million tonnes annually and is expected to increase to more than 10 million tonnes annually by 2030.

(source: Indian Mineral Yearbook 2020)

2.2 Iron and Steel manufacturing in the Country

Total Steel Production Capacity in the Country at Present (2021) is 143.91 Million Tonnes.

The details of production, consumption, export and import of finished steel are as following: -

Year	Total Finished Steel (million tonnes)			
	Production	Consumption	Export	Import
2019-20	102.62	100.17	8.36	6.77
2020-21	96.20	94.89	10.78	4.75
April-June, 2021	26.35	24.85	3.56	1.16

Source: Joint Plant Committee (JPC)

Details of Steel Production Capacity and State-wise No. of Units (2020-21)

A.		Public Sector	
State	Unit	(thousand tonnes) Capacity	(thousand tonnes) Production
Steel Authority of India Limited (SAIL)			
Chhattisgarh	Bhilai Steel Plant	6000	4244
West Bengal	Durgapur Steel Plant	2200	2085
Odisha	Rourkela Steel Plant	3800	3498
Jharkhand	Bokaro Steel Plant	4600	3380
West Bengal	IISCO Steel Plant	2500	1847
West Bengal	Alloy Steels Plant	234	58
Tamil Nadu	Salem Steel Plant	180	100
Karnataka	Visveswaraya Iron and Steel Ltd.	118	0
Total		19632	15213
Rashtriya Ispat Nigam Limited (RINL)			
Andhra Pradesh	Vizag Steel Plant	6300	4302
TOTAL: Public Sector		25932	19515

Guidelines on Management of Pyro-metallurgical Slags - Iron & Steel Slags

B. Private Sector			
		(thousand tonnes)	(thousand tonnes)
State	Units	Capacity	Production
Andhra Pradesh	24	2314	1596
Arunachal Pradesh	3	125	0
Assam	6	131	59
Bihar	13	830	465
Chhattisgarh	80	13191	8939
Goa	10	405	400
Gujarat	71	13688	8403
Haryana	14	1037	731
Himachal Pradesh	25	1144	766
Jammu and Kashmir	8	189	118
Jharkhand	30	14888	12169
Karnataka	24	15143	11688
Kerala	29	480	253
Madhya Pradesh	9	457	369
Maharashtra	54	12030	7925
Meghalaya	5	181	37
Odisha	52	21530	17934
Punjab	114	5064	2917
Rajasthan	31	1005	589
Tamil Nadu	90	3542	2059
Telangana	27	1605	1192
Tripura	1	30	7
Uttar Pradesh	46	1617	1005
Uttarakhand	39	1524	950
West Bengal	39	5238	3085
Dadra and Nagar Haveli	10	168	145
Daman and Diu	3	46	40
Delhi	2	16	10
Total: Private Sector	869	117982	84030
Total: Public Sector	9	25932	19515
All Region Total	878	143914	103545

Source: Joint Plant committee

The major wastes produced in integrated steel plants include BF Slag / Iron Slag, Steel Melting Shop (SMS) Slag accounting for nearly more than half a ton for each

ton of steel produced. Generally, BOF/LD route produces 150-180 kg and EAF route produces 200-220 kg slag per ton of steel.

The iron making and steel making slag are different physically and chemically, there are different process technology for iron making like blast furnace, Corex and Sponge iron (DRI - Rotary kiln or Midrex) and steel making like BOF/LD Converter, EAF, Conarc, IF, etc. Every process generates different kind of slag with different composition range and physical properties. Major Indian iron and steel manufacturing process is summarised in table given below.

Process	Technology	Input	Output
Iron Making	Blast Furnace	Iron ore pellet, Lump Ore, Iron ore Sinter	Hot metal, BF Slag (granulated/ungranulated)
	Corex	Iron ore pellets	Hot metal, Corex Slag (granulated/ungranulated)
	Sponge Iron	Gas based sponge iron (iron ore pellets, Calibrated lump ore Coal based sponge iron (iron ore, coal, limestone)	Direct Reduced Iron, Char
Steel Making	BOF (LD Converter)	Hot metal, Lime, Dolime, Oxygen,	Liquid Steel, BOF Slag
	EAF/Conarc	Hot metal/ Cold DRI/ Hot DRI/ Briquettes, Steel Scrap, Pig Iron, Lime, Dolime, Oxygen	Liquid Steel, EAF Slag Conarc Slag
	Induction Furnace	Steel Scrap, Pig Iron, DRI	Liquid Steel, IF Slag
	Ladle Furnace	Liquid Steel from EAF / BOF	Liquid Steel, LF Slag

[Source: ISA]

3.0 Pyro-metallurgical Slags Generation and its Properties - Iron & Steel Plants

As per Indian Minerals Yearbook 2019 (Part-II: Metals and Alloys) Iron, Steel & Scrap and Slag (August 2021), the slag from iron and steel plant is defined as:

Slag is a by-product generated during manufacturing of pig iron and steel. It is produced by action of various fluxes upon gangue materials within the iron ore during the process of pig iron making in blast furnace and steel manufacturing in steel melting shop. Primarily, slag consists of calcium magnesium, manganese and aluminium silicates and oxides in various combinations. The cooling process of slag is responsible mainly for generating different types of slags required for various end-use consumers.

The chemical composition of slag may remain unchanged but physical properties vary widely with the changing process of cooling.

In an integrated iron and steel plant, the slag is generated from the process namely Blast Furnace, De-sulphurisation Process, Basic Oxygen Furnace Process and Ladle Furnace Process. The composition of iron ore, coal/coke, fluxes, etc. used in iron

making plays an important role in the quantity and quality of slag generation. Certain stand-alone units namely Electric Arc Furnace, Induction Furnace, Secondary Refining units, etc. also generated slag. The quantity of slag generated in Electric Arc Furnace and Induction Furnace processes is less in comparison to quantity of slag generated from other processes.

Most of the steel plants are utilizing 100% of the BF slag produced mostly in cement making and some portion as aggregate, while others are closer to reach the 100% utilization. However, the utilization of SMS (particularly LD) slag is limited due to the following:

- Phosphorous content;
- High Free lime content; and
- Higher specific weight.

To resolve these issues, Ministry of Steel is funding research & development initiatives for finding ways & means for utilization of steel slag.

3.1 Slag from Blast Furnace

The slag generated from blast furnace is tapped in molten form and have a temperature upto 1500 °C. The blast furnace slag is processed with water or air for formation of desired BF slag product based on end use. There are various methods available for processing of blast furnace slag as below:

Method	Process	End Product
Blowing	Quick cooling by air and steam to produce glass fibre	Slag wool
Granulation	Quick cooling with water to produce vitrified granulates (<5 mm)	Granulated blast furnace slag
Pelletizing	Quick cooling in air to produce glassy/crystalline pellets (< 20mm)	Blast furnace slag pellets
Foaming	Moderate cooling with less water to produce a crystalline/glassy and porous material	Foamed blast furnace slag
Cooling in air	Slow cooling in air in slag pits to produce crystalline material	Crystalline blast furnace slag

#BREF -Best Available Techniques (BAT) Reference Document for Iron and Steel Production

The commonly adopted methods by iron and steel plants in the country for cooling of slag from blast furnace are air cooling and granulation. The Air Cooled BF slag is a crystalline, rock like slag whereas Granulated BF slag is fine granules type slag. The physical properties of slag from blast furnace have similarity with reference to other natural rock materials.

A typical chemical analysis of the slag from blast furnace in the country is tabulated as below:

Composition		SiO ₂	CaO	Al ₂ O ₃	MgO	MnO	FeO	Fe	S	TiO ₂	Hg
Range (%)	Min	26.4	28.72	14	0.52	0.07	0.04	0.08	0.3	0.51	0.018 mg/ Kg
	Max	37.2	37.22	35.3	10.21	0.47	0.66	0.9	0.85	0.9	
Avg (%)		33.701	35.268	19.588	8.004	0.410	0.483	0.545	0.593	0.707	

[Source: Industry]

BF slag generation rate based on 2017-18 data of 11 major producers varied between 320-426 kg per ton of hot metal (average-358.27 kg per ton of hot metal) and total annual BF slag generation for 2018-19 and 2019-20 in the country was estimated to be 28.3 MT and 27.5 MT.

(Reference: Status Report on Iron and Steel Slag (Generation and Utilization) MoS)

3.2 Slag from Desulphurisation Process

The slag generated in Desulphurisation process is a heterogeneous slag and partially melted. The composition of slag generated from desulphurisation process depends on the desulphurisation agents used for the process. The slag contains relatively high sulphur content. The slag is processed to metal recovery plant for separation of metallic and non-metallic parts.

A typical chemical composition of the slag from the desulphurisation process is as below:

Composition	SiO ₂	CaO	Al ₂ O ₃	MgO	MnO	Total Fe	P ₂ O ₅	Cr ₂ O ₃	S	Free CaO
Concentration (wt-%)	18	27	8	10	< 0.5	20	< 0.2	0.3-0.85	< 4	< 5

[Source: Industry]

The rate of generation of slag from desulphurisation process is 3-21 kg/ton of Liquid steel (BREF) and 14-16 kg/ ton of hot metal (MoS).

3.3 Slag from Basic Oxygen Furnace

The slag generated from Basic Oxygen Furnace is dependent on the hot metal, flux composition and desired grade steel for end use. The slag is tapped from pot after tapping of liquid steel is completed. The slag is collected in slag pot (ladle) and transferred to cooling yard/pit for air cooling and/or water sprinkling. The effective cooling of the slag is required for achieving the required temperature for further processing. The cooling processes includes the following methods:

Methods	Process
Air Granulation	Use of high pressure air to solidify the molten slag and granulation after cooling.
Instantaneous slag chill (ISC)	Molten slag is collected in steel box for cooling or solidification and further treatment with water sprinkling and immersion cooling.
Water Granulation	Molten slag is collected in container and cooled through rapid water sprinkling.

The chemical composition of the slag from Basic Oxygen Furnace is as below:

Composition		SiO ₂	CaO	MgO	MnO	FeO	Fe ₂ O ₃	Total Fe	P ₂ O ₅	S	Al ₂ O ₃	Free CaO	Hg
Range (%)	Min	10.13	40.95	4.16	0.58	13.54	23	16	0.6	0.049	0.27	2.53	0.086 mg/ Kg
	Max	19.06	52.35	15.15	3.12	23.5	23.57	20.63	2.68	3.5	5.36	3.96	
Avg. (%)		14.276	46.803	8.454	1.16	19.3	23.285	17.866	2.864	0.954	1.733	3.233	

[Source: Industry]

BOF slag generation rate is 85-165 kg/ton of Liquid steel (BREF) and 150 kg/ton of hot metal (MoS) and total annual BOF slag generation for 2017-18 in the country was estimated to be more than 7.4 MT (Reference: Status Report on Iron and Steel Slag (Generation and Utilization) MoS).

3.4 Slag from Ladle Furnace Process

The slag is generated from Ladle Furnace Process where refining of steel is carried out in ladle after Basic Oxygen Furnace. The slag generated during the ladle furnace process is dependent of the slag composition of primary stage, flux & ferro-alloys added during the process and other technological parameters. The ladle furnace process involved addition of fluxes and ferro-alloys as per desired end product requirements.

Typical chemical composition of the slag generated from Ladle Furnace Process for low alloy steel (< 5% alloys in total) is as below:

Composition		SiO ₂	Al ₂ O ₃	CaO	MgO	MnO	FeO	Fe ₂ O ₃	Total Fe	P ₂ O ₅	S	Cr ₂ O ₃
Range (%)	Min	2	8	40.08	4.5	0.2	0.5	4.4	0.37	0.11	0.085	0.14
	Max	20	35	57	10	1.95	15.21	4.4	0.37	0.68	1.83	0.43
Avg. (%)		9.472	22.766	43.772	7.778	0.369	2.885	4.4	0.37	0.224	0.425	0.285

[Source: Industry]

The rate of generation of slag from Ladle Furnace Process is 9-15 kg/ton of Liquid steel (BREF) and 12-27 kg/ton of Steel (MoS). The composition of Ladle furnace slag varies significantly based on the type of steel produced. Slags produced during production of high alloy steels (>5% alloying elements) may have higher amounts of Chromium, Nickel, Cobalt, Phosphorus, Sulphur etc.

3.5 Slag from Electric Arc Furnace process

The quality of slag generated from the electric arc furnace is dependent on the hot metal/Hot DRI/cold DRI/Flux/Scrap composition and desired grade of steel to be produced for end use. A foamy slag practice is followed where slag is removed out from the spout of the furnace first in the form of foam. The slag is collected in a pot stationed at the bottom of the furnace known as slag pot. This process starts a few minutes from the beginning of the process and continues till the end of steel making.

At the end small amount of slag remains in the furnace and liquid steel is tapped by opening the bottom tapping door on the other side where liquid steel is collected in a ladle. The liquid slag is taken in the slag pot to slag processing site where it is cooled either naturally or water spray or air granulation process based on required quality of product for end. The cooling process explained is one of many followed and the cooling process will vary from manufacturing plant wise.

The chemical composition of EAF slag using Sponge Iron/Hot metal/internally recycled scrap as input materials is shown in table below:

Composition		SiO ₂	CaO	MgO	MnO	Total Fe	P ₂ O ₅	T-Cr	Al ₂ O ₃	Free CaO
Range (%)	Min	17	30	5	0.4	15	0.1	0	5	0
	Max	22	42	8	0.5	23	1	0.1	9	0.2
Avg. (%)		19.5	35.5	6.5	0.45	19	0.5	0.05	7	0.01

[Source: ISA]

Generally BF/BOF route produces 150-180 kg and EAF route produces 200-220 kg slag per tonne of steel, however from Conarc furnace is about 165 kg/Tonne of crude steel, however, the quantity of slag generated will be dependent on the quality of input materials especially Iron ore in BF/BOF route.

Globally various options for utilization of iron slag and steel slag are being explored. Status of iron and steel slags generation, utilization and storage in major iron & steel plants in the country is given in **Annexure-I**.

4.0 Current Practices for Handling and Management of Pyro-metallurgical Slag

4.1 Iron making slag from Blast Furnace/ Corex /Midrex

The Slag generated from Blast Furnace is taken to slag handling system where slag is treated through either quenching with water for conversion to granulated slag in Slag Granulation Plant or cooling with air in open dry pit at Blast Furnace. The granulated slag is designated for further use in cement industries for co-processing with raw materials. The air-cooled BF slag is generated while solidification under atmospheric conditions in slag dry pit.

4.2 Slag Granulation

The molten metal in blast furnace along with slag is passed through channel at tapping point in blast furnace bottom. The slag is separated from the molten metal with the use of skimmer method. The separated slag is routed to granulation tank where slag and water get mixed and flows to dewatering drum by action of gravity. Further, it is quenched by water jets in blowing box to produce granulated slag. The de-watering facility in the channel separates the water from granulated slag and the

hot water is collected in water tank below the conveyor belt. The granulated slag is taken to dedicated slag storage area or yard.

4.3 Air Cooling in Dry Pit

The slag dry pit method is used for storage of slag whereby the slag from blast furnace is diverted to dry pits through slag runner and also natural air cooling. The air-cooled slag is further processed to crushing & screening and subsequently utilized use in making insulation material, road sub-surface material, etc.

4.4 Steel making slags from LD- Convertors/EAF/Conarc/Induction Furnaces

The solidified steel slag from different processes is taken to recycling plant for removal of magnetic components and reduction in size. The slag is graded as per further requirement. The Basic Oxygen Furnace slag is stabilized through natural ageing or weathering whereby the steel slag is stocked in open air for adequate exposure to moisture and further hydration of CaO and MgO present in slag. The process is slow in nature, need adequate open space and requires longer time duration for stabilization to occur.

In order to overcome the existing issues of slow weathering, the slag is processed through accelerated ageing process whereby the slag is treated with steam for complete hydration of slag in relatively shorter time duration. The steam passes through the inside pores of slag and hydrates the free CaO and MgO. This results in loss of expansion of slag from 3-5% to < 0.4 %. The steam ageing is carried out in two different methods - atmospheric steam ageing process and pressurised steam ageing process.

EAF/Conarc slag is graded and magnetically separated like LD slag. However these slags do not require any aging treatment as the expansion in slag is inherently low due to absence of free lime content. Some of the international practices are given at **Annexure- II**.

5.0 Utilization of slags in road construction and as aggregates in concrete

Indian Road Congress has published "Guidelines for Use of Iron, Steel and Copper Slag in Construction of Rural Roads – 2018". These guidelines provide detailed information on engineering properties of these slags along with the possible utilisation options.

The Indian Standards IS-383: 2016 of the Bureau of Indian Standards on "Specifications of Coarse and Fine Aggregates for Concretes" permits use of aggregates other than natural sources, including slags as given in Annexure-A of said standards. Engineering quality requirements of aggregates are specified in main document.

Central Road Research Institute, New Delhi (CSIR-CRRI) is bringing out revised Guidelines for Utilization of Steel Slag in Road Construction based on the research findings of CSIR-CRRI emanated out of various steel slag road sections laid across

India using processed steel slag aggregates of BOF, EAF and CONARC Steel Slag of some major steel plants.

6.0 Guidelines for management of pyro-metallurgical slags of iron and steel plants

Iron and steel plants shall follow the principles of resource efficiency for optimal use of primary resources in production of iron and steel. The plants shall take steps to facilitate utilization of various wastes, by-products or process rejects including slags. They shall set-up facilities for internal recovery of material, treating the slags to make it utilizable as alternate material outside the plant. Steel plants shall also take adequate safety measures and standard operating procedures shall be practiced in safe handling of iron and steel slags including the quenching, granulation and recovery operations. It shall be ensured that the slag is tapped in the slag pot or pit only after ensuring that slag pot or pit is dry. The flow of reactive slag into ladle is to be avoided by adopting suitable operational practices. After pouring and filling the Ingot moulds/ Bottom plates, foundry ladle shall be tilted with the help of auxiliary hoist of crane and total residual slag/metal shall be dumped into slag pots slowly. The safety guidelines for handling of hot metals issued by Ministry of Steel shall be followed.

The following guidance is applicable to all types of iron and steel slags as mentioned in this document according to their characteristics;

- 6.1 Iron and Steel plants shall use best available options for maximising internal use of slags in process and recovery of resource material from slags.
- 6.2 The plants shall adopt appropriate cooling/quenching/treatment techniques to maximise recovery of resource material from slags. The slag treatment pits if any should have impervious hard surface to avoid contamination of soil and wastewater or surface run-off generated should be either re-cycled or treated prior to discharge. The slag handling in open yards if any should have impervious hard surfaces, and run-off from handling area shall be collected and treated prior to discharge.
- 6.3 Iron and Steel plants shall adopt environmental friendly practices in collection, handling, storage and transport of slag to avoid water and air pollution.
- 6.4 Iron and Steel plants shall adopt environmental policy for continuous improvement by adopting cleaner / new techniques. Environment management should be supervised by senior management.
- 6.5 Un-utilized slag shall be stored in captive storage yard having impermeable base and garland drain to prevent the soil and water / groundwater contamination. The unlined slag handling, storage areas and dumpsites shall be discontinued within 2 years from issuance of these guidelines.

- 6.6 A new slag storage yard shall be constructed above the ground with impermeable base such as compacted clay of minimum 600mm thickness over a single layer of 1.5mm thick geo-membrane. Run-off from slag storage area shall be collected and treated prior to discharge.
- 6.7 All Iron and Steel plants shall monitor grounds water quality around storage area during pre and post monsoon seasons through a recognised laboratory (under the Environment (Protection) Act, 1986 or any NABL Accredited) for assessment of the contamination (if any) and such assessment reports shall be submitted to respective SPCB/PCC annually. The groundwater shall be monitored for parameters namely pH, alkalinity, Calcium, Magnesium, and heavy metals namely Fe, Mn, Al, Cd, Cr, Cu, Ni, Mercury, Pb and any other parameter that may be prescribed by SPCBs/PCCS/CPCB.
- 6.8 Iron and steel slags from pyro-metallurgical route may be used in following areas subject to meeting the quality requirement/standard for the material / application:
- i. Cement production
 - ii. Aggregate in cement-concrete
 - iii. Cement-concrete blocks / bricks /tiles
 - iv. Aggregate in construction of roads/ railways
- 6.9 Iron and Steel plants intending to utilise iron or steel slag for any other purpose, not mentioned above may submit the proposal along with relevant details to CPCB through the respective SPCB/PCC.
- 6.10 Iron and Steel plants shall maximize external use or recycling of slag which cannot be used or recycled internally. Iron and Steel plants shall take steps to achieve 100% regular utilization of iron slag and steel slags for current generation within one year and also fully utilise the legacy iron slag by September 2025 and legacy steel slag by Sep 2027, respectively. Thereafter, the maximum allowable storage of slags at any point of time will not be more than one year's generation for steel slag and 6 months of generation for iron slag
- 6.11 Industry should submit the annual report on generation, quantity stored, quantity utilized and the concerned usage, and disposal as per format given in **Annexure-II** or on online waste reporting portal as and when developed by CPCB by 30th June of the following year to SPCB/PCC and CPCB.

Annexure – I

Filled up questionnaires received from units

Slag generation, utilisation and storage data									
Name & Address of plant with Production Capacity	Type of Slag	Qty. of Slag stored on 31.03.2021 (in MT)	For F.Y. 2021-22 (April 2021 - March 2022)		Qty. of Slag stored on 31.03.2022 (in MT)	Method of Utilisation	Method of Storage (with details of impervious liner / layers and embankment/dyke)	Plan for achieving 100% utilisation of current and legacy slag	
			Qty. of Slag Generated (in MT)	Qty. of Slag Utilised (in MT)					
				Within Plant					Externally
Tata Steel-Jamshedpur	Granulated BF Slag	41000	4081238	-	4041422	80816	Cement Making	Storage facility not required because of continuous utilisation	Sufficient market demand and availability and better logistics (rake availability) will improve the utilisation
	Air-cooled BF Slag	10000	270070	14018	263767	2285	1. Road construction 2. Works Project, 3. Mineral Wool Manufacturing	Storage facility not required because of continuous utilisation	Sustaining the current initiatives
	Steel making Slag	25300	1614344	339308	1281836	18500	Metallics: -Remelting in Steel Melting Shop Non-Metallics: -Consumption in Sinter making -Works Project -External Project -Fly Ash brick making -Cement Making -Road Making	For slag processing. Storage facility has inbuilt Geo-membrane lining.	Sustaining the current initiatives
Tata Steel-Miramandali	Granulated BF Slag	18080	1749020	-	1603104	163996 (In transit for exports)	Cement Making	Storage facility not required because of continuous utilisation	Sufficient market demand and availability and better logistics (rake availability) will improve the utilisation

Guidelines on Management of Pyro-metallurgical Slags - Iron & Steel Slags

Slag generation, utilisation and storage data									
Name & Address of plant with Production Capacity	Type of Slag	Qty. of Slag stored on 31.03.2021 (in MT)	For F.Y. 2021-22 (April 2021 - March 2022)		Qty. of Slag stored on 31.03.2022 (in MT)	Method of Utilisation	Method of Storage (with details of impervious liner / layers and embankment/dyke)	Plan for achieving 100% utilisation of current and legacy slag	
			Qty. of Slag Generated (in MT)	Qty. of Slag Utilised (in MT)					
				Within Plant					Externally
	Air-cooled BF Slag	505964	24000	-	9964	520000	Road construction	Storage at in-house yard with embankment and garland drains.	Current slag is being 100% utilised. For legacy slag: processing is ongoing and usage is being enhanced in new applications : 1. Usage as aggregate in paver, Concrete 2. Manufacturing Sand
	Steelmaking Slag	1001495	88264	466507	400174	1017078	Metallics: -Re melting in Steel Melting Shop Non-Metallics: -Consumption in Sinter making -Works Project -External Project/Harstand -Fly Ash brick making -Cement Making -Road Making	for slag processing, Storage facility is with garland drain.	Current slag is being 100% utilised. For legacy slag: processing is ongoing and usage is being enhanced in new applications : 1. Usage as aggregate in paver, Concrete 2. Manufacturing Sand
Tata Steel-Kalinganagar	Granulated BF Slag	12243	1391610	147925	1251587	4341	Cement Making Ground Granulated BF Slag	Storage facility not required because of continuous utilisation	Sufficient market demand and availability and better logistics (rake availability) will improve the utilisation
	Air-cooled BF Slag	11139	58495	34063	35371	200	Road construction Works Pavement Paver Block Manufacturing	Storage facility not required because of continuous utilisation	Sustaining the current initiatives

Slag generation, utilisation and storage data									
Name & Address of plant with Production Capacity	Type of Slag	Qty. of Slag stored on 31.03.2021 (in MT)	For F.Y. 2021-22 (April 2021 - March 2022)			Qty. of Slag stored on 31.03.2022 (in MT)	Method of Utilisation	Method of Storage (with details of impervious liner / layers and embankment/dyke)	Plan for achieving 100% utilisation of current and legacy slag
			Qty. of Slag Generated (in MT)	Qty. of Slag Utilised (in MT)					
				Within Plant	Externally				
	Steel making Slag	69750	626611	499573	128429	68360	Metallics: -Remelting in Steel Melting Shop Non-Metallics: -Consumption in Sinter making -Works Project -External Project/Harstand -Fly Ash brick making -Cement Making -Road Making	for slag processing, Storage facility is with garbage liner and drain.	current slag is being 100% utilised. For legacy slag: following measures will be taken: 1. Higher dispatch to brick customers 2. Development of new applications/projects. 3. Slag dispatches to cement making through rakes.
AMNS HAZIRA SMS-I 4.5 MTPA SMS-II 5 MTPA	Steel making slag EAF & Conate	2051288	1520240	664000	2407426	500101	Recycle in sinter/BF/Corex. Sales for road and construction as aggregate	Storage on bare soil in open yard in the form of heap/ dump	Setup advance crushing/ Magnetic separation and screening facility
AMNS Hazira BF 1.8 MTPA Corex 1.7 MTPA	BF/Corex Granulated Slag	1064987	951843	0	1516259	500571	For Cement making Export/ domestic Sale		Huge demand we are already selling more than we are generating
AMNS Hazira BF 1.8 MTPA Corex 1.7 MTPA	BF/Corex Air-cooled Slag	487161	107428	0	460866	133723	Crushing and screening for road making / land filling		Reducing the generation
AMNS Hazira SMS -I 4.5 MTPA SMS-II 5 MTPA	I.F Slag	172958	113852	0	231325	65704	Direct Sales		Magnetic Separation plant
AMNS Hazira	HMDP Slag		11190	0	971		Direct Sales		Magnetic Separation plant

Guidelines on Management of Pyro-metallurgical Slags - Iron & Steel Slags

Slag generation, utilisation and storage data									
Name & Address of plant with Production Capacity	Type of Slag	Qty. of Slag stored on 31.03.2021 (in MT)	For F.Y. 2021-22 (April 2021 - Mar . 2022)			Qty. of Slag stored on 31.03.2022 (in MT)	Method of Utilisation	Method of Storage (with details of impervious liner / layers and embankment/dyke)	Plan for achieving 100% utilisation of current and legacy slag
			Qty. of Slag Generated (in MT)	Qty. of Slag Utilised (in MT)					
				Within Plant	Externally				
JSPL Raigarh	Granulated BF Slag	15605.81	1080815.09	309184.105	442722.13	344514.664	Cement Plant	Storage at designated place	Further dispatch of material to use in cement plant.
JSPL Raigarh	SMS Slag	2888276	931834	41560	286744	3491806	PS Ball making, Cement Making, Metal recovery, Aggregate and Land Filling	Open storage in a designed yard	To utilise maximum quantity in cement production, to replace river sand with slag sand, to use in cement concrete, increase in PS Ball making and increase in aggregate utilisation
JSPL Angul	BF Gr Slag	354106	1316335	8756	811120	850565	Sold to Cement plants	Open Slag yard	Dispatch and consumption in own cement plant
JSPL Angul	BOF Slag	300000	711276	1011276	0	0	land Filling after crushing and metal recovery	No Stock	Installed crusher unit in 2021 and plan to utilization of legacy slag 100% as per generated amount.
JSPL Angul	EAF/NOF Slag	200000	319027	489027	0	30000	land Filling after crushing and metal recovery	storing in big hips and specific locations	Installed crusher unit in 2021 and plan to utilization of current and legacy slag 100% till July 2023.
Bhilai Steel Plant, Bhilai, Chhattisgarh, Production Capacity: Crude Steel = 7.0 MTPA	BF Slag	991981	2430817	0	2237642	1185156	1 Sold to Cement manufacturers and Slag wool manufacturers	Dumped at Slag Yard	100% (Subject to BF-1 being phased-out resulting in no generation of Air cooled BG slag)

Slag generation, utilisation and storage data									
Name & Address of plant with Production Capacity	Type of Slag	Qty. of Slag stored on 31.03.2021 (in MT)	For F.Y. 2021-22 (April 2021 - Mar . 2022)			Qty. of Slag stored on 31.03.2022 (in MT)	Method of Utilisation	Method of Storage (with details of impervious liner / layers and embankment/dyke)	Plan for achieving 100% utilisation of current and legacy slag
			Qty. of Slag Generated (in MT)	Qty. of Slag Utilised (in MT)					
				Within Plant	Externally				
Durgapur Steel Plant, Durgapur, West Bengal, Production Capacity: Crude Steel = 2.5 MTPA	BF Slag	106289	857619	0	945531	18377	1) Sold to Cement Manufacturers		100% being sold to cement manufactures
Rourkela Steel Plant, Rourkela, Odisha, Production Capacity: Crude Steel = 4.85 MTPA	BF Slag	0	1722913	0	1722913	0	1) Sold to Cement Manufacturers		Already achieved
Bokaro Steel Plant, Bokaro Steel City, Jharkhand, Production Capacity: Crude Steel = 5.01 MTPA	BF Slag	250000	1877415	143260	1734255	249900	1) Sold to Cement manufacturers. 2) Used in road making		100% utilisation of granulated BF slag already achieved.
IISCO Steel Plant, Burnpur, West Bengal, Production Capacity: Crude Steel = 2.5 MTPA	BF Slag	240087	902161	0	1066602	75646	1) Sold to Cement manufacturers.		100% utilisation of air cooled BF slag yet to be achieved.
SAIL	BF Slag	1588357	7790925	143260	7706943	1529079			

Guidelines on Management of Pyro-metallurgical Slags - Iron & Steel Slags

Slag generation, utilisation and storage data									
Name & Address of plant with Production Capacity	Type of Slag	Qty. of Slag stored on 31.03.2021 (in MT)	For F.Y. 2021-22 (April 2021 - March 2022)			Qty. of Slag stored on 31.03.2022 (in MT)	Method of Utilisation	Method of Storage (with details of impervious liner / layers and embankment/dyke)	Plan for achieving 100% utilisation of current and legacy slag
			Qty. of Slag Generated (in MT)	Qty. of Slag Utilised (in MT)					
				Within Plant	Externally				
Bhilai Steel Plant, Bhilai, Chhattisgarh, Production Capacity: Crude Steel = 7.0 MTPA	BOF Slag	1378742	522168	222294	38441	1640175	1) Processed BOF slag used as input material in Sinter plant, Blast Furnaces and Steel Melting Shop. 2) Unprocessed BOF slag used	Dumped at Slag Yard	Bulk utilization by NHAI/ NRRDA/ State PWD/ in agriculture and enhancement in sale of unprocessed BOF slag
Durgapur Steel Plant, Durgapur, West Bengal, Production Capacity: Crude Steel = 2.5 MTPA	BOF Slag	9078087	344440	236227	2501	9183799	in road levelling, low lying land filling and sold to external agencies.	Dumped at Slag Yard	12.4 lakh tonners of BOF Slag (from old stock) was auctioned/ sold on May 2022 for Road Making (National/State Highway). 139812 Tonn of material has already been lifted during June 22 Jan2023 achieving BOF Slag utilisation of 110.8% in FY 2022-23 (up to Jan 2023) Auction /Selling of BOF Slag/ LD Slag for Road Making will continue.
Rourkela Steel Plant, Rourkela, Odhisa, Production Capacity: Crude Steel = 4.85 MTPA	BOF Slag	2000000	601317	299709	99067	2202541			Enhancement in sale of unprocessed BOF slag to external agency.

Slag generation, utilisation and storage data									
Name & Address of plant with Production Capacity	Type of Slag	Qty. of Slag stored on 31.03.2021 (in MT)	For F.Y. 2021-22 (April 2021 - March 2022)		Qty. of Slag stored on 31.03.2022 (in MT)	Method of Utilisation	Method of Storage (with details of impervious liner / layers and embankment/dyke)	Plan for achieving 100% utilisation of current and legacy slag	
			Qty. of Slag Generated (in MT)	Qty. of Slag Utilised (in MT)					
				Within Plant					Externally
Bokaro Steel Plant, Bokaro Steel City, Jharkhand, Production Capacity: Crude Steel = 5.01 MTPA	BOF Slag	50000	421701	404709	36076	30916		Enhancement in sale of unprocessed BOF slag to external agency.	
IISCO Steel Plant, Burnpur, West Bengal Production Capacity: Crude Steel = 2.5 MTPA	BOF Slag	614200	294662	155983	11445	741435		Enhancement in sale of unprocessed BOF slag to external agency.	
SAIL	BOF Slag	13121029	2184288	1318922	187530	13798866			
RINL (Visakhapatnam Steel Plant)	BF Slag	5598723	2119894	75	2426228	5292314	1. 75T utilised for construction activity within the plant 2. 2426228T sold to cement industries	No specific storage methods present	Sale to cement companies
RINL (Visakhapatnam Steel Plant)	SMS Slag	5453545	879908	294061	11625	6027767	1. 294061 T consumed in process & Land filling within the Plant 2. 11625 T sold	No specific storage methods present	Maximising in process use, exploring for use in road making

Guidelines on Management of Pyro-metallurgical Slags - Iron & Steel Slags

Slag generation, utilisation and storage data									
Name & Address of plant with Production Capacity	Type of Slag	Qty. of Slag stored on 31.03.2021 (in MT)	For F.Y. 2021-22 (April 2021 - Mar . 2022)		Qty. of Slag stored on 31.03.2022 (in MT)	Method of Utilisation	Method of Storage (with details of impervious liner / layers and embankment/dyke)	Plan for achieving 100% utilisation of current and legacy slag	
			Qty. of Slag Generated (in MT)	Qty. of Slag Utilised (in MT)					
				Within Plant					Externally
JSW Steel Ltd., Salem Works, Pottaaerl, Mecheri, Mettur, Salemworks. Tamil Nadu.636453.IntegratedSteel Plant with the capacity 1.15 MTPAspecial alloy steelproduction	BF	30237	451752	311	227431	254247	Due to the COVID-19 disposal not happened. From May 2022 onwards slag grinding unit is in operation and slag 100% generated is sent to slag grinding unit to produce value added product of GGBS. Portion of quantity is sold to cement industries also. The accumulated quantity will be also used in slag grinding unit	BF granulated slag directly sent to slag grinding unit	100 % utilisation
JSW Steel Ltd., Dolvi, Maharashtra	SMS Slag	218975	240657	1563948	141467	164217	In-house consumption at SP, SMS Paver block mfg and to Cement Industries & open market	SMS Slag sent to crushing unit where iron bearing materials are separated and the crushed material is stored in a yard (dyke) and subsequently sent to Captive consumption and disposal	97 % utilisation. Maximise through paver making facility and sale to cement industries
	BF Slag from BF 1 (Granulated BF Slag)		1436782				Used for Cement plant	Stored in a designated place with dyke wall	1
	BF Slag from BF 2 (Granulated BF Slag)		574486					1	

Slag generation, utilisation and storage data									
Name & Address of plant with Production Capacity	Type of Slag	Qty. of Slag stored on 31.03.2021 (in MT)	For F.Y. 2021-22 (April 2021 - Mar . 2022)		Qty. of Slag stored on 31.03.2022 (in MT)	Method of Utilisation	Method of Storage (with details of impervious liner / layers and embankment/dyke)	Plan for achieving 100% utilisation of current and legacy slag	
			Qty. of Slag Generated (in MT)	Qty. of Slag Utilised (in MT)					
				Within Plant					Externally
	Electric Arc Furnace (EAF) Slag from Steel making Shop-1	1195458	440663	556709	969784	After metal recovery, EAF & BOF slag is utilised for construction purpose, road making in National Highway (Concrete Road and Bituminous Road) land reclamation in low lying area in side premises. Proposed for utilization in marine application like tetrapods and marine structure.	Stored in a designated place with dyke wall		
	Basic Oxygen Furnace slag (BOF) from steel Melting shop 2	143826					Stored in a designated place with dyke wall		

Annexure-II**International Practices in management of Iron and Steel Slags****Slag from Blast Furnace****US Department of Transportation: (User Guidelines for Waste and By-product Materials in Pavement Construction)**

Air-Cooled Blast Furnace Slag: Liquid slag is cooled slowly under ambient condition to form a crystalline structure and to produce a hard, lump slag that can be crushed and screened for further use.

Expanded or Foamed Blast Furnace Slag: Liquid slag is cooled and solidified by adding controlled quantities of water, air or steam, in order to accelerate the process of cooling and solidification and to produce a lightweight expanded or foamed product with increased cellular nature.

Pelletized Blast Furnace Slag: Liquid slag is cooled and solidified with air and water in a rotating drum to produce pellets of more crystalline nature as a beneficial for aggregate use.

Granulated Blast Furnace Slag: Liquid slag is cooled and solidified through rapid water quenching to have a low crystallization occurrence and to produce a sand size fragments and clinker like materials

Ground Granulated Blast Furnace Slag: When granulated blast furnace slag is crushed to very fine cement-size particles to produce ground granulated blast furnace slag for use in cement industry as a replacement/additive of Portland cement.

Australasian (iron & steel) slag association: (Blast Furnace Slag Cements & Aggregates: Slag Binders and Aggregates and Australian Standards)

Ground Granulated Iron Blast Furnace Slag: It is defined as the glassy granular material resulting from the rapid chilling of molten, a non-metallic product, consisting essentially of silicates and alumina-silicates of calcium, produced simultaneously with iron in an iron blast furnace slag.

United Kingdom: (Blast Furnace Slag: A technical report on the manufacturing of blast furnace slag and material status in the UK).

Air-cooled Blast Furnace Slag (ACBFS): The molten slag is being taken to open air pits located nearby blast furnace and the slag is quenched with water applied through water spray system to provide cooling and its crystallisation. The cooled slag is then crushed and screened to produce aggregates for other applications.

Ground Granulated Blast Furnace Slag (GGBFS): The molten slag is passed through granulation plant where it is quenched rapidly with warm water and results in production of vitrified (glassy) material having sand-like appearance. The cooled granulated slag is grinded in grinding mill for conversion into ground granulated blast furnace slag.

Slag from Steel Industry**BREF – European Union**

De-sulphurisation slag: A heterogeneous slag, whose composition is dependent on used desulphurisation agent, contains high sulphur content is generally recycled to sinter mix or partially used for landfill construction.

Basic Oxygen Furnace slag: The slag from basic oxygen furnace is dependent on process employed. It is generally used as an aggregate in road construction as base/sub-base, in asphalt mixtures and in waterway construction. Also, it is selectively used as fertiliser and liming agent in agriculture due to presence of CaO content.

Annexure – III**Format for submission of annual report on slag generation, utilization and storage.**

1. Name and Address of the Plant:
2. Contact Person Responsible for Management of Iron & Steel Slag:
 - a. Name and Designation:
 - b. Mobile Number:
 - c. Email ID:

Financial year	Slag Type*	Opening Stock (in MT) as on 31 st March	Qty. of Slag Utilised in F/Y (in MT)		Slag stored at the end of the financial year (in MT)	Method of Utilisation	Method of Storage (with details of liner layers and embankment/dyke)
			Within Plant	Externally			
	Iron Making Slags						
	a) Granulated BF Slag						
	b) Air-cooled BF Slag						
	c) Corex Slags						
	Steel making Slags						
	d) BOF/LD Slag						
	e) EAF/Conarc furnace Slag						
	f) Induction furnace Slag						
	g) Other slag (please specify)						

*As applicable

Item No. 06

Court No. 1

**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI**

Original Application No. 538/2024

News item titled "Arsenic in Food: Should you wash rice before cooking it" appearing in Times Now dated 31.03.2024

Date of hearing: 16.05.2024

**CORAM: HON'BLE MR. JUSTICE PRAKASH SHRIVASTAVA, CHAIRPERSON
HON'BLE MR. JUSTICE ARUN KUMAR TYAGI, JUDICIAL MEMBER
HON'BLE DR. A. SENTHIL VEL, EXPERT MEMBER**

ORDER

1. This original application is registered *suo-motu* on the basis of the news item titled "Arsenic in Food: Should you wash rice before cooking it" appearing in Times Now dated 31.03.2024.

2. The matter relates to the presence of arsenic in rice as warned by experts that can be poisonous for human body. As per the article, arsenic found naturally in soil and water is considered toxic and can be easily washed away by soaking and washing the rice properly.

3. The article states that arsenic naturally occurs in water, soil and rocks, but its levels may be higher in some areas than others. It easily enters the food chain and accumulates in significant amounts in both animals and plants, some of which are eaten by humans. The article alleges that as a result of human activities, arsenic poisoning has been rising. The main sources of arsenic pollution include certain pesticides and herbicides, wood preservatives, phosphate fertilizers, industrial waste, mining activities, coal burning and smelting.

4. The article states that rice is particularly susceptible to arsenic contamination because it is grown in flooded fields, and it absorbs more arsenic from water and soil compared to other common food crops. It states that as per World Health Organisation, long term symptoms of arsenic poisoning tend to occur in the skin first and can show up within five years of exposure. Cases of extreme poisoning can even lead to death.

5. The news item raises substantial issue relating to compliance of the environmental norms and implementation of the provisions of scheduled enactment.

6. Power of the Tribunal to take up the matter *suo-motu* has been recognized by the Hon'ble Supreme Court in the matter of "*Municipal Corporation of Greater Mumbai vs. Ankita Sinha & Ors.*" reported in 2021 SCC Online SC 897.

7. Hence, we implead the following as respondents in this matter:

- (i). Central Pollution Control Board, through its Member Secretary, Parivesh Bhawan, East Arjun Nagar, Delhi-110032.
- (ii). Ministry of Agriculture and Farmers Welfare, through its Secretary, Krishi Bhawan, New Delhi-110001
- (iii). Ministry of Environment, Forest and Climate Change, through its Secretary, India Paryavaran Bhawan, Jorbagh Road, New Delhi-110003.

8. Let notice be issued to the above respondents for filing their response at least one week before the next date of hearing.

9. List on 02.09.2024.

Prakash Shrivastava, CP

Arun Kumar Tyagi, JM

Dr. A. Senthil Vel, EM

May 16, 2024
OA No. 538/2024
HB