# REPORT OF THE TWO-DAY WORKSHOP ON LEGAL, REGULATORY AND COMPLIANCE FRAMEWORK ON CHEMICAL AND WASTES IN INDIA

Organized by

CEERA, NLSIU

In collaboration with

Ministry of Environment, Forest and Climate Change

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Ministry of Environment, Forest and Climate Change

Centre for Environment Law, Education, Research & Advocacy





National Law School of India University, Bengaluru

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We would also like to thank all our Resource Persons and Participants who participated in this workshop and contributed to the deliberations.

**Prof. (Dr.) Sairam Bhat** Coordinator, CEERA Professor of Law, NLSIU

### **INTRODUCTION**

#### **ABOUT THE WORKSHOP:**



#### Group Photograph

The Centre for Environmental Law, Education, Research and Advocacy organized a **Two-Day Workshop on "The Legal, Regulatory and Compliance Framework on Chemical and Hazardous Waste in India"**, on **November 29-30, 2019** at NLSIU, Bengaluru. The workshop was conducted under the aegis of a three-year research project on "Collaborative Engagement for Research, Training and Development in Handling of Chemical and Hazardous Waste", the objectives of which include, among other things, assisting the Ministry of Environment, Forest and Climate Change on matters connected to the Conference of Parties under various Multilateral Environmental Agreements, granted by the Ministry of Environment, Forests & Climate Change, Government of India, which include the following 5 conventions:

 Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal (1989)

- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, (1998)
- Stockholm Convention on Persistent Organic Pollutants (2001)
- Strategic Approach to International Chemicals Management (SAICM) (2006)
- Minamata Convention on Mercury (2017)

Spread across small, medium and large scale units, the Indian chemical industry is one of the most diversified industrial sectors covering more than 70,000 commercial products. The sheer magnitude of the Indian chemical industry, the wide spectrum of products manufactured, the allied and dependent sectors using chemicals, the emergence of new chemical products with each passing day and the impact that the industry has on the safety and livelihood of the persons employed in the sector and those working in close contact with chemicals, makes it incumbent on the state to devise a regulatory mechanism for the chemical industry. In keeping with the requirements of the industry and the challenges it can pose, especially in terms of environmental and health risks, India has a comprehensive legislative framework for the management of chemicals, many of which have been formulated in response to its international obligations under the different multilateral environmental agreements that on chemicals and waste that India has ratified.

With the wide array of issues that the chemical sector presents, the multiple bodies involved

in its day to day functioning and the far reaching consequences that can result if chemicals are not used, managed, stored, transported and disposed of appropriately, the legal, regulatory and compliance framework on chemicals and wastes in India presents itself as a subject that needs to be extensively deliberated upon, With this in view, the Centre organized the Two-Day Workshop to discuss, deliberate and create awareness about the subject. The objective of the Workshop was to build capacity and awareness regarding the legal, regulatory and compliance framework on chemical and hazardous waste in India, stemming from the obligations under the various C&W MEAs that the country is a party to.

The Workshop covered deliberations on the following topics:

- □ Chemical Industries in India: A Sectoral Analysis
- Legal, Policy and Regulatory Framework on Chemicals in India
- □ International MEA's on Waste Management and India
- □ Issues and Challenges in C&W management, handling and regulation in India

□ Role of the multiple stakeholders in C&W management and handling in India

The Two-Day Workshop received participation from industry professionals, members of pollution control boards, regional offices of the MoEF&CC, legal professionals, members from the academia and other institutes engaged by the Ministry in this project – IIT, Madras, IIT, Hyderabad and NEERI, Nagpur. This report gives a detailed description of the proceedings and deliberations of the workshop.

#### **ABOUT THE INSTITUTIONS:**

#### NATIONAL LAW SCHOOL OF INDIA UNIVERSITY, BENGALURU

The National Law School of India University, the Nation's premier law university, came into existence through a Notification under the National Law School of India University Act (Karnataka Act 22 of 1986). It signified the culmination of efforts by the Judiciary, the Bar Council of India, the Karnataka Bar Council, the Bangalore University and the Government of Karnataka to reform legal education and to establish a centre of excellence for legal education and research in India. The Law School has undertaken many research projects funded by the UGC, the Government of India, the Government of Karnataka, the Department of Women and Child Development, UN agencies, the World Bank, HIVOS, Department of Justice etc.

The Projects have served to strengthen research and teaching at the Law School. The National Law School of India University since its inception has taken proactive steps in organizing conferences, seminars, workshops, refresher courses and certificate courses to update academicians, law teachers, students, industry personnel in different subject areas.

#### CEERA

The Centre for Environmental Law Education, Research and Advocacy (CEERA), established in 1997 is a benefactor of the Ministry of Environment and Forest (MoEF), Government of Karnataka, the Bar and the Bench in India and abroad. Building an environmental law database, effectively networking among all stakeholders, building up an environmental law community and policy research in the area of environment are CEERA's main objectives. To achieve the aforesaid, CEERA has incessantly and successfully been able to build functional and professional linkages with government agencies and non-

governmental organisations in India, the South Asian Region and at International levels. CEERA annually organises, a University Grants Commission recognized, One-week Law Teacher's Refresher Course. CEERA, has been partnering with Central Pollution Control Board in organising Training programs for the officers of various State Pollution Control Boards and other industry professionals for over seven (7) years.

One of the first in India, to be granted a five year World Bank project on Environmental Law capacity building and thereafter being a steady choice for the Ministry of Environment Forest and Climate Change, CEERA has been entrusted with research projects and workshops to impart training to Forest Officers, Revenue Officers, Officers of the Central Pollution Control Board and also of the Government of Karnataka. CEERA is proud to have completed a two-year Research Project granted by the United Nations Development Programme (UNDP) under the Global Environment Facility (GEF), and as one of the deliverables, organised, convened and conducted over twenty workshops at Institutions of national repute creating awareness on the Biodiversity Law and Access and Benefit Sharing (ABS) in less than 2 years. Two research publications on a minimal research area of biodiversity laws were also the outcome of this project.

CEERA has also made several publications in the area of environmental law, the law and public policy along with Newsletters, CEERA March of the Environmental Law, NLSIU's first e-Journal – Journal on Environmental Law, Policy and Development and manages two websites viz., www.nlsenlaw.org, wherein the law and policy on Environment is regularly updated, and www.nlsabs.com, a dedicated portal wherein the law and policy on Biodiversity Access and Benefit Sharing is updated periodically. All our publications are duly updated on our online portal www.nlspub.ac.in, which is open for subscription to all readers.

#### **MoEF & CC and the Project:**

The Ministry of Environment, Forest and Climate Change is the nodal agency in the administrative structure of the Central Government for the planning, promotion, coordination and overseeing the implementation of India's environmental and forestry policies and programmes. It is also the nodal ministry for Chemical and Waste(C&W) related Multi-Lateral Environmental Agreements (MEAs). MEAs are a set of legally binding or voluntary instruments which comprise of the policy framework intended to promote chemical safety, prevent environmental pollution, eliminate/reduce adverse impacts on human health and promote sustainable development.

The Ministry of Environment Forest and Climate Change and CEERA, NLSIU have entered into MoU for three years to assist and support the Ministry in coordinating and implementing the matters related to the Chemical &Waste related Multilateral Environmental Agreements and to:

- Introduce and establish a programmatic approach to handing C&W MEAs in MoEF & CC.
- Identify and develop long-term strategic partnership to provide key legal, policy and strategic inputs to the Ministry in the management of C&W MEAs.
- To act as a repository of knowledge and create as well as maintain database for C&W MEAs related issues in the country and MEAs related matters.
- To assist and support MoEF&CC during national and international meetings on C&W MEAs and related matters.
- Conduct demand driven and follow up research to assist in the negotiations and issues pertaining to the Convention that could help in strategizing the national priorities.
- Conduct stakeholder consultations, capacity building programmes and network with other institutions and agencies.

This workshop is organized as one of the project deliverables with a view to undertake capacity building programmes with respect to C&W MEAs and network with other institutions, academicians and professionals working in the field of chemical and waste management.

### **SUMMARY OF PROCEEDINGS**

#### DAY 1: 29<sup>th</sup> November, 2019

#### **INAUGURAL SESSION**



The two-day workshop on 'Legal, Regulatory and Compliance Framework on Chemical and Wastes in India' organized by the Centre for Environmental Law Education, Research and Advocacy (CEERA), National Law School of India University in collaboration with the Ministry of Environment Forest and Climate Change (MOEF&CC) began on 29<sup>th</sup> of November, 2019. Aimed to serve as a forum to

facilitate discussions for the multiple stakeholders in the Chemical Industry, on the legal and regulatory framework governing the sector, the workshop began with a welcome address by Ms. Geethanjali K.V., Legal Associate, CEERA, NLSIU. A brief introduction about the Centre's activities, initiatives and research projects was given to the participants. CEERA since its inception, has worked in association with numerous Government agencies and International Organizations. It has worked in collaboration with MOEF &CC as well as the Central Pollution Control Board. CEERA conducts multiple conferences and seminars where it imparts training to forest officers, revenue officers, government officials, etc. Various publications of CEERA were introduced. Ms. Geethanjali also apprised the participants about the three websites that the centre operates: www.nlspub.ac.in, www.nlsenlaw.org and www.nlsabs.com.

The Chief Guest for the inauguration, Prof [Dr.] M.K. Ramesh, Professor of Law, NLSIU began his talk by welcoming all the academicians, research scholars, nominees from different industries and public sector undertakings, members nominated by the different Pollution Control Boards, officers nominated by the regional offices of MoEF&CC, and all the other participants at the event. Prof. Ramesh reminisced about the 22-year long association that CEERA shares with the MoEF&CC, and mentioned that even during the ratification of the

Basel Convention, the MoEF&CC and Central Government had sought the advice of CEERA. With this 3 year project collaboration, he affirmed that CEERA's association with the Ministry has been renewed with new vigor in exploring new contours in the field of Chemical and Hazardous Waste Management.



Prof (Dr.) Sairam Bhat, Professor of Law and Coordinator, CEERA, NLSIU welcomed the esteemed resource persons and participants to the workshop. He began by stating that the workshop is the point of confluence of ideas and thoughts of multiple stakeholders- such as chemical industries, waste management companies, Non-Governmental Organizations, people from the academia, CPCB, MoEF&CC, etc. Speaking of the diverse areas of work that the Centre engages in, he gave an overview of the Certificate Courses and workshops organized by CEERA in the month of November, such as the Five-Day Professional Certificate Course for Officers of Hindustan Aeronautics Limited on 'Business Laws: Negotiation, Drafting, Management and Interpretation of Contracts – International and National" and the three-day certificate course on 'Energy Law'. The handbook titled "Handbook on Chemicals and Hazardous Waste Management and Handling in India" –a consolidated output of the research conducted under the first leg of the project and the first in the as the first in a series of publications under the Three-Year Project of the Ministry of

Environment Forest and Climate Change on Collaborative Engagement for Research, Training and Development in Handling of Chemical and Hazardous Waste, was released by the dignitaries. A copy of the Handbook was circulated to all the participants at the workshop.

Prof. Sairam Bhat further emphasized that the main aim of the project revolves around revisiting of the legislations and regulatory mechanisms regarding effective chemical and hazardous waste management. Elaborating on the subject matter of the workshop, Prof. Bhat mentioned that the deliberations would majorly deal with international conventions on chemicals and hazardous substances and the State and non-State responsibility with regard to the same. Since hazardous chemicals can have inter-generational impact on the natural and human environment, risk and danger management in industries dealing with these must be regulated. He further added that another important aspect to be considered over the course of the workshop would be – 'should chemical industry have extended producers' liability?'. With this question he concluded his address and encouraged everybody to put forth their perspectives from the industrial, legal and policy standpoint to make the deliberations and discussions richer and more interactive.



Release of the Handbook on Chemical Waste

## SESSION 1- ENVIRONMENTAL LAWS WITH SPECIAL REFERENCE TO CHEMICALS AND WASTE



Madhubanti Ms. Sadhya, Teaching Associate, at NLSIU commenced the session with an overview of the Chemical sector in India. The purpose of this sectoral analysis was to give participants the a preliminary understanding of the extent of influence that the chemical sector exerts over our economy, growth rate and

consumption patterns. Statistics bear testimony that the chemical sector is a primary contributor to the GDP and its expanse is such that necessitates effective regulation. The

major chemical producing states were identified to be Maharashtra (44%), Gujarat (40%), Tamil Nadu (7%), Andhra Pradesh (5%) and Others (4%). Ms. Madhubanti explained the interconnected interface between the key drivers of growth of the Chemical Industry in India. The factors are as follows-

- Demand for products
- Availability of cheap labour
- Conducive policy initiatives
- Strong IP Regime
- Revamping the tax regime

In the further course of presentation, she established the expanse of the Sector and is the emergent toned to regulate the Sector for the following reasons-

#### • Ambiguity in definitions-

The Environment Protection Act, 1986 which is an umbrella legislation with regard to the aspects of environmental regulation does not define what constitutes "chemical waste" nor does it define what a "chemical substance". It goes on to define the term "hazardous substance" under Section 2(e) in which there is no cogent understanding of the amount of importance given to the chemical industry and dealing with the nuances of chemicals as a category which requires separate focus owing to its nature. She further notes that there is non-uniformity in the list of hazardous chemicals addressed by different legislation for different aspects of chemical handling. Further, definitions/criteria for flammability in MSIHC and Petroleum rules are also different. It was also noted by the speaker that the degree of legislations for controlling/regulating chemicals is less in case of consumer chemicals including food products in comparison to other sections.

• Absence of a specific legislation to specifically cater to the needs of the Chemical sector in India- There is a huge legislative vacuum in the realm of chemicals which are not hazardous by nature but owing to lack of standards to ensure its safety, turns harmful. In the absence of requisite legislative infrastructure, it poses a serious problem for the chemical products manufactured in India to be compliant with the European Union's REACH (Registration, Evaluation, Authorization and Restriction of Chemicals).

- Need for collation of independent and updated statistics: Inadequacy of reliable statistics on the amount of waste generated and chemical industries and plants calls for a need to collate sufficient data with requisite indicators to ensure the comprehensive understanding of the industry as a whole, which further necessitates regulation
- Lack of adequate hazardous waste treatment and management facilities: While efforts are being made by governmental and non-governmental bodies to contain the amount of waste generated, the fact that many States do not have a TSDF's signifies the need for positive steps to be taken to handle hazardous wastes. Further, small scale industries working in the chemical sector have outdated facilities and technologies for waste treatment and disposal owing to lack of funds and sufficient knowledge. This further calls for regulation of the sector.
- Industrial accidents: Accidental release of hazardous chemicals and industrial accidents; accidental spillage, lack of monitoring while transportation of chemicals and untrained drivers and handling staff can pose great threat to the industrial establishments and the adjoining areas. This further necessitates the regulation of the sector. Moreover, health problems associated with the use of handling of chemicals do not get manifested for the longest time, which further necessitates careful handling and regulations in place that stipulate norms for the same.

After laying down some of the broad reasons that makes it incumbent on the state to regulate the chemical sector, Ms. Madhubanti went on to speak about the regulatory framework presently existing in the country to govern the sector. With the wide expanse of the sector and the multifarious activities it engages in, multiple Ministries and Departments of the Government, govern different aspects of the sector, with the Ministry of Environment Forest and Climate Change at the helm of affairs in so far as the environmental and hazard regulation aspect of the sector is concerned. While talking about the regulatory framework the speaker stated that it is confluence of several Ministries as under-

 Nodal Ministry- Ministry of Environment, Forest and Climate Change- Hazardous Substances Management Division – responsible for chemical safety in the manufacture, storage and import of chemicals, chemical accidents with special reference to emergency planning, preparedness and response, hazardous waste management, solid waste management, bio-medical waste management, municipal solid waste amongst other measures. The Division is also the coordinating body for Report

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the five multilateral environmental agreements to which India is a party namely; the Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their disposal; Rotterdam Convention on Prior Informed Consent Procedure for certain Chemicals and Pesticides in International trade; Stockholm Convention on Persistent Organic Pollutants, the Minamata Convention on Mercury and Strategic Approach to International Chemicals Management.

- Ministry of Commerce and Industry-Department of Industrial Policy and Promotion oversees the export and import of chemicals
- Ministry of Chemicals and Fertilisers-Department of Chemicals and Petrochemicals works as the nodal department for the formulation and implementation of policies and programmes for the overall growth and development of the chemical and petrochemical sector in the country.
- Ministry of Agriculture
- Ministry of Petroleum and Natural gas
- Central Pollution Control Board and the respective State Pollution Control Boards
- National Disaster Management Authority

While discussing the laws governing the sector, Ms. Sadhya, noted that India has a comprehensive legislative framework for the management of chemicals and hazardous chemical waste. Regulations have been enacted for the entire life cycle of chemicals, starting from manufacture, storage, use, handling, transportation, import and export, recycling, disposal and waste management, consumer interest for using chemicals and the protection of the environment and public health. However, due to cross - sectoral nature of chemical management, several pieces of legislation, regulations or standards in the country address chemicals in different ways. Additionally, there are specific legal instruments dealing with a particular category of chemicals, such as pesticides, petroleum, explosives etc. Many of these laws, regulations, standards, decrees or other legal instruments are relevant even though they are not limited to or specifically target chemicals. To accommodate the diverse legislations governing the sector in a cohesive manner and to facilitate the understanding of the participants, the speaker categorized the different legislations governing the sector under three broad heads:

#### Environmental Management

This category comprises of the Environment (Protection) Act, 1986 that acts as an umbrella legislation under which most Rules and Regulations on chemical wastes are framed. Moreover, this legislation links the different multilateral environmental agreements. Some of the Rules framed under this legislation include the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, E-Waste Management Rules, 2016 , Ozone Depleting Substances (Regulation and Control) Rules, 2000 etc.

#### • Target specific Chemical legislations

This category comprises of the different legislation that deal with specific chemicals such as the Petroleum Act, 1934, the Explosives Act, 1884 and the Insecticides Act, 1968, to name a few. Elaborating on these legislations, the speaker noted that the Petroleum Act, 1934 defines 'petroleum' to include any liquid hydro-carbon or mixture of hydrocarbons and any inflammable mixture (liquid, viscous or solid) containing any liquid hydrocarbon. The Act further prescribes rules for administrative procedures and management schemes that include regulations on import, transport, storage, production, refining, blending, delivery and dispatch of petroleum. The speaker further spoke about the monitoring and implementation mechanism under the Act. In a similar fashion, the speaker intimated the participants about the salient features of the Explosives Act, 1884, the Insecticides Act, 1968 and the specific chemicals and classification criteria under them, the administrative, monitoring and implementation mechanism in place under these respective legislations.

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#### • Chemical Safety and Disaster Management

Under category the speaker delineated the different legislations that govern chemical safety and disaster management aspect under the chemical sector. Some of the legislations covered by the speaker included the Manufacture Storage and Import of Hazardous Chemical Rules, 1989, Chemical Accidents (Emergency Planning Preparedness and Response) Rules, 1996, and the Public Liability Insurance Act, 1991. Under the MSIHC, Rules, 1989 the speaker elaborated on the responsibilities vested on the occupier of an industrial establishment, which include identifying major accident hazards, to take adequate steps to prevent major accidents and limit their consequences to person and the environment and provide to the persons working on the site with information, training and equipment including antidotes necessary to ensure their safety, preparing and keeping up to date onsite emergency plan, taking appropriate steps to inform persons outside the site who are likely to be in an area, which may be affected by a major accident, about the nature of the major accident hazard, the safety measures and the Do's and 'Don'ts; which should be adopted in the event of a major accident, preparation of safety data sheets etc. Ms. Madhubanti spoke about the Constitution of the Central Crisis Group (CCG), State Crisis Group (SCG), District Crisis Group (DCG) and Local Crisis Group (LCG) to deal with chemical accidents at different levels under the Chemical Accidents (EPPR) Rules, 1996. She further told the participants about the constitution of the Crisis Alert Systems that are obligated to provide information to public regarding chemical accidents – prevention, preparedness and mitigation at different levels.

#### • Other Acts and Rules

Apart from the aforementioned legislations, there are other allied legislations such as the Factories Act, 1948, the Central Motor Vehicles Rules, 1989, Merchant Shipping Act, 1958which govern other aspects of the chemical sector. Speaking about the Factories Act, 1948 Ms. Madhubanti highlighted that the Act mandates the constitution of a Site Appraisal Committee to grant permission for the initial location of a factory involving hazardous process or for the expansion of any such factory; the compulsory disclosure of information by the occupier regarding dangers including health hazards and the measures to overcome such hazards arising from the exposure to or handling of the material or substances in the manufacture, storage, transportation etc. and the laying down of emergency standards of safety in respect of hazardous processes. The speaker also mentioned about the 116 chemicals enlisted under the Act with their maximum permissible limit for two sets of exposure duration in work place environment. While speaking about the import of hazardous chemicals, Ms. Madhubanti spoke about the duties of the importer and the authorities stipulated under the MSIHC, Rules, 1989. The speaker also highlighted the role of the Central Motor Vehicles Rules, 1989 and Merchant Shipping Act, 1958 which may although seem unrelated to the chemical sector have a very important role. The speaker told the participants that the Central Motor Vehicles Rules, 1989 mandates certain educational qualification of drivers carrying dangerous or hazardous goods; requires every owner of a goods carriage transporting any dangerous or hazardous goods to display a distinct mark of the class label appropriate to the type of dangerous or hazardous goods and equip every such carriage with safety equipment and spark arrester for preventing fire, explosion or escape of hazardous or dangerous goods. Further, the speaker informed the participants that under the Merchant Shipping Act, 1958, Central Government may make rules for regulating in the interests of safety the carriage of dangerous goods in ships and the owner, master or agent of a ship carrying or intending to carry any dangerous goods as cargo and about to make a

voyage from a port in India has to furnish in advance the prescribed particulars of the ship and the cargo to such authority as may be prescribed for the purpose.

With regard to the non-regulatory mechanism for managing chemicals, Ms. Madhubanti mentioned that industries take several initiatives for environmental protection and chemical management, such as Responsible Care, Corporate Responsibility in Environmental Planning (CREP), ISO14001, OHSAS 18001, ISRS, Eco Mark etc. Additionally, several awards related to chemical and environmental management are initiated on voluntary basis by industrial associations, who play an important role in encouraging industries to go for non-regulatory mechanisms. Moreover, schemes launched by the Government from time to time also aids in regulating this sector. As an example, she spoke of the Petroleum, Chemical and Petrochemical Investment Region (PCPIR) scheme launched in Gujarat, Odisha, Andhra Pradesh and Tamil Nadu, which is a cluster approach to promote petroleum, chemicals and petrochemical sectors in an integrated and environmental friendly manner on a large scale. Projected Investment on full realization of PCPIRs is Rs. 7.63 lakh crore and employment generation is expected for around 33.96 lakh persons.

The session gave a brief understanding to the participants about the nature of the Chemical sector and industry and set the tone for the rest of the discussions and the deliberations.

## SESSION 2 - INDIA'S COMMITMENT TO INTERNATIONAL MEA'S ON CHEMICALS



The session commenced by Mr. Rohith Kamath, Advocate & ACS with a brief discussion on the various type of wastes that exist. They were generally categorised as municipal solid waste, industrial waste, hazardous waste, bio-medical waste, plastic waste and e-waste. The types of wastes were discussed so as to get a general understanding of the regulatory framework vis-a-vis each category and the management of the same. Furthermore, it was pointed out that around 7.46 million metric tonnes of industrial waste is generated every year out of which 45% is recyclable waste, 46% is managed by land filling and

9% is incinerable.

Proceeding further, the various rules regarding waste management in India were highlighted. They include:

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

Rule 3(17) under the said Rules defines 'hazardous waste' to mean:

- 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; The Batteries (Management and Handling) Rules, 2001 - Although there is no specific definition of hazardous waste, Rule 9 sub-rule (2) of the Rules provides that-

- 9(2) The Joint Secretary, Ministry of Environment and Forests or any officer designated by the Ministry or an agency designated by it shall ensure that the recyclers possess appropriate facilities, technical capabilities, and equipment to recycle used batteries and dispose of hazardous waste generated.
- Moreover, Form VI that contains the particulars to be submitted for registration of facilities possessing environmentally sound management practice for recycling of used lead acid batteries requires authorization under the Hazardous Wastes Rules, and details of hazardous waste management, including analysis report of characterization of hazardous waste generated.
- The Bio-Medical Waste Management Rules 2016 No specific definition of hazardous waste however,
  - Schedule I that lays down details of biomedical wastes categories and their segregation, collection, treatment, processing and disposal options provides that expired or discarded medicines which includes pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc. shall be sent to common bio-medical waste treatment facility or hazardous waste treatment, storage and disposal facility for incineration
  - The Schedule further provides that chemicals used in production of biological and used or discarded disinfectants shall be disposed of by incineration or Plasma Pyrolysis or Encapsulation in hazardous waste treatment, storage and disposal facility.
  - Part 2 of Schedule I provides that ash from incineration of biomedical waste shall be disposed of through hazardous waste treatment, storage and disposal facility, if toxic or hazardous constituents are present beyond the prescribed limits as given in the Hazardous Waste Rules or as revised from time to time. It also provides that residual or discarded chemical wastes,

used or discarded disinfectants and chemical sludge can be disposed at hazardous waste treatment, storage and disposal facility.

- The E-waste Management Rules, 2016 No specific definition of hazardous waste. But several provisions under the Rules make mention of hazardous wastes such as the following:
  - Under Rule 13(3), any dismantler or recycler of e-waste seeking renewal of authorization from the State Pollution Control Board must file a certificate of compliance of effluent and emission standards, treatment and disposal of hazardous wastes as applicable from the concerned State Pollution Control Board or any other agency designated for this purpose.
  - Rule 16 requires every producer of electrical and electronic equipment and their components or consumables or parts or spares to reduce the use of hazardous substances in the production. Every producer of applications listed in Schedule II must ensure that the limits of hazardous substances as given in Schedule II are to be complied. Moreover, the Central Pollution Control Board shall conduct random sampling of electrical and electronic equipment placed on the market to monitor and verify the compliance of Reduction of Hazardous Substances provisions and the cost for sample and testing shall be borne by the Producer.
  - With regard to transportation of e-waste, Rule 19 provides that transportation of waste generated from manufacturing or recycling destined for final disposal to a treatment, storage and disposal facility shall follow the provisions under Hazardous and Other Wastes (Management, Handling and Transboundary Movement) Rules.

Following this the methods of Management of Hazardous and Other Wastes was discussed. The methods of management include:

- (a)prevention;
- (b)minimization;
- (c)reuse,
- (d)recycling;

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- (e)recovery, utilization including co-processing;
- (f)safe disposal

The next topic covered by Mr. Rohith were the authorities responsible for the disposal and management of hazardous waste and their corresponding duties. The duties of the authorities are as follows:

1. MoEF u/EPA 1986 - Identification; Grant of Permission for Import and Export including Transit.

2. CPCB - Recommend standards and specifications for treatment and disposal of wastes; characterisation and identification of hazardous wastes; prevent/reduce/minimise the generation and handling of hazardous wastes; registration of Recyclers/Re-processors.

3. State Governments - Hazardous Waste Treatment Storage and Disposal Facility (TSDF); Assess EIA reports and convey the decision of approval of site or otherwise; ESM of Hazardous Waste.

4. SPCB - Inventorisation of hazardous wastes; Monitoring of compliance of various provisions and conditions of authorisation including conditions of permission for issued by MoEF exports and imports; Examining the applications for imports submitted by the importers and forwarding the same to the Ministry of Environment and Forests.

Mr. Rohit also discussed about the quantum of hazardous waste generated in India along with the disposal mechanisms of Hazardous waste.

Currently, the number of units that operate as disposal and treatment plants are as follows -

Integrated TSDFs (with both SLF and Incinerator): 17

TSDFs with only Common Incinerators: 9

TSDFs with only Common Secured Landfills: 15

Furthermore, certain quantified data was portrayed to show the amount of waste being generated and treated as in the years 2000, 2009 and 2016. The data is as follows (in million tonnes)

1. Number of Industries generating hazardous waste. - 12, 584 nos., 36.165 and 43, 938.

2. Total generation of Hazardous waste - 7.243, 6.232, 4.467.

- 3. Land Fillable hazardous waste 5.250, 2.728, 3.416.
- 4. Incinerable waste 0.118, 0.415, 0.695
- 5. Recyclable waste 1.4292, 0.3088, 3.356

Following this, Ms. Madhubanti delved into the provisions of the **Basel Convention on Transboundary Movement of Hazardous Wastes, 1989.** The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, in response to a public outcry following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from abroad.

The speaker discussed the overarching objective of the Basel Convention which is to protect human health and the environment against the adverse effects of hazardous wastes. Its scope of application covers a wide range of wastes defined as "hazardous wastes" based on their origin and/or composition and their characteristics, as well as two types of wastes defined as "other wastes" - household waste and incinerator ash.

While discussing the aims of the Convention, Ms. Madhubanti highlighted the following points-

- The reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal;
- The restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management; and
- A Regulatory system applying to cases where transboundary movements are permissible.

In the context of India's obligation under the said Convention, India signed the Convention on 15<sup>th</sup> March, 1990, ratified the same on 24<sup>th</sup> June, 1992 and it finally came into force in India on 22<sup>nd</sup> September, 1992. It has not ratified the Basel Ban or the 1999 Protocol till now. India is also actively involved in the work relating to preparation of technical guidelines for environmentally sound management of shipbreaking along with Norway and the Netherlands under this convention. -In Basel Convention COP 14, 2019, two important issues were discussed and decided, i.e. technical guidelines on e-waste and inclusion of plastic waste in the PIC procedure. Opened negotiations and corrections in the interim technical guidelines on

e-waste, strengthened India's global commitment towards phasing out single use plastic. Pursuant to the Basel Convention, there has been much judicial intervention. In the year 2012, for example, the Supreme Court banned the import of chemical substances prohibited under the Convention in the case of *Research Foundation for Science, Technology and National Resource Policy v. Union of India.* 

Following this, Ms. Madhubanti spoke about the Stockholm Convention on Persistent Organic Pollutants, 2004. The Stockholm Convention on Persistent Organic Pollutants was adopted by the Conference of Plenipotentiaries on 22 May 2001 in Stockholm, Sweden. The Convention entered into force on 17 May 2004. The Stockholm Convention on Persistent Organic Pollutants is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment.

Elaborating on the salient provisions of the Convention the speaker highlighted that the Convention requires each party to:

- Prohibit and/or eliminate the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex A to the Convention (Article 3)
- Annex A allows for the registration of specific exemptions for the production or use of listed POPs, in accordance with that Annex and Article 4, bearing in mind that special rules apply to PCBs. The import and export of chemicals listed in Annex A can take place under specific restrictive conditions, as set out in paragraph 2 of Article 3.
- Restrict the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex B to the Convention (Article 3)
- Annex B allows for the registration of acceptable purposes for the production and use of the listed POPs, in accordance with that Annex, and for the registration of specific exemptions for the production and use of the listed POPs, in accordance with that Annex and Article 4. The import and export of chemicals listed in Annex B can take place under specific restrictive conditions, as set out in paragraph 2 of Article 3.
- Reduce or eliminate releases from unintentionally produced POPs that are listed in Annex
   C to the Convention (Article 5)

As per the mandate, Paragraph 1 of Article 7, each party to the Stockholm Convention shall develop and endeavour to implement a plan for the implementation of its obligations under the Stockholm Convention. The development of the National Implementation Plan (NIP) is the first step to implement the Stockholm Convention on PoPs. With respect to the role of

India under the Stockholm Convention, the National Implementation Plan aims to incorporate the spirit of the Convention. The NIP developed with the support of the Global Environment Fund includes the following strategies:

- Environmentally Sound Management and Final Disposal of PCB polychlorinated biphenyls
- Environmentally Sound Management of Medical Wastes
- Development and promotion of non POPs alternatives to DDT
- Implementation of the Best Available Technology (BAT)/ Best Environmental Practices
- (BEP) strategies for elimination / reduction of unintentional POPs emissions of the priority industry sectors identified in the NIP of India
- Management of PVC plastic waste to avoid incineration / dumping the landfill for preventing releases of Dioxins and Furans due to burning
- Capacity building, demonstration of production and promotion of bio-botanical neem derived bio-pesticides as viable, eco-friendly, bio-degradable alternatives to POPs pesticides
- Identification of sites contaminated by POPs chemicals and of remediation process at the potential hotspots
- POPs and pesticides management in India
- Inventorization of newly listed POPs
- National POPs monitoring India program and
- Strengthening institutions and capacity building for effective and efficient implementation of the NIP in India.

Further speaking about India's obligations under the Convention, the speaker highlighted that India has ratified the 12 initially listed chemicals, and in 2018, the government introduced the Regulation of Persistent Organic Pollutants Rules 36 which imposed bans on 7 of the 14 (at the time) newly listed substances.

Ms. Madhubanti also touched upon the **Minamata Convention.** The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury. It was agreed at the fifth session of the Intergovernmental Negotiating Committee on mercury in Geneva, Switzerland at 7 a.m. on the morning of Saturday, 19 January 2013 and adopted later that year on 10 October 2013 at a Diplomatic Conference (Conference of Plenipotentiaries), held in Kumamoto, Japan.The Minamata Convention

entered into force on 16 August 2017, on the 90th day after the date of deposit of the 50th instrument of ratification, acceptance, approval or accession.

The Convention draws attention to a global and ubiquitous metal that, while naturally occurring, has broad uses in everyday objects and is released to the atmosphere, soil and water from a variety of sources. Controlling the anthropogenic releases of mercury throughout its lifecycle has been a key factor in shaping the obligations under the Convention.

Major highlights of the Minamata Convention include a ban on new mercury mines, the phase-out of existing ones, the phase out and phase down of mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the regulation of the informal sector of artisanal and small-scale gold mining. The Convention also addresses interim storage of mercury and its disposal once it becomes waste, sites contaminated by mercury as well as health issues.

The speaker noted that in accordance with the mandate of the Convention India is obligated to:

- Not grant permission for fresh projects on primary mercury mining after the coming into force of this Convention and allow existing projects to continue for only a period of 15years from the date of Convention.
- Mercury from such mining to be used only in manufacturing of mercury-added products, in manufacturing processes and disposed only using operations which do not lead to recovery, recycling, reclamation, direct re-use or alternative uses.
- Identify individual stocks of mercury or mercury compounds exceeding 50 metric tons, as well as sources of mercury supply generating stocks exceeding 10 metric tons per year.
- Ensure that, where the Party determines that excess mercury from the decommissioning of chlor-alkali facilities is available, such mercury is disposed of in accordance with Article11.
- Allow export of mercury only after written consent from country of import provided that it's for a use allowed under this Convention or is to be stored on an interim basis in an environmentally sound manner
- Initiate steps that will lead to reduction in the usage of mercury and its compounds in activities such as gold mining and processing, and wherever feasible eliminating the

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Usage of mercury and its compounds in mining and processing activities, and also the environmental emissions and releases of mercury from the aforementioned activities.

- Develop and implement national action plan
- Identify the relevant "point source categories" of mercurial releases into land and water within a time line of three years after of date of entry into force of the Convention.

Ms. Madhubanti apprised the participants that in India, mercury wastes are dealt with under the Hazardous Waste Management Rules,2016, in accordance with the provisions of the Basel Convention. At present, India does not have any specific legislation to deal with management of mercury wastes. However there are technical guidelines developed by the Central Pollution Control Board (CPCB) in order to deal with mercury wastes generated by health-care facilities. A draft of these guidelines was prepared in 2010 and they were finally adopted in 2012. These guidelines aim to reduce the risk posed by mercury wastes disposed by hospitals and other health care providers by mandating certain norms for their safe and responsible disposal. They also aim to reduce the dependence of health-care providers on devices and instruments that include mercury as one of their main constituents.

IMMI (Improvement of Mercury Management in India) is a project being implemented by UNDP for the Ministry of Environment, Forest and Climate change, and funded by the Global Environment Facility (GEF). The aim of the project is to develop a national mercury profile by undertaking a comprehensive inventory of mercury including significant sources of emissions and releases. India approved ratification of Minamata convention along with the flexibility for continued use of mercury-based products and processes involving mercury compounds till 2025.

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## SESSION 3 - INTERNATIONAL LEGAL FRAMEWORK FOR HAZARDOUS SUBSTANCES AND WASTES



**Professor [Dr.] M.K. Ramesh**, Professor of Law, NLSIU commenced the session with a brief overview of the concept of waste management. It was stated that the notion of waste management, more specifically, hazardous waste management as a concept originated in the West. As the developed west found it difficult to handle the waste in their own jurisdictions, they began exporting their waste to the developing nations at a price. This led to a phenomenon which is popularly known as the "Toxic Imperialism of the West". With this imperialistic attitude towards the developing nations, there was a need to develop a regulatory framework that prevented the exploitation of the situation by the West. Therefore, the first step towards this change was brought about by the Basel Convention in 1989. This Convention was landmark not only in the sense that it pioneered an international measure towards hazardous waste management, but also because it sought to ease the friction between the developing countries.

Following this, **Prof [Dr.] T.R. Subramanya**, Dean, School of Legal Studies, CMR University went into an elaborate discussion on the history of the Basel Convention, with examples. Professor Subramanya spoke about the emergence of the developing countries' dilemma with respect to the disposal and management of hazardous waste by citing two

examples. The first related to the realisation of the ill-effects of cadmium and industrial waste in Japan after the outbreak of the itai-itai- disease in 1912. The second related to the problems caused by the dumping of waste caused by the asbestos industry from 1946 onwards. The other instances that spurred the need for sound chemical and hazardous waste management measures were as follows:

- Hooker Chemical Corporation in 1968, disposed of some 80,000 tons of mainly chlorinated organic waste at the 15-acre site from 1953 to 1975, particularly inclusive of tetrachlorodibenzo-p-dioxin (TCDD). In September 1983, EPA of US put this industrial landfill on its list of the most hazardous sites. This raised issues with respect to the contamination of soil and water.
- Another instance referred to was when Midwest Solvent Corporation, which is engaged in the business of reclaiming solvents and in the business of storing and disposing of various solid and hazardous wastes had dumped around 24,000 gallons of a 50-gallon capacity of waste in the state of Indiana. This act attracted significant attention when this waste caught fire and led to a massive fire breakout in the landfill.
- In 1980's a Houston based company, PCB started dumping hazardous plastic waste within the Mexican territory which highlights the treatment of Latin American countries as dumping yards of waste by the United States.
- In the mid 1980s, Italy could only process 20 percent of the toxic waste it generated. The small fishing village of Koko, Nigeria, made international headlines in 1988 when it was discovered that two Italian firms had arranged for the storage of 18,000 drums of hazardous waste with Koko residents. The containers were disguised as building materials and offloaded into a local man's vacant yard for \$100 per month. Furthermore, the acts of dumping hazardous waste in Nigeria by Italy was investigated more closely when the Nigerian government realised that the vegetation in the village was disappearing due to the toxicity of the waste.
- Later on, in the sub-continent of South America, a Philadelphia based MNC began to dump around 13,476 tonnes of waste which resulted in a public outcry in the American countries. The first country that took a positive step was Bermuda, which out rightly rejected the export and dumping of waste from the US.
- The final and most significant incident involved the Banana Gate Scam in 1975. A US based company entered into an agreement with the government of Costa Rica to provide pesticides to Banana cultivators. These pesticides resulted in various health defects of the

growers and farmers which stirred up the agriculturalists in Costa Rica. Interestingly, 1341 women approached the court seeking compensation from the company as their husbands were sterile owing to the pesticides and therefore sought for divorce.

- One country that has taken a positive step against the toxic imperialism of the west is Kenya. In 1956, the President of Kenya opposed the dumping of hazardous waste in the country by invoking the clauses of the Agreement on Self-Determination.
- Ivory Coast followed suit by becoming the first country among the OECD group of nations to take positive action against violators who allowed for dumping of hazardous waste.
- Nigeria also imposed death penalty as punishment for those who violated the rules against the dumping of hazardous waste.
- Following this, 39 Latin American countries took measures to prevent the dumping of hazardous waste.

On a concluding note, Professor Subramanya laid emphasis on how the Basel Convention sought to resolve these problems, as evidenced above. After deliberating upon the provisions briefly, he also threw light on the demerits of the Convention. The first demerit is that the definition of Hazardous Waste differs from country to country which renders the



definition ambiguous. Secondly, the Convention makes no mention of transfer of technology. Thus, while the Convention reflects a positive step in the regulation of hazardous waste management on a global level, it is not devoid of certain flaws.

## SESSION 4 INTERNATIONAL LEGAL FRAMEWORK FOR HAZARDOUS SUBSTANCES AND WASTES



Dr. A. Ramesh Kumar, Senior Scientist, Solid and Hazardous Waste Management Division, Stockholm Convention Regional Centre CSIR-NEERI, Nagpur presented on Microplastics and Plastics Associated Chemicals in Terrestrial Environment. He started his presentation by discussing the importance of basic science as the Conventions are based on scientific data.

The scope of his presentation included-

- Plastic waste and Microplastics An emerging pollutant of global concern
- Plastic associated chemicals/additives
- Benefits and Risks
- International conventions- Basal, Stockholm, Strategic Approach in International Chemical Management
- Sound management of chemicals and wastes-Issues and the way forward.

He further referred to sources like American Chemical Society's database and provided facts about the existing chemical world. The Chemical Abstract Service (CAS), which gives a number to track the properties of the chemicals, stated that 139 million chemicals are registered (both organic and inorganic) and include natural, synthetic, polymer, biomolecules, minerals etc. There are about 20 million synthetic chemicals and a new chemical is synthesized every 27 seconds. Around 99.5 % of chemicals are synthesized for academic interest. But there are still many chemicals unknown. We have chemicals in our body as well.

He further spoke about the ambitious Sustainable Development Goals which are related and interlinked. There linkages between chemicals, waste management and Sustainable Development Goals. There has to be responsible production and consumption through the means of a lifecycle approach. The manufacture of raw materials and products leads to use and end of life of products. There is dust and chemical exposure. The consumer generates garbage and industries generate greenhouse gases and effluents like solid waste. There has to be a paradigm shift to a value chain approach for each sector. There has to be increased and extended producer responsibility through the life cycle of the product. The chemicals are listed in the BRS Convention and Minamata Convention.

Dr. Ramesh Kumar moved on to the discussion on plastics. Plastics were introduced in 1950 and has become an integral part of our daily life. It has led to the control of infectious diseases by the creation of disposable syringes but has increased medical waste. It is lightweight with an ability of being moulded into different shapes. The global production is more than 150 million tons/year and India's per capita plastic consumption is 11 kgs. But most plastic waste is generated in Asia. There are the most number of chemical composition than any other products and has a lot of POPs.

But the generation of waste and mismanagement in disposal of plastic has caused serious problems. There is choking and clogging of waterways. East Asia and Pacific 65% of mismanaged plastic. The Great pacific Garbage patch is of 1.6 million square kilometres. Around 62% of plastic is single use plastic from packaging industries and around 80,000 metric tons of plastic inhabiting in the patch. Around 92 % of the mass is microplastics which are plastics below the size 5 mm. The types of microplastics are fibres, pellets, films, foams, fragments and microbeads.

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The different sizes of plastic are:

- Macro->25mm
- Meso- <25mm- 5mm
- Micro- <5mm-1mm
- Mini-micro- <1mm

In India, plastic waste generation is about 9.4 million tonnes per annum. People in India generated about 26,000 tonnes of waste/day even though 60% of the plastic produced is recycled. Around 9400 tonnes of plastic is left unattended in the environment causing land, air and water pollution. 70% of plastics packaging products are converted into waste within a short span of time.

All the Conventions address this issue and they are interlinked in SAICM which is the Strategic Approach to Chemical Management. While discussing some of the concerns posed by chemicals especially to the health of humans, Mr. Ramesh spoke of chemicals that are mutagenic, carcinogenic, toxic to reproduction, endocrine disrupters (EDCs), neurotoxic, persistent, bio accumulative and toxic (PBT) or very persistent and very bio accumulative (vPvB) and may have serious and often irreversible effects on human health and the

environment. The top three diseases that cause deaths are cardiovascular disease, chronic obstructive pulmonary disease and cancer. He next discussed the Basel Convention and the Stockholm Convention. There have been discussions to include solid plastic waste in Annex II of the Basel Convention which deals with wastes which need special consideration. He ended his session by discussing the way forward which included

- Implementation of all waste management rules, in letter and spirit
- Mainstreaming of stakeholders
- Country specific data on chemicals and waste as hazardous/POP properties depends on both the nature of chemical and environmental conditions
- Epidemiological data on chemical exposures and health outcomes
- Awareness of effects of chemicals and mixtures of chemicals at sublethal levels due to scientific advances.

#### **SESSION 5 CHEMICAL INDUSTRIES IN INDIA: A SECTORAL ANALYSIS**



Dr. Ravi D R, Officer, Karnataka State Pollution Control Board started his presentation by discussing the importance of chemicals which are raw materials for all manufacturing sectors. The Chemical industry contributes for Indian economy to the tune of 2.11 % of the GDP. The Bulk chemicals account for 39 %, followed by

Agro-chemicals of 20.3 % and Specialty chemicals of 19.5 %. India is one of the world's leading producers of Dyes, Agro-Chemicals and Petrochemicals, with over 70,000 commercial products and is the 6th largest producer of Chemicals in the world, and the 3rd largest producer in Asia. The chemicals can be categorized in the segments as follows:

- Bulk Chemicals which include Basic Organic and Inorganic chemicals
- Petrochemicals
- Intermediates
- Fertilizers

- Pharmaceuticals
- Agrochemicals
- Specialty Chemicals
- Biotechnology

He informed the participants that India ranks 14th in exports and chemicals contributes to 1.3% of the Nation's Gross Value. The total production of major chemicals and petrochemicals in 2018-19 was 27,847 MT and witnessed a 4.15% growth over 2017-18. Alkali chemicals had the largest share of 69% in the Chemical Industry. The projected growth in petrochemicals is 7.5% from 2019-22 and in agro chemicals it is 8% reaching USD 4.7 Bn by 2025. The specialty chemicals is expected to increase by 12% from 2019-22 and fertilizers is projected to increase to 13% from 2019-23 reaching USD 138 Bn. There is 100% FDI investment allowed under direct route as well.

Dr. Ravi further spoke about the environmental conservation measures for reducing water consumption and effluent generation, and adopt better management practices for reuse/recycle of the treated effluent. Better practices must also be implemented for maintenance of flanges/valves, handling and transport of material etc., to reduce fugitive emissions. There must be an installation of steam injection to reduce particulate emissions, and implementation of vapour recovery system to control losses of volatile organic compounds (VOC's) from storage tanks and loading areas. Further, there must be efficient technology installed for minimising the generation of oil sludge and recover the oil from sludge using improved adsorbent. There must be better management practices for segregation, effective utilisation of raw materials; improvement in efficiency of process; and recovery of by-products.

He also discussed about the use of technology for air and water pollution control by installation of scrubbing systems with proper treatment for reuse or recovery of the scrubbed liquid. There must also be an installation of :

- Automatic feeding system for chemical dosing with pH indicator and alarm system.
- Pneumatic systems for collection and transportation of collected particulate matter through cyclone, bag filters etc.
- Oil Recovery system for removal of Oil and the same shall be transported for reuse or recovery.
- Operation of the denitrification system for removal of Nitrogen.

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- High-pressure hydrolyser strippers with recovery of ammonia and condensate.

He also spoke about the management of Hazardous Waste through prevention, minimization, reuse, recycling, recovery and safe disposal. He mentioned that the greenhouse gas emissions must be reduced, co-processing of waste in cement plants must be encouraged and energy recovery from waste having high calorific value must be promoted. The spent solvent or mixed solvent generated by chemical industry should be co-processed in cement kiln. The process waste should be incinerated or disposed at authorized secured landfills, with the prior authorization and should follow the guidelines framed under the Rules. There must be detoxification of empty drums/bags etc, before selling and maintain manifest system. He ended his presentation by discussing the applicability of EIA Notification which provides the procedure for Prior Environmental Clearance to Chemical Industries in India.

After the sectoral analysis of the chemical sector, Dr. Ravi D.R. further presented on Hazardous Waste (Management, Handling and Transboundary Movement) Rules 2016. The first comprehensive rules on hazardous waste management were brought about in July 1989 through the Hazardous Waste (Management and Handling) Rules 1989 but these rules suffered some limitations. After India became a party to the Basel Convention, the Rules were amended in 2000, 2003 and a final notification of the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 in supersession of former notification was brought about. These Rules were again superseded by Rules of 2016, which was recently amended in 2019. "Hazardous waste" has been defined to mean 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.

The Rules focus on the minimization, reuse, recycling, recovery, replenishment, reproduce, utilization including co- processing, and safe disposal of waste.

In order to manage waste, industries get authorization from State Pollution Control Board for generation, storage, treatment, transportation and disposal of hazardous wastes. Once waste is generated, priority is for recovery/reuse of waste materials. This solvent recovery is practiced by all industries. Many useful products are recovered from waste streams like sodium sulphate from mother liquor of chemical manufacturing. After recovery, only residual materials are to be treated and disposed of either in captive facility or in Common TSDF.

Final treatment and disposal of residual wastes can be done by securing landfill inorganic wastes and incinerating organic wastes.

The classification of Hazardous Waste is done in Schedule I which also indicates the processes that the different hazardous waste have to be subjected to.

SL. NO.	PROCESSES	HAZARDOUS WASTE
1	Petroleum Refining or re- processing of used oil or recycling of waste oil	<ul> <li>Oil sludge or emulsion</li> <li>Spent Catalyst</li> <li>Slop oil</li> <li>Organic residue from processes</li> <li>Spent clay containing oil</li> </ul>
2	Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	<ul> <li>Used or spent oil</li> <li>Wastes or residues containing oil</li> <li>Waste cutting oils</li> </ul>
3	Metal surface treatment, such as etching, staining, polishing, galvanizing, cleaning, degreasing, plating, etc.	<ul> <li>Acidic and alkaline residues</li> <li>Spent acid and alkali</li> <li>Spent bath and sludge containing sulphide, cyanide and toxic metals</li> <li>Sludge from bath containing organic solvents</li> <li>Phosphate sludge</li> <li>Sludge from staining bath</li> <li>Copper etching residues</li> <li>Plating metal sludge</li> </ul>
Schedule II provides the list of waste constituents with their concentration limits. Schedule III provides the lists of hazardous waste in the Basel Convention as follows:

- Part A List of Hazardous Waste applicable for Import & Export of with Prior Informed Consent.
- Part B List of Hazardous Waste applicable for Import & Export of Not Requiring Prior Informed Consent.
- Part C List of Hazardous Waste on Characteristic Code.
- Part D List of Other Waste applicable for Import & Export without Permission from MoEF.

Dr. Ravi also spoke of the various forms provided in the Rules I which deal with permissions from authorization to appeal.

Type of Forms	Purposes					
Form -1	To Get Authorization by the Industry					
Form -2	Grant Authorization by KSPCB					
Form 3	Maintenance of a record of hazardous and other wastes					
Form -4	Prepare and submit the annual return to the State Pollution Control Board,					
	Before 30 <sup>th</sup> of June Every Year					
Form-5	Application for getting approval to import or transit for Transboundary					
	movement of hazardous and other wastes specified in Part A and Part B of					
	Schedule III to MOEF					
Form-6	Application for obtaining permission for the import of other wastes listed in					
Part D of Schedule III, the importer shall not require the permi						
	Ministry of Environment, Forest and Climate Change. However, the importer					
	shall furnish the required information as per Form 6 to the Customs					
	authorities,					

One Time authorization obtained by the importer who is a trader, importing					
waste on behalf of actual users.					
The labelling shall be done as per Form 8.					
The occupier shall provide the transporter with the relevant information					
Form 9, regarding the hazardous nature of the wastes and measures to be					
taken in case of an emergency					
The sender of the waste shall prepare seven copies of the manifest in Form					
10 comprising of colour code					
Accident Reporting Format					
Appeal for Suspension or Cancellation/ Refusal of Authorization or its					
Renewal by KSPCB					

He further discussed the responsibility of various stakeholders. The responsibility of the waste generator includes:

- Handling of waste The Occupier is required to take all required steps while handling hazardous wastes to contain contaminants and prevent accidents and limit its impact on human beings and the environment; and provide training, equipment and information to all persons working on the site to ensure their safety.
- Efficient packaging of the hazardous waste The containers utilized for storing and handling Hazardous and other wastes, must be able to withstand normal handling and retain integrity for a period of six months
- Labelling the hazardous waste during transportation The Rules mandate two types of labelling requirements: Individual containers Labelling and Transport vehicles Labelling. Containers that contain hazardous waste shall be labelled with the words "HAZARDOUS WASTE" in Vernacular language, Hindi / English.

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- Collection and transportation of hazardous waste The occupier must ensure that information regarding characteristics of wastes particularly in terms of being Corrosive, Reactive, Ignitable or Toxic is provided on the label; and that the transport of hazardous waste containers are in accordance with the provisions of HW (M & TBM) Rules, 2016 and the rules made by the Central Government under the Motor Vehicle Act, 1988.
- 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	Purnose				
with Colour Code	T ut pose				
Copy 1 (White)	To be forwarded by the sender to the State Pollution Control Board or Committee after signing all the seven copies.				
Copy 2 (Yellow)	To be retained by the sender after taking signature from the transporter and the rest of the five 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 /Committee.				
Copy 6 (Blue)	To be sent by the receiver to the sender.				
Copt 7 (Grey)	y) To be sent by the receiver to the State Pollution Control Board of the sender in case the sender is in another State.				

After discussing the responsibility of the occupier/waste generator, Dr. Ravi discussed the responsibility of the Pollution Control Boards which includes issuance of authorization in Form-2 to units engaged in generation, processing, treatment, packaging, storage, transportation, use, collection, conversion, offering for sale, transfer of hazardous waste. They also authorise the industry to dispose waste with incinerator, re-processor, co-incineration in cement kiln and common disposal facility. They have to ensure that industries are submitting returns, after disposal of hazardous waste, as per authorization conditions. The

Supreme Court in its order No. SLP No. 657/95 dated: 14/10/2003 has issued directions to all State Pollution Control Boards to develop Treatment, Storage and Disposal Facility (TSDF) for disposal of Hazardous waste generated in their State Jurisdiction in the interest of public health and environment.

While discussing the issues pertaining to Hazardous wastes and their management, Dr. Ravi mentioned that is necessary to understand the best practices in waste management at individual industries, the exposure to technologies for Hazardous Waste Minimization & Processing, and Inventorization of Per-capita generation of Hazardous waste with respect to specific industrial sectors (like automobile service stations, engineering industries, metal finishing industries, etc).

Before concluding his session, Dr. Ravi spoke of some of the challenges of the Hazardous waste management which include the following:

- The environmentally sound technology (based on type of waste) is not available to the Re-processors.
- Ensuring life cycle analysis of HW including transparency in transportation is difficult
- There is an absence of a standard framework for National and State level auditing of hazardous waste.
- Capacity building of officials of PCBs in tracking movement of hazardous waste is required.
- Small quantity of HW generators (ex: Electroplating) –create difficulty in Management.
- Management of Household hazardous waste.
- Development of Self-Regulatory Mechanism.

## SESSION 6 TRADE, MARKET AND TECHNOLOGY ORIENTED CHALLENGES IN CHEMICAL MANAGEMENT AND HANDLING IN INDIA



The last session of Day 1 had four speakers to deliberate on the issue of trade, market and technology oriented challenges in chemical management and handling. The first speaker of this session Ms. Lakshmi Achuta, Strategic Advisor, Shiba Biotechnology Inc. gave the industry perspective on chemical management and handling. She began by giving an insight into the industrial dimension of Chemical Handling and Management. With her wide range of experience in the pharmaceutical industry, she focussed upon the aspect related to the need of effective chemical management systems in the pharmaceutical industry due to its indispensable interface. A Chemical Management System is a process that ensures proper compliance with safety and environmental policy. This calls for responsible chemical management. She elaborated and deliberated upon certain practices which can ensure responsible chemical management such as:

- **Comprehensive chemical inventory-** Maintaining an inventory which comprises of all the chemicals utilised in the industry facilitates taking safety precautions as per the requirements and nature of the chemicals. She emphasised on the Comprehensive Chemical Inventory which deals with the aspects of acquisition, use, storage, transportation, final disposition and automated tracking.
- **Culture and commitment** Aimed at promoting effective and responsible chemical management.
- Identification and Analysis of Chemical Hazards- Identification of chemical hazards which will ensure adequate safety systems are in place to deal in case of any chemical hazard.
- Systems to manage Safety Data Sheets (SDS)- Maintaining Safety Data Sheets for the chemicals by following the Globally Harmonized Systems (GHS) of classification and labelling of chemicals which is an internationally agreed-upon standard managed by the United Nations. She emphasised that these internationally accepted labelling process would enable a systematic method of labelling containing the following indicators-



- Identification of the substance or mixture and of the supplier
- 2. Hazards identification 3. Composition/information on
- ingredients Substance/Mixture First aid measures
- 5. Firefighting measures
- Accidental release measures
  Handling and storage
- 8. Exposure controls/personal protection
- 9 Physical and chemical properties
- 10. Stability and reactivity

- 11. Toxicological
- 12. Ecological information (non mandatory)
- 13. Disposal considerations (non mandatory)
- 14. Transport information (non mandatory)
- 15. Regulatory information (non mandatory)
- 16. Other information including information on preparation and revision of the SDS
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- Approval process for introducing new chemicals on site- The approval process will ensure that the substances which require planned evaluation and approval before use on site will be according to the requisite compliance.
- On-site chemical management (viz., Just In Time) Handling and storage- With particular reference to the Chemical Compatibility Matrix, the Chemicals used in the pharmaceutical industry are to be maintained as per the matrix. Apart from this, the aspect of chemical hygiene was also stressed upon. Chemical Hygiene as a concept is slowly gaining popularity owing to its impact in minimizing the exposure to harmful chemicals by maintaining an effective Chemical Hygiene Plan.
- Proper waste disposal by using adequate and effective waste management systems
- Review of Chemical Management Systems- Regulatory Surveillance Groups have to form a periodic review of the chemical management systems in place for the industry.

She concluded her talk by stressing on the need for responsible chemical management and how the pharmaceutical industry constantly has to carry out hazard and risk analysis of the products to ensure there are no untoward chemical accidents.

The next speaker, Dr. Mamatha Mishra, Founder, Health First Service spoke about the 2 major problems



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which the Chemical Industry poses from the industrial standpoint and the consumer standpoint. From the industrial standpoint, the textile industry has an intrinsic interdependence to the chemical industry. In addition, the recent Single-use plastic regulation will have a bearing on the players in the food industry as well. She emphasised that replacing plastic in the food industry is going to remain a significant challenge due to its useful nature. The amount of dependence of the food industry on plastic is such that with the new regulation in place, there is a dire need to look for alternatives to plastic.

The resource person emphasised upon the use of bagasse as a sustainable material in sugar industry and an effective alternative to plastic. She stressed that the disposal of bagasse is turning out to be a major issue in the sugar industry after processing of sugar and hence can be put to better use by using it as a substitute for plastic. She called for an interaction and an integrated approach among industries to work out solutions which are mutually beneficial. The adulteration in the kind of food products we use bears testimony to the fact that there are substantial traces of oestrogen in groundwater. She also spoke about Reuse of Used Cooking Oil (RUCO) initiative wherein the cooking oil was reused as a biofuel. She concluded on the note that waste management can pose a significant threat in the form of bioterrorism. There needs to be a shift from the preventive action to corrective action to ensure that we tackle the issue of waste management efficiently.

The third speaker of the session, Prof. [Dr.] Shiju Professor & HOD (Law) Christ Academy Institute of Law, Bengaluru raised three concerns for the chemical sector from a policy perspective. The concerns he raised were within the realm of :

- Environmental issues
- Labour issues
- Competition issues



He stressed that a sense of Environmental consciousness will ensure enforcement of stricter regulations. He spoke with particular reference to the Bhopal Gas Tragedy as well as the Bicchri Incident. He emphasised that the issues with relation of chemicals and its environmental impact cannot be brushed aside and effective regulations can acts as a means of mitigating the damage caused. He emphasised on the universal trend towards sustainability basing the claim

on the Sustainable Developmental Goal 12 that talks about sustainable consumption patterns. With respect to the labour concerns, he reiterated the fundamental objective behind the formation of the International Labour Organisation (ILO) that is "decent work". He raised concerns with regard to the issues of contract labour, collective bargaining issues and participation of women in the Chemical Industry. He also elaborated upon the occupational and safety hazards that the workers are exposed to requires adequate measures to be taken with regard to workmen welfare.

With regard to the competition issues, he stressed that the Chemical industry is highly consolidated and vertically integrated as 92% of chemicals are controlled by 30 giants in the Chemical Industry. He mentioned that there have been certain behavioural charges in light of the 3 major mergers in the Industry in India. In order to give an international dimension to the discussion, he spoke about the Anti-Trust Authority in China and USA which have been seen as effective regulators in facilitating healthy competition in the market. He deemed that the Competition Commission of India not interjecting in the matters of the major mergers in the Chemical Industry as a 'missed opportunity'. However, he was optimistic that with the emergence of awareness regarding the matters related to competition regimes, the Competition Commission of India will play a far more significant role in the regulating matters in Chemical industry of the country.



The last speaker of the day, Mr. Naveen G V , Managing Director & Executive Global BD, Gensuite LLC again brought in the industrial perspective to the discussion. His primary focus was on the key challenges in managing chemicals in the workplace. He suggested that digitizing chemical management can go

a long way in ensuring that there is a digitized chemical inventory which facilitates effective chemical management. While highlighted some of the key challenges of the Chemical Sector he enlisted the following-

- A holistic programme must be in place for effective management of chemicals
- The regulations must be comprehensive and must be open to interpretation for convenience

- There is limited expertise with regard to the conduct of chemical evaluations
- There is ignorance towards using validation tools or processes to keep track of changes in compliance or regulatory requirements
- Work areas need to be optimised with sufficient storage space with separate assigned area for each process to avoid missing of incompatible chemicals

He advocated that the approach of digitizing chemical management within the industry would prove to be effective owing to the following reasons-

- It would define accountability
- There are clear established protocols and tollgates and effective maintenance of the Safety Data Sheet (SDS)
- The chemical management programmes can be integrated with the safety and environmental programs taken up by the Organisation
- Information and training in effective chemical management is well documented
- Compliance is ensured

This session brought the deliberations of the first day to a close. At the end of the session, the participants interacted with the resource persons on effective chemical management and myriad aspects of the chemical industry and the need for effective regulation in the sector.

#### Day 2 – 30th NOVEMBER, 2019

### **SESSION 1 - MERCURY AND THE MINAMATA CONVENTION**



Dr. Navya Cherian, Indian Institute of Technology, Hyderabad began her session by giving a brief overview of the characteristics of mercury as a hazardous substance and its relevance in developing regulations for its disposal and treatment. A

few characteristics described included its physical and chemical traits. Mercury – a shimmering, silvery, liquid metal is a highly volatile substance. It possesses the quality of Conducts electricity and expands at a constant rate in response to changes in temperature and pressure. It is available in the atmosphere in three states – gaseous, particulate and aqueous. In terms of its utility, many of its applications were discussed. First, Electrical switches, barometers and thermometers take advantage of these properties. Secondly, Hg combines with other gases to form more complex molecules that emit light when charged with electricity, hence the use in Fluorescent and Neon lights. Thirdly, Hg combines with most metals to form malleable alloys such as dental filling amalgam. Finally, its property of attaching to other metals, together with the ease of separating and distilling the amalgams led to the widespread use in gold mining. Thus, mercury is said to be of immense use, commercially and in the industry.

Further, Dr. Cherian took the participants through an understanding of the sources of mercury. Broadly, the sources can be categorised into two types: (a) Natural Sources and (b) Anthropogenic Sources. The natural sources include degassing, volcanic eruptions, forest fires and oceanic releases. On the other hand, the anthropogenic sources include erosion sources, atmospheric deposition, urban discharges, combustion/industrial discharges, agricultural resources, mining processes.

Furthermore, considering that mercury possesses certain hazardous traits, the various ways in which mercury is emitted into the air was deliberated upon. They include:

- Natural emission: Volcanoes, Forest fires
- Emission from power plants
- Burning oil and wood that contains mercury
- · Burning mercury-containing wastes, including
- wastes from the manufacture of Portland cement
- consumer products that contain mercury, like electronic devices, batteries, light bulbs and thermometers, that are thrown into garbage that is incinerated
- Using certain technologies to produce chlorine
- Breaking products that contain mercury
- Burning iron ore, coke and limestone in electric arc furnaces used to produce steel

Proceeding further, the session delved into a nuanced understanding of the process of transformation of mercury in the environment. Furthermore, building on the consequences of such chemical reaction and transformation of mercury into the atmosphere, the means of getting exposed to mercury were elaborated. It was stated that the primary means of exposure of people to mercury is by eating fish and shellfish that have high levels of methylmercury, a highly toxic form of mercury, in their tissues. A less common way that people are exposed to mercury is by inhalation of mercury vapour. This can happen when mercury is released from a container, or from a product or device that breaks. If the mercury is not immediately cleaned up, it can evaporate, becoming an invisible, odourless, toxic vapour.

In the next part of the session, Dr. Navya focussed on the health and ecological effects of mercury exposure. In terms of the health effects, mercury exposure at high levels can harm the brain, heart, kidneys, lungs, and immune system of people of all ages. High levels of methylmercury in the bloodstream of babies developing in the womb and young children may harm their developing nervous systems, affecting their ability to think and learn. Similarly, from an ecological perspective, birds and mammals that eat fish are more susceptible to methylmercury exposures than other animals in water ecosystems. Predators that eat these birds and mammals are also at risk. Methylmercury has been found in eagles, otters, and endangered Florida panthers. At high levels of exposure, methylmercury's harmful effects on these animals include: death, reduced reproduction, slower growth and development, and abnormal behaviour.

In the following part of the session, Dr. Navya focussed on the conceptual difference between Bioaccumulation and Biomagnification. Bioaccumulation is the process by which organisms (including humans) take up contaminants more rapidly than the rate at which their bodies can eliminate them, thus the amount of mercury in their body accumulates over time. On the other hand, Biomagnification is the increase in concentration of a contaminant at each level of a food chain. Even at very low input rates to aquatic ecosystems, biomagnification effects can result in mercury levels of toxicological concern. These processes raise certain issues with respect to the release of mercury into the environment. For example, fish binds methyl mercury through covalent bonding with protein sulfhydryl groups whereby the half-life of elimination is of the order of 2 years. This leads to Selective enrichment of MeHg with passage from one trophic level to the next.

Speaking about the uses of mercury for consumers, Dr. Cherian spoke about the different products that require mercury in their production such as button cell batteries and mercuric oxide batteries, fluorescent light bulbs, including compact fluorescents (CFLs), several types of thermometers, thermostats, amalgam in dental fillings, thimerosal in vaccines, automotive switches. As mercury is highly pervasive in terms of its use in consumer products, Dr, Cherian emphasized on the need on the part of consumers to take certain steps for its safe use and disposal. In this context, Dr. Navya discussed five easy lifestyle changes that one can adopt to help prevent mercury pollution and protect oneself. This includes:

1. Buying Mercury-Free Products

- Choosing products that do not contain mercury. Looking for digital thermometers and electronic thermostats.
- Asking one's dentist if he or she will employ mercury-free composites for any dental work.

2. Discarding Products Safely

- Separating mercury-containing products, such as thermometers, thermostats, old paint (pre-1991) and batteries (pre-1995) from regular garbage.
- Not removing mercury switches from products, such as thermostats; it is safer to keep or recycle the product when it is intact.

3. Conserving Energy

- Purchasing only energy-efficient products
- 4. Avoiding Exposure to Mercury at Home, School and Work

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- Never playing with liquid mercury, and washing any area that comes in contact with liquid mercury immediately.
- Notifying one's employer or school official on finding stored or spilled mercury.
- 5. Being Aware of Mercury in Fish
  - Pregnant women, breastfeeding women and children (under 15) should never consume large ocean fish, especially fresh tuna, shark, swordfish, king mackerel or tile fish. Other fish species should be consumed in moderation.
  - ➤ As a general rule, smaller fish are safer to eat.

In the next and most pertinent part of the session, Dr. Navya steered the presentation towards the legal and regulatory framework as enshrined in the Minamata Convention. The Minamata Convention - A global treaty to protect human health and the environment from the adverse effects of mercury was named after the bay in Japan and adopted on the 10th October, 2013 with effect from 16th August, 2017. The number of Parties included 115 and India was 93rd party that signed the Convention on 18th June 2018. Highlighting the major objectives of the Convention, Dr. Cherian stated that it included controlling the mercury supply and trade, reducing the use, release and emission of mercury; raising public awareness on the ill-effects of mercury and building necessary institutional capacity.

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The speaker highlighted some of salient provisions of the Convention such as Articles 3 and 4 of the Convention deal with aspects of trade in mercury and mercury related products. **Article 3** provides for Mercury Supply Sources and Trade. It specifically provides for Control measures aimed at limiting the global supply of mercury to complement and reinforce the demand reduction control measures in Article (4-7) and provisions to limit the sources of mercury available for use and trade.

Further, reliance was placed on the Sources of Mercury Supply which include

- Primary mercury mining
- > By-product mercury from mining other metals and natural gas production
- Decommissioning chlor-alkali facilities
- Recovery of mercury from wastes and used products that contain mercury
- Government or private mercury stocks.

Additionally, the duties and responsibilities of the importer and exporter were discussed in terms of international trade. The relevant provisions include:

- Exporter is a party & Importer is a party (Article 3.6.a)
- Exporter is a party & Importer is a non-party (Article 3.6.b)
- Exporter is a non-party & Importer is a party (Article 3.8)

This is however, subject to certain exceptions which may be as follows:

- a. The importing Party has provided the exporting Party with its written consent; and
- b. The mercury is for only for the following purposes:
  - i. A use allowed to the importing Party under the Convention (as defined in Article 2.k); ii. Environmentally sound interim storage (Article 10).
- When the non-Party importer has:
- a. Provided the exporting Party with its written consent; and
- b. Certified that:

i. It has measures in place to ensure the protection of human health and the environment and to ensure its compliance with the provisions of storage (Article 10) and final disposal (Article 11); and

ii. Such mercury will be used only for a use allowed under this Convention or for environmentally sound interim storage (Article 10).

• The exporter non-party has provided certification that the mercury is not from primary mercury mining, decommissioning chlor-alkali facilities and the importing party has provided its written consent

Article 4 enshrines the provisions relating to Mercury Related Products (MAP). It defines an MAP as a "Product or product component that contains mercury or a mercury compound that was intentionally added". Subject to this provision, the Convention also provides for the phasing out of MAPs by the year 2020. The various MAPs to be phased out by the given deadline include: Batteries, except for button zinc silver oxide batteries with a mercury content < 2% and button zinc air batteries with a mercury content < 2%, Switches and relays, Compact fluorescent lamps (CFLs), Linear fluorescent lamps (LFLs), Pesticides, biocides and topical antiseptics, Barometers; hygrometers; manometers thermometers; sphygmomanometers, High pressure mercury vapor lamps (HPMV), Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) and Cosmetics (with mercury content above 1ppm), including skin lightening soaps and creams.

Dr. Cherian also apprised the participants about **Article 5** that provides for the phasing out of manufacturing processes that utilize mercury or mercury compounds. Accordingly, for Chloralkali production, the target date for phase out is 2025 and for Acetaldehyde production in which mercury or mercury compounds are used as a catalyst, it was 2018. Additionally, for Vinyl chloride monomer production, the sub-clauses specify the specific measures as follows: i) Reducing the use of mercury in terms of per unit production by 50 per cent by the year 2020 against 2010 use;

(ii) Promoting measures to reduce the reliance on mercury from primary mining;

(iii) Taking measures to reduce emissions and releases of mercury to the environment;

(iv) Supporting research and development in respect of mercury-free catalysts and processes;

(v) Prohibiting the use of mercury five years after the Conference of the Parties has established that mercury-free catalysts based on existing processes have become technically and economically feasible;

(vi) Reporting to the Conference of the Parties on its efforts to develop and/or identify alternatives and phase out mercury use in accordance with Article 21.

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Article 6 provides for exemptions. It states that a party seeking additional time to comply with the deadlines for the phase-out of mercury use in products (Article 4) or industrial processes (Article 5). Dr. Navya informed the participants that, India has extended the phase - out date to 2025. Article 8 provides for emissions which include emissions from Coal-fired power plants, Coal-fired industrial boilers, Smelting and roasting processes used in the production of lead, zinc, copper and industrial gold, Waste incineration facilities and Cement production facilities. In the penultimate part of the session, Dr. Navya discussed about the impact of the Third Conference of Parties of the Convention. It was conducted between 25-29 November, 2019 in Geneva Switzerland. The Conference agreed that by 2020 the manufacture, import and export of mercury-added products is no longer allowed. Furthermore, Parties agreed on a framework to monitor the effectiveness of the Convention in order to strengthen its implementation. It also agreed on custom codes for mercury-added products that would permit to gather reliable information and therefore facilitate trade, including the banning of products containing mercury and Custom codes for mercury-added products (help to gather reliable information, and therefore facilitate trade, including the ban of products containing mercury)

In the final part of the session, Dr.. Navya elaborated on the environment and legal framework in India pertaining to the use, management and disposal of mercury. Interestingly, India is in the third place in emitting mercury followed by China and USA (UNEP, 2008; Pacyna *et al.*,2010). Approximate total mercury emissions in the years 2001 and 2010 were 415 and 310 tonnes respectively and is projected to rise to 540 tonnes in 2020 (Burger Chakraborty *et al.*,2013). In India, the relevant mercury sources include (i) industrial and nonindustrial processes in which mercury is used intentionally (chlor-alkali and vinyl chloride monomer (VCM) production, artisanal, and small scale gold mining), (ii) processes utilizing fuels or ores that contain mercury as an impurity (coal and lignite power plants, petroleum combustion, cement production, iron, steel) and (iii) products that are in circulation in the society, which encompass personal, household, and health care goods (Mercury containing lamps, thermometers, amalgam for tooth filling, switches, batteries etc.).

# SESSION 2: MULTILATERAL ENVIRONMENTAL AGREEMENTS ON CHEMICAL AND WASTE AND THEIR IMPLICATIONS FOR INDIA



Mr. Piyush Mohapatra, Senior Programme Coordinator, Toxics Link, New Delhi, commenced the session with a brief overview of chemicals and the importance to regulate their use and disposal under international law. According to WHO reports, it was estimated

that by 2004, at least 4.9 million deaths would have been caused by exposure to chemicals. Furthermore, it results in 86 million disability adjusted life years. Interestingly, Volatile Organic Compounds (VOCs) and mercury emissions alone account for 5.7 - 13 percent of the annual USD 2 trillion to 4.5 trillion.

Considering the fact that chemicals pose a significant threat to human health and environment, Mr. Mohapatra told the participants that the international legal framework is guided by certain principles in regulating such chemicals. The principles are as follows:

- Minimise the impact on human health and environment
- Upstream ( Chemical) and downstream ( Waste) management
- Precautionary approach
- Reduce chemical foot print/Body Burden
- Extended Producer Responsibility
- Technological Innovation

Mr. Piyush then gave an overview of the international legal and regulatory framework by delving into the Basel Convention, the Rotterdam Convention, the Stockholm Convention, the Minamata Convention and the SAICM.

The first convention delved upon was the **Basel Convention.** Adopted in 22 March 1989 and coming into the force with effect from 5 May 1992, the Convention is based on the two-fold objective of Control of Trans boundary Movements of Hazardous Wastes and Their Disposal and largely to prevent waste movement from developed to developing countries. Around 197 countries are party to the Convention.

In the context of fulfilling the obligations under this Convention, Mr. Piyush highlighted some the issues for India that include:

- Environmentally Sound management Hazardous Waste
- E-Waste management
- Plastics Waste (India has banned imports)
- Recycling Infrastructure
- Adoption of Basel Ban Amendment

These issues were highlighted by citing examples of plastic waste being dumped in India illegally and the case of 5000 illegal waste processing units in Delhi NCR region.

The next Convention delved upon was the **Rotterdam Convention.** The Convention was adopted in Rotterdam on 10<sup>th</sup> September, 1998 and came into the force on 24<sup>th</sup> February, 2004. The Convention has 161 parties It is based on the following objectives:

- To promote shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals in order to protect the human health and environment from potential harm
- To contribute to their environmentally sound use by facilitating information exchange about their characteristics
- Providing for a national decision-making process on their import and export by disseminating this information to parties

In context of fulfilling the obligations under this Convention, the issues that India needs to look into were flagged off by Mr. Mohapatra which included the following:

- Misunderstanding about the Convention
- Greater emphasis on the management of only toxics pesticides Paraquate and Asbestos that are posing challenges for India
- Issue of traceability
- Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

The issues were highlighted by citing the example of India's unwillingness to regard chrysotile fibres as hazardous under the Convention.

The next Convention delved upon was **the Stockholm Convention.** The Convention was adopted on 22<sup>nd</sup> May, 2001 and entered into the force on 17<sup>th</sup> May, 2004. Around 179 Courtiers are parties to the Convention. Highlighting the main objectives of the Convention, the speaker enlisted the following

- To protect human health and the environment from Persistent Organic Pollutants (Principle 15 of the Rio Declaration) -Persistent organic pollutants (POPs) are chemicals of global concern due to their potential for long-range transport, persistence in the environment, ability to bio-magnify and bio-accumulate in ecosystems, as well as their significant negative effects on human health and the environment.
- To categorize POPs as Banned (A), Restricted (B) and Reduction of unintentional release (c). Some designated POPs include Endosulphan, DDT, Aldrin, Dioxins and Furans, PCBs, Brominated Flame Retardants, PFOAs and Dicofol

Further, the concerns and challenges relating to POPs were discussed. Some of the challenges are enlisted below:

- Non-availability of data
- Public information on POPs

- Management of Stockpiles
- Illegal sale of POPs
- Cross contamination of POPs
- POPs and Food Safety

The next Convention discussed was **the Minamata Convention.** The role of India as a party to the Convention was further elaborated in context of how it has become a trading hub. The tabular representation is as follows:

HS Code (28054000)	Import (Quantity in Thousands)	Highest Importing countries (the name are ranged in descending order)	Export (Quantity in Thousands)	Highest Importing countries (the name are ranged in descending order)
2011-12	177.37 tons	Singapore, Sudan, Spain and Saudi	71.25	USA, Japan, Turkey
2012-13	164.99 tons	Spain, Sudan, Kenya, Papua New Guinea	44.66	USA. Japan, Mexico, Finland
2013-14	149.54 tons	UAE, Spain, Kenya, Myanmar	83.92	Japan, USA, Switzerland, Netherland
2014-15	97.86 tons	Kenya, Bangladesh, Myanmar, Pakistan, Sri Lanka	9.62	Japan, Ukraine, Netherland
2015-16	228.19 tons	Kenya, Bangladesh, Sri Lanka Myanmar,	62.52	Japan, Singapore, Mexico, USA
2016-17	272.63 tons	Guyana, Kenya, Morocco, Spain, Togo, Bangladesh	49.78	Japan, Indonesia, Italy, Thailand
2017-18	147.29	Kenya, Togo, Spain, Australia	15.90	Japan, Thailand
2018-19(Apr – Aug)	52.34	Guyana, Kenya, South Africa and Egypt	8.88	Vietnam, Turkey, Japan

The final regulatory framework discussed was the **SAICM.** Strategic Approach to International Chemical Management (SAICM) is an international non-binding policy framework to support efforts to achieve the Johannesburg Plan of Implementation (WSSD). SAICM was adopted in 2006 with the aim to a create policy framework for the promotion of chemical safety around the world. Further, its overall objective is to achieve sound management of chemicals throughout their life cycle so that by the year 2020 chemicals are produced and used in ways that minimizes significant adverse impacts on the environment and human health.

According to the 2020 goal, the objectives of the SAICM are as follows:

- Enhance the responsibility of stakeholders
- Establish and strengthen national legislative and regulatory frameworks for chemicals and waste

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- Mainstream the sound management of chemicals and waste in the sustainable development agenda
- Increase risk reduction and information sharing efforts on emerging policy issues
- Promote information access
- Assess progress towards the 2020 goal of minimizing the adverse effects of chemicals on human health and the environment

Furthermore, it aims to adopt a visionary approach which includes the following measures.

- Voluntary and Mandatory Approach
- Chemical safety contribution for sustainable development goal
- Information on the supply –chain process
- Availability of dedicated funds
- Obligatory national action plans for agreement in the frameworks
- Open, Inclusive and transparent multi-sectoral and multi stakeholder participation
- High-level political ownership

The speaker also highlighted some of the emerging issues that have been identified under SAICM which are as follows:

- Lead in paint
- Chemicals in products
- Hazardous substance within the life cycle of electrical and electronic products
- Nanotechnology and manufactured nanomaterials
- Endocrine-disrupting chemicals
- Environmentally persistent pharmaceutical pollutants
- Perfluorinated chemicals and the transition to safer alternatives
- Highly hazardous pesticides

In the final part of his presentation, Mr. Piyush gave a gist of some case studies that were relevant in the context of implementing this international legal framework.

- 1. The first case study involved an overview of the threat of lead paint in children's chairs and its consequent violation of the Federal lead paint ban in America.
- 2. The second case study revolved around the drastic effect of pesticides on the Indian tea market and agricultural sector.
- The third case involved a wrongful authorization by the European Commission with respect to lead chromates to a Canadian corporation known as the Dominion Colour corporation.

- 4. The fourth case involved a 2 billion fine on Monsanto for its product causing cancer of a groundskeeper in San Francisco.
- The final case involved the PFOA Perfluorooctanoic acid debacle by Dupont since 1951

# SESSION 3- ISSUES AND CHALLENGES IN WASTE MANAGEMENT, HANDLING AND REGULATION IN INDIA



Dr. V.R. Muraleedharan, Professor in-Charge, Centre for Technology and Policy, IIT Madras began the session with a general introduction about our everyday interaction with chemicals. Relying upon a study conducted by the Thanjavur Medical College on the chronic and short term exposures to pesticides, he stated that the residues of pesticides found were alarming. He drew a necessary conclusion from the same study stating that the pesticide amounts are directly proportional to the amount of money a farmer possesses which is directly proportional to the amount of pesticide he uses. He was critical of the classification and labelling approach with regard to pesticides and chemicals as he stated that more resistant the pest, more potent is the pesticide. This brought about a discussion among the resource person wherein the use of pesticide Aldrin was called into question. The continued usage of this pesticide despite its ban in the country was debated and deliberated upon. The resource

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persons reached a consensus that institutionalisation of chemicals with the integration of

technology such as Apps to check cultivation and chemical requirements of plants was required. They agreed that there needs to be an integration of several knowledge-intensive industries empowered with technological solutions to ensure that there is awareness among farmers regarding the harmful effects of pesticides



The next speaker of the session **Dr. Srinivas Ravindra, Director, Centre for Sustainable Development, Bengaluru** spoke with specific reference to the Basel Convention. The Basel Convention was primarily basic on the following principles-

- The generation of hazardous wastes and other wastes must be reduced to a minimum in terms of quantity as well as hazard potential
- Where the generation of hazardous wastes or other wastes is unavoidable, they must be disposed of as close as possible to their source of generation
- Hazardous wastes shall be exported only if the state of export does not have the technical capacity and facilities to dispose of them in an environmentally sound manner
- If the exporting state has reason to believe that their environmentally sound management and disposal would not be guaranteed in the prospective state of import
- No state shall allow any transboundary movement of hazardous wastes or other wastes to a state which has prohibited their import.
- In the context of illegal traffic, the state of export is responsible for the actions of the exporter and the generator, and the state of import is responsible for the actions of the importer and the disposer

He spoke about the provisions of the Convention especially with respect to the liability imposed- both based on strict and fault-based liability. Fault liability where there is a failure to comply with the convention or damage occurs because of negligent acts or omissions. Under the strict liability rule, the notifying entity is generally liable for damage until the disposers takes possession of the wastes.

He further highlighted the Indian position which is mainly covered by the Hazardous waste Management Rules, 2016. He traced the evolution of the legislations which led to the change which resulted in the Hazardous Waste Management Rules, 2016. In order to highlight the contrast in the jurisprudence between the Indian Courts and foreign jurisdictions, he took a comparative study of the Blue Lady and the Clemenceau case. The Blue Lady case illustrates the importance given by the Supreme Court to the economic consequences of preventing ship dismantling in India which provide livelihoods to many workers while Clemenceau shows compliance to Basel Convention and its commitment towards honouring International Obligations.

The last part of his discussion was centred on the implementation issues of the Basel Convention. The issues highlighted were as follows-

- The Convention itself lacks any kind of mechanism to measure the success of implementation by a country.
- Most countries do not report national data regularly and India is one of them. It is therefore difficult to quantitatively assess India's compliance to the Treaty objectives.
- In India the last three years have seen hazardous waste import increase by 40%. Much of this waste was metal, electronics and plastics.
- The import of hazardous waste enters India through a gap in the law that allows the import of waste for recycling.
- India has a capacity to handle just 30% of its domestic waste. India's capacity to treat hazardous waste is not growing at the same pace as its waste generation.
- Although recycling industries are temporarily profitable; the damage to the environment is often permanent.
- Uniformity in procedures adopted by State Pollution Control Board for compliance assessment is lacking in respect of TSDFs
- In 2005 at Tuticorin40 containers of 10007mt of mixed paper waste was seized. Most of the recyclable waste was trash only 20% was of recyclable value.
- Economists have also found that there is an oversupply of recyclables in the developed economics, which led to low prices of materials, resulting in trade flow to developing countries.
- Countries with higher degree of environmental concern have lower prices for hazardous waste goods and hence an advantage in export markets.

- Level of technology and pollution control available in the exporting country. It is unlikely to be environmentally sound to import waste from states with higher standards of waste disposal.
- Common contention against Basel Convention is that the ban of hazardous waste will lead to increased primary resource consumption in countries like India.
- Domestic lead industry uses up to 50% of its needs through imports of recyclable waste. Ban could have an impact on resource consumption and cost of the product.
- In the case of metal scrap it is difficult to trace who is the actual user. It changes several hands before the desired metal is actually recovered.



The third speaker of the session, **Dr. Kanchan Kumari Co-Lead, Coordinator, Senior Scientist, NEERI** further spoke on Persistent Organic Pollutants (PoP's) – their current status and future challenges. She began with the history of the use of chemicals and traced its origin dating back to the late 18<sup>th</sup> and early 19<sup>th</sup> century marked by the

revolution in industrial and agricultural sectors. This led to a drastic increase in use of chemicals and pesticides/ insecticides. One of the first modern synthetic insecticides developed in the 1940s is commonly known as **Dichloro-diphenyl-trichloroethane (DDT)**. The function of DDT was to fight insect-borne human diseases like malaria among military and civilian populations and as a pesticide for insect control in crops. She also spoke about the harmful nature of Polychlorinated Biphenyl (PCB). In order to emphasise upon the nature of the POPs, she enlisted some of the basic of POPs characteristics in the following manner-

- Environmentally Persistent: Resist breakdown by natural processes. The persistence provides the necessary conditions to bio-concentrate in organisms. The chemical properties (low water solubility, high stability in the environment and semi-volatility) favour their long-range transport. They can be traced to thousands of miles away from the source of release.
- Synthetic Organic Chemicals: Anthropogenic and capable of long range transport (thousands of miles away from release) through air, water and land with cycles of

evaporation and atmospheric cycling of rain, snow and dry particles and deposition, leading to global pollution even in remote places like Arctic Circle.

- **Lipophilic:** Soluble in fatty tissues and bio-accumulate in food chain which are found in high levels in fish & marine mammals.
- Acutely Toxic: Leads to cancer and other potentially life threatening diseases

She emphasised that the nature of POP makes it substantially harmful to human health as well as the environment. Humans are exposed to these chemicals not only through the food we eat, but also through the air we breathe by the process of bioaccumulation. People are mainly exposed to POPs through contaminated foods. Less common exposure routes include drinking contaminated water and direct contact with the chemicals. She added that many products used in our daily lives may contain POPs, which have been added to improve product characteristics, such as flame retardants or surfactants. She argued that POPs can be found virtually everywhere on our planet in measurable concentrations. She further stressed that that all of us have a lifetime exposure to POPs.

She explained the concept of transboundary movement of POPs. Persistence gives POPs the ability for long range atmospheric transport from their sources of emissions. The distance travelled is governed by the mobility of the chemical, and often occurs through the "Grasshopping" mode. Based on the latitudinal distance, the transportation takes place. Transport in low latitudes takes place by evaporation and deposition, in mid –latitudes through seasonal cycling of deposition and evaporation and in high altitudes by deposition and evaporation.

Report

She emphasised upon the International legal framework with regard to the POPs– Stockholm Convention on Persistent Organic Pollutants by taking the participants through the negotiation timeline of the Convention. Annex D of the Convention provides for the screening criteria for POPs based on the following indicators:

- Chemical identity- Name (trade names, commercial names or synonyms), CAS (Chemical Abstracts Service) Registry Number, IUPAC name, structure and structure of chemical class.
- **Persistence-** chemical having half-life greater than 2 months in water and half-life greater than 6 months in soil and sediments.

- **Bio-accumulation** if the chemical have bio-concentration factor or bio-accumulation factor greater than 5000 or log KOW is greater than or the chemical presenting other reasons of concerns such as ecotoxicity or high bio-accumulation in other species.
- Long range environmental transport potential- For a chemical that migrates significantly through the air, its half-life in air should be greater than 2 days.
- Adverse effects- chemical having potentials to cause adverse effects to human health or to the environment.

She stressed upon the process of adding new chemicals as well the trade in POPs. She argued that the carcinogenic risk that POPs pose to human health is alarmingly high. She identified and highlighted the following challenges in India-

- Although intentional use of POP pesticides has been banned, DDT is the only POP pesticide, which is used in vector control but has been banned for agricultural use. India may use up to 10,000 MT of DDT (at 50 per cent formulation) per year for malaria control programmes.
- Another major challenge in India is phasing out Polychlorinated Biphenyl(PCB) from the electricity sector. There is no estimation of PCBs in capacitors and transformers, which makes the job all the more difficult. Oil in old transformers is recycled into new transformers and may contain PCB.
- The ship breaking industry is also a major and growing source of PCB in India. Another critical issue in India is that of dioxins and furans, the sources of which are various like incineration, cement factories, PVC units, biomass burning, open burning etc.

Speaking about the national obligations under the Convention, Dr. Kanchan mentioned that with the Regulation of Persistent Organic Pollutants Rules, 2018 coming into picture, the provisions of the National Implementation Plan seems to have been strengthened. She further mentioned that in order to eliminate POPs, CSIR-NEERI has been identified as Stockholm Convention Regional Centre (SCRC) on Persistent Organic Pollutants (POPs) for Asia Region. She concluded her talk by highlighting the following key issues in eliminating POPs:

- Lack of awareness amongst the general public on the adverse effects of POPs and lack of awareness on the technical front amongst industry personnel.
- Limited experience of government so far in effectively mainstreaming of POPs issues.

- Perceptions of risk and uncertainty among all stakeholders regarding handling this issue.
- Generally weak institutional capacity at regulatory levels.
- Disjointed coordination amongst concerned Departments and Ministries.
- Need for capacity building.
- Need for more research in the area of POPs.
- Need for identifying POPs in India.
- Need for identification, handling and disposal of pesticide stockpiles.
- Improving monitoring and laboratory facilities.
- Shifting to safer alternatives of POPs and future POPs.
- Checking inadvertent production of POPs.



The last speaker of the session, Prof. (Dr) S. Nataraju, Principal, JSS Law College, Mysuru spoke on the issues and challenges in chemical and waste management, handling and regulation in India from the legal standpoint. He took a judicial approach by referring to the decisions of the Supreme Court which has given out directives

with regard to hazardous waste management. He placed reliance on the cases of:

- Chhetriya Pardhushan Mukti Samiti Sangarsh samitiv v. State of UP (1990) wherein the Supreme Court issued guidelines on protection against hazardous activities affecting flora and fauna (an oil Mill and a refinery plant in the area, and the effluents discharged by the plants has been causing serious environmental pollution in the thickly populated area, leading to epidemic diseases.)
- Research Foundation for Science V. Union of India (2012)7SCC769: where the constitutional validity of Hazardous Wastes Management Rules,2008 was challenged and SC held that Basel Convention norms must be strictly followed before permitting

carry of any vessel suspected to be carrying toxic and hazardous material into Indian territorial waters.

He further emphasised on the various legal doctrines evolved by the Supreme Court in order to facilitate environmental protection from anthropogenic and anthropocentric tendencies such as strict liability to absolute liability, polluters pay principle/ principle/precautionary principle (developed in Vellore Citizen Welfare Forum case); Developers pays Principle and the Public Trust Doctrine (M.C. Mehata v Kamalnath); Corporate Social Responsibility (Johannes Burg initiatives); Parens Patriae principle (Charnalal Sahu v..UOI) Role of the State in the protection of public interest Forest Conservation initiatives (T.N. Godavarman v. Thirumulpadu).

. Stressing upon the various instances of Industrial accidents across borders, he evaluated what steps have been taken post- Bhopal gas tragedy. He reiterated that the proactive role of judiciary creates awareness amongst the different stakeholders. He relied upon cases in the aftermath of the Bhopal gas tragedy. In the case of M.C. Mehta v. Union of India AIR 1987 SC 1086, popularly known as the Oleum gas leak in Delhi and commonly known as Shriram Food and Fertilizers Case the principle of Absolute Liability was laid down by the Supreme Court. Dr. Nataraju emphasised that the principles evolved by the Supreme Court are the pillars of enforcing legal action on the waste generators. He emphasised upon a holistic approach to chemical waste management by taking the necessary jurisprudence evolved by the Courts.

Report

Dr. Natarju also spoke about the need for developing a holistic risk management framework for chemical disaster prevention and management. In this regard he highlighted two perspectives:

a) Off-site perspectives: which should involve consideration of geography / land-use / regional planning, geo-informatics, disaster risk mitigation, environmental law, emergency planning, emergency medicine system, socio-psychological & trauma care, emergency communication, etc. The Off-site Emergency Plan shall be prepared by the District Collector in consultation with the Industries and Government Departments. Factories department play a key role in offsite emergency planning in many states.

b) On-site perspectives: Environmental system, chemistry, process engineering, incident-control system, fire, occupational health care and emergency medical system,

internal transport, communication, etc should be taken note of . Responsibility to prepare and maintain an on-site emergency plan lies with the occupier of the facility or installation.

Stressing upon some of the issues that requires attention in the field of hazardous waste management, Dr. Nataraju highlighted the following loopholes:

- Plethora of laws and lack of co-ordination between the enforcing agencies.
- State attitude and lack of interest in complying with the international initiatives.

Before concluding his session Dr. Nataraju gave the following suggestions, to counter the problems plaguing the sector:

- Awareness programmes on adverse effects of Hazardous wastes and financial initiatives to the Industries adopting clean technologies in minimising the hazardous wastes.
- Adopting economically & ecologically viable and feasible technologies in recycling, reuse by efficient management.
- Implementing the concept of smart cities and Swacch Bharat Abhiyaan.
- Defining the role and responsibilities of ULBs, the private sector and NGOs to deliver sustainable systems and monitoring their roles from time to time. Incorporating the Waste to Wealth Policy in practice.

## **SESSION-4 SAICM PROJECT: SCOPE AND ROLE OF IIT MADRAS**

Ms. Pratima Yadav, PhD scholar, Department of Humanities and Social Sciences, IIT Madras started her presentation by talking about their project which was based on the knowledge of scientific work in India. The project is done in collaboration with MOEF&CC and SAICM. Chemicals and waste are integral to our everyday life but also need strict regulations due to its adverse impact on human health and environment. SAICM is intended to complement the existing conventions on chemical and waste by helping states to reduce the risks of toxic chemicals left unaddressed by the patchwork of global treaties, while also promoting the implementation.

Speaking about the origin of SAICM, Ms. Yadav mentioned that SAICM is a policy framework which was adopted by the First International Conference on Chemicals Management (ICCM1) on 6 February 2006 in Dubai. SAICM's overall objective is the

achievement of the sound management of chemicals throughout their life cycle. It is based on three documents agreed at the first ICCM1:

a. Dubai Declaration – documents the high level political commitment made by participating governments.

b. Overarching Policy Strategy (OPS) - sets out SIACM's scope, objectives, underlying principles, and implementation and review arrangements.

c. Global Plan of Action – It lists 273 activities, accompanied by indicators, to be implemented by stakeholders, as appropriate, without giving which activities should gain priority.

The reasons attributed to SAICM's development are the proliferation of global chemical industry and the lack of Comprehensive Chemical Coverage. SAICM reflects collaboration between stakeholders which includes governments, international organisations, industry and civil society organisations. Ms. Yadav further mentioned that the scope of SAICM is to ensure environmental, economic, social, health and labour aspects of chemical safety, and agricultural and industrial chemicals, with a view to promoting sustainable development and covering chemicals at all stages of their life-cycle, including in products.

SAICM has 46 objectives clubbed under five themes which are Risk reduction, Knowledge and Information, Governance, Capacity building and technical cooperation, and Illegal International traffic.

The International Conference on Chemicals Management (ICCM) undertakes periodic reviews of the Strategic Approach. The functions of ICCM include tasks like receiving reports from all relevant stakeholders, to evaluate the implementation etc. WHO is an important stakeholder in the SAICM. In May 2017, the Seventieth World Health Assembly (WHA) approved the Road map to enhance health sector engagement by organizing actions in the 4 areas of Risk reduction, Knowledge and Evidence, Institutional capacity, and Leadership and Coordination.

Talking about the limitations of SAICM, Ms. Pratima mentioned that, it does not impose obligations on participating governments. The governing body of SAICM lacks effective mechanism for taking binding decisions on issues of global concern. There is no mechanism for moving policy concerns beyond identification as emerging issues or for taking actions on substances of global concern. It has no provisions for monitoring, reporting, and evaluating what States are actually doing concerning chemical management. It is severely constrained by a lack of financial resources. There are ambiguous definitions and goals.

Speaking about the assignment given by the Ministry to IIT Madras she mentioned that the objective of this engagement is to assist MoEF&CC in coordinating and implementing the matters related to SAICM with a view to safeguard the country's interest. She mentioned that the team at IIT, Madras is also establishing a programmatic approach to handling SAICM with a view to ensure long-term strategic partnership to provide key technical, policy and strategic inputs to the Ministry in Management of SAICM. They also aim to establish a repository of knowledge and create as well as maintain database for SAICM related issues in the country. They will also support MoEF&CC during International/National meetings on SAICM and related matters.

To fulfil the objectives, the team has currently two major goals which are to collate, analyze and present all existing scientific and technical work carried out in India on chemical and hazardous waste management, and to understand the existing rules and regulations regarding the chemicals. The team is also researching on policies and guidelines of developed countries like the US, UK and EU regarding these chemicals.

Ms. Pratima further elaborated that their scope includes lead in paint, chemicals in products, hazardous substance within the life cycle of electrical and electronic products, nanotechnology and manufactured nanomaterials, endocrine-disrupting chemicals, environmentally Persistent Pharmaceutical Pollutants, Perfluorinated chemicals, and highly Hazardous Pesticides. They intend to go beyond the 2020 policy framework for SAICM and implement the Globally Harmonized System of Classification and Labelling of Chemicals.

The methodology adopted by IIT, Madras in this project is to collaborate with educational institutions and undertake research. Dr. Muraleedharan mentioned that they are planning to hold a Round Table Conference with resource persons from scientific and legal disciplines to deliberate on the ongoing work. The speakers while further delineating their scope of work under this project mentioned that they are aiming to work with toxicity data and components that are not soluble in water through systematic research, review of literature, and case studies with practice. They also mentioned that they would focus on Environmentally Persistent Pharmaceutical Pollutants (EPPPs) with the increasing concentration of Pharmaceuticals in the Western Countries. Dr. Muraleedharan told the participants that India has to no priority list or standards. There are no statutory maximum limits for active

pharmaceutical compounds in Drinking Water whereas in Australia, Pharmaceuticals guidelines in Drinking Water was enacted in 2008. Thus, he opinion that the best way forward would be to undertake a new line of research with collaboration.

Elaborating further on their plan of action, the resource persons mentioned that they are looking forward to research in the scope and adoption of green manufacturing practices in pharmaceuticals and devise recommendations based on it. They concluded their presentation by urging the participants and other research organizations present at the gathering to conduct case study research for certain pharmaceuticals industries to understand the problems in regulatory mechanisms, and conduct inter- state comparative study to understand the measures adopted by the EU, USA and UK to combat the problem of pharmaceutical chemical waste. They concluded their presentation by providing the details of their conference. At the conclusion of their session, there was a discussion on whether expired drugs can be used in the agricultural sector and reverse dumping. However, post deliberations, it was decided that the purity and impurity profiling will change the impact of the drug and there would not be control when used in agriculture, and the adverse affects of the drug would pass into the food chain of humans and animals consuming the same.

## SESSION 5 PANEL DISCUSSION: INSIGHTS ON THE LEGAL REGULATORY AND IMPLEMENTATION CHALLENGES IN THE SECTOR OF CHEMICAL AND HAZARDOUS WASTES



The penultimate session of the second day of the workshop was a panel discussion, moderated by Prof. (Dr.) Sairam Bhat. There three panellists were member of CEERA, who have contributed to the research under the project undertaken by the Centre.

The first panellist, Mr, Raghav Parthasarathy, Teaching Associate, NLSIU spoke about the legislative prescriptions governing electronic, plastic and steel scrap in India. He told the participants that e-waste includes electronic waste like plastics and is governed by the E-waste Rules, 2000. He displayed 4 logos and asked the participants to identify them. The logos were conforming with European Standards- No direct disposal, Quality of Plastic and Reduction of Hazardous Substances. He further mentioned that Maharashtra has banned single use plastics as special rules have to be enacted. He further spoke about the Steel Scrap Recycling Policy which was enacted by the Ministry of Steel with regard to end of life vehicles.

Ms. Raagya Zadu, Teaching Associate, NLSIU began her presentation by talking about how people wait for an accident to happen and then act upon it. There have been a number of chemical accidents that have happened. She spoke about several chemical accidents and disasters such as the SS Grand Camp accident in 1947, where composition and segregation of Hazardous waste was implemented and prior informed consent was introduced. In the Seveso disaster, management of heat was implemented. Before concluding her talk, she referred to the E&Y report of 2017, which advocates that waste should either be eliminated or restricted. But there are five limitations to the same.

Report

- 1. Absence of infrastructure for scientific disposal.
- 2. Lack of financial resources
- 3. Lack of collated data
- 4. Need for documentation which is followed by safety and safety otherwise becomes secondary.
- 5. Training capacity in one building.

Ms. Geethanjali K.V., Legal Associate, CEERA, presented on the International Trade aspect ever since the BRS Convention came into being. International trade began with ships carrying important goods. She spoke about the Marpol Convention which established the first management and liability in ships. In the Khian Sea ship case, 14,000 tons of hazardous waste was incinerated into ash and dumped into the sea. This was the prime reason for the enactment of Basel Convention as companies had difficulties in transporting hazardous waste. The import and export of waste contaminate the countries importing the waste. This includes countries in the Southern hemisphere (including India) which are considered to be a part of the Global south (although Australia is not included). In India, the licensing authorities like the PCB inspect the import and management of hazardous waste.

Prof. [Dr.] Sairam Bhat ended the panel discussion by talking about the hazardous sites in Karnataka which is in Dabaspet. He also spoke about the inefficient disposal of e-waste by electronic companies that do not have a buyback plan hence are not enforcing extended producer's responsibility. He also discussed about the 'Not in my backyard' syndrome which reduced liability and also mentioned that the penalty for violation of the rules and non-compliance by factories is maximum 5 years imprisonment and fine.

# SESSION 6 ACCIDENT REPORTING IN CHEMICAL INDUSTRIES: LEGAL AND REGULATORY COMPLIANCES



Mr. Nandkumar, Head. Legal, Syngene International Ltd. Bangalore began his session by introducing Syngene. Syngene is a research organization which aims at providing integrated scientific services to pharmaceutical, biotechnology, nutrition,

animal health, consumer goods and specialty chemical industries around the world.

His session essentially involved the critical analysis of an accident that occurred on the premises of Syngene on 12 of December, 2016. Due to the release of some chemicals, within a matter of hours, the laboratory caught fire which further spread to the entire building, which had 20 synthetic chemistry laboratories, although the exact cause of fire still remains speculative. The biggest question which was to be answered was how the fire could have spread so quickly in such a short span of time. In about 10 to 11 hours, the entire building had burned down. Due to this, there was no evidence to find out the primary cause of fire, however, the investigation team suggested six possible reasons for the same.

Report

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Later it was found that the laboratory with the chemical had an exhaust fan. Upon being released, the chemicals went out the exhaust fan, into the shafts/ FRP ducts. These ducts were interconnected with other laboratories and were not fire resistant. The company suffered a loss of up to Rs 350 Crores. More than the monetary loss suffered by the Company, the Company had to now re-build and regain the trust of the clients, employees and the scientists.

He provided an insight as to the compliance steps to be taken in case of an industrial accident. As per Factories Act compliances, in case of minor accidents, company will have to record it in form 23 as returns. For reportable accidents, form 77A is to be filed, in case of more than 48 hours of loss of manpower. Further, electrical inspectors were appointed who had responsibility of finding the cause of fire and sending the official information to electrical department.

When the matter was taken to the police department, the company was safe because of no manpower loss. A report was filed to the Labour office stating that the accident has not resulted in any manpower loss. Compliances had to be taken care of with Karnataka Industrial Area Development Board and the Pollution Control Board. Due to the burning of a lot of chemicals, these were released into the atmosphere and the company had to answer questions as to in which direction the gases went. Further, to put off the fire in the building, lots of water was used. This water contaminated with chemicals also became a matter of concern to the company and public. The company had to provide information regarding the same.

Before the matter reached the public and media, the first department to be intimated was the Securities and Exchange Board of India. With regards to the left over inventory of chemicals, they had to be taken out as per the SEZ rules and guidelines. In order to claim for insurance, the company had to give information and evidence of time, date, cost of equipment, list of equipment, inventory, etc. Ultimately, the rehabilitation took almost 8 months to complete.

The level of operations to be performed in such situations is fairly tedious. Most importantly, a crisis management team has to be set up. Communication with the investors, employees, government and public is also a crucial aspect. In the end of the session, Mr. Nandkumar had a very brief question-answer session where questions were raised regarding consideration of the psychological aspect of the employees of the company. He emphasised on the importance of communication of information to the employees and maintenance of transparency in the company, in order to retain their trust and faith.

### VALEDICTORY SESSION

Prof (Dr) Sairam Bhat began the Valedictory session by welcoming the Registrar, , Prof (Dr) Sarasu Esther Thomas, Professor of Law, NLSIU. He expressed his happiness that the workshop provided an interesting platform where experts from both the sectors- industry and law, put forth their ideas and thoughts. He added that CEERA has been working in environmental aspects and that through the course of this workshop it has become evident that Environmental Law cannot be separated from Science and Technology. Prof. [Dr.] Sairam Bhat thanked all the participants, resource persons, the Vice Chancellor, the Registrar, institutional support from NLSIU, the MOEF&CC, CEERA team and expressed his gratitude as the co-ordinator of CEERA.

Prof. Sarasu Esther Thomas expressed her happiness over the fact that 80% of the research centres in NLSIU deal with social issues. She introduced the various courses offered at NLSIU and encouraged the participants to explore all the opportunities here and stay involved with the University. The workshop ended with the distribution of certificates to all the participants by the dignitaries.



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Certificate of Participation

This is to certify that

**«Name»** «Designation», «Firmorganisation»

has participated in the two day workshop on

"Legal, Regulatory and Compliance Framework on Chemical and Hazardous Waste in India"

held during November 29 - 30, 2019, jointly organised by Centre for Environmental Law, Education, Research & Advocacy (CEERA), National Law School of India University, Bengaluru (NLSIU), and Ministry of Environment, Forest and Climate Change (MoEF&CC), New Delhi.

**Prof.(Dr.)** SUDHIR KRISHNASWAMY Vice Chancellor, NLSIU **Prof.(Dr.) SAIRAM BHAT** Professor of Law, NLSIU

		29 Nov 2019	30 Nov, 2019
16	Ms. Ongmula Bhutia Assistant Professor, School of Law, Jagran	Dr	Q2°.
17	Prof. (Dr.) Vani Kesari, A		
	Director, School of Legal Studies, CUSAT, Kochi, Kerala	Coh	teh-
18	Dr. Navya Cherian Indian Institute of Technology Hyderabad	dang.	abut -
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Centre for Environmental Law, Education & Research Advocacy (CEERA)

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### Ministry of Environment Forest and Climate Change, New Delhi

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1	Dr.Dola Bhattacharjee Research Officer (Env.) Ministry of Environment, Forest and Climate Change, Regional Office (South Zone), Banzalore	2 29/11/19	A significo			
2	Dr.Ganesh Palappan Manager (ESD) Bharat Heavy Electronics Limited, Bengaluru	x.e.f.	S. J. Jule	& and the full	X. Laborer Baloly	
3	Dr.Mini S Professor The National University of Advanced Legal Studies, Kochi	Atu.	Atr. S	Ator	Hun	
4	Dr.Muraleedharan M V Professor IIIT, Madras					
5	Dr.Navya Cherian HIT, Hyderabad					

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7	Mr.A. Ramesh Kumar Senior Scientist NEERI, Nagpur			18		
8	Mr.Achal Satish Khilnani Engineer WAPCOS Limited, Chennai	A.S.Ph.	A S. Phi : (29/11/2019)	A.S. Mby . (30/11/2019)		
9	Mr.Atul Alexander Assistant Proffessor West Bengal National University of Juridical Sciences, Kolkata	ARUL	Aguel 11/201	30/11/208	1000 11 8019 20 111 8019	
10	Mr.Ayush Chaubey Strategic Marketing and Communications Executive SUEZ Water Technologies & Solutions Pvt Ltd	Orgert Uneutrust	Cyur Uning			

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11	Mr.Ayush Jha Assistant Professor, K.L.E Law College, Bengaluru	Apron Je	How Ju	Jun Jos	form The	
12	Mr.Balakrishna BV Assistant Professor, Arunodaya Institute of Legal Studies, Bengaluru	Bulatowhan.	Balabarre.	Falalonst.	Bulatard	
13	Mr. Bharath-Krishua B.V. BALA Assistant Professor Arunodaya Institute of Legal Studies, Bengaluru	1 Salativista				
14	Mr.Jagadish A T Assistant Professor J S S Law College, Mysuru	Joge dul A.T	Jagadel Att	Jogodul AF	Jagodi AT	
15	Mr.Jishnu Baruah Student National Law University and Judicial Academy, Guwhati	Jiehne B.	gishner.			

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17	Mr.Kaverappa Soragaon Dy Engineer SC&PV Department, BHEL KAREPPA SORAGAON	Bosep	Berge	Belger	Brag	
18	Mr.P.J.Babu Sr.Manager(HSE) <u>Cle Challs</u> Bharat Heavy <del>Electroni</del> cs Limited, Bengaluru	NO.	M.Q.	BLOD	BO	
-19	Mr.Piyush Mohapatro Sr.Programme Coordinator Toxics Link					
20	Mr.Praveen Tripathi Assistant Proffessor School of Law, Bennett University, New Delhi	Amatur	Prealler	Junatur	Reparter	

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22	Mr. Ranjan Thakur E-Waste Programme Manager	Patra	Pater	Baku	Patri	Rajan Thakur
23	Mr.Ravinder Kumar Sr Engineer SC&PV Department, BHEL	Revinde	Rownols	Rainde	Rowinder.	
24	Mr.Rishil Rai Sales Executive SUEZ Water Technologies & Solutions Pvt Ltd	Red	Riden	Ribil	Phy	
25	Mr.S.Palnisamy M E District Environmental Engineer Tamilnadu Pollution Control Board, Hosur	SZ-	S 2,	fl,	82.	

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## Two day workshop on "The Legal, Regulatory & Compliance Framework on Chemical & Wastes in India"

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26	NyShivanna M Assistant Professor Reva University, Bengaluru	Bivanne Or.	Bione of.	Asocure or.	Hisourger.	
27	Mr.Suresh Kumar Adapa Joint Director, Scientist 'D' Regional Office (WCZ) Ministry of Environmen,Forest & Climate Change	A. baller	Ainhle	A-ball	Alulik	
28	Mr.V.Gopalakrishnan M E , Ph.p. District Environmental Engineer Salan Tamilnadu Pollution Control Board, Hasur	v. R.	N.A.	N.J.	N. P.	
29	Ms.Abarna K Student <u>School of excellence in</u> <del>Tamilnadu National law University</del> , law Kiruchirappalli_ chennal	Right.	Jult.	Auf .	Ald.	
30	Ms.Aishwarya Jain Legal manager	aj a-i	yan,			

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31	Ms.Anurathna Mathivanan Student Tamilnadu National law University, Tiruchirappalli	physic	All the	Auter	Make	
32	Ms.Ayushi Kripanshu Chaturvedi Sr.Executive-Environment Aarti Industries Ltd	J.	AND -	J.	Start.	
33	Ms.Chandramita Das Student National Law University and Judicial Academy, Guwhati	Chandramita	Clandramila.	Chandramila	et and ameter.	
34	Ms.Claudia S Nadh	No.	M.	ja .	<i>M</i> .	
35	Ms.Jaini Haemendra Nagar Environmental Engineer J B H Enerprise	Thragar	Anagar.	Thagar	Ohnagag	Hemendra

Centre for Environmental Law, Education & Research Advocacy (CEERA)

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36	Ms.Kanchan Kumari <u>Sr Scientist and Project Leader,</u> NEERI, Nagpur					
37	Ms.Loganayaki P Assistant Professor Reva University, Bengaluru					
38	Ms.Maanyaa Anand Student Christ Academy Institute of Law, Bengaluru	Anewend	hanant	Mamand	Mamand	Juformative as well as the resource persons aided me increasing my to
39	Ms.Natasha Kalra Research Scholar Institute for Social & Economic Change, Bengaluru	Naturha	Dectarba	Data has Nature	Notochar Notochar Notochar	
40	Ms.Ongmula Bhutia Assistant Professor Jagran Lakecity University, Bhopal	Chi, 1	al .	Ja .	Gr.	June and State States or and the states of t

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sl	Name	29th Nove	mber 2019	30th November 2019		Pemarks
No		Forenoon	Afternoon	Forenoon	Afternoon	
41	Ms.Pavithra R Assistant Professor, School of Law, CHRIST (Deemed to be University)	Britten R	Som the P	Britton R.	Britten R.	
42	Ms.Pavitra Mahale Consultant-EHS Bangalore Bioinnovation Centre	Ru	Am		Hu	
43	Ms.Pratima Yadav PH.D. Scholar <del>Department of Humaniti</del> es and Social S <del>ciences, IIT Madras, Chenn</del> ai.					
44	Ms.Preethi Reddy Student Christ Academy Institute of Law, Bengaluru	the -	Ht.	×.	the .	An informative dels ion, Enhand my provedge on Environmental laws of other delaga aquesi
45	Ms.Reshma Fathima J Student <u>SCHool OF EXCEILENCE</u> Taminadu National law University, IN LAU Firuchtrappalli CHENNAL	pers	find	bots	pris	response chemical hea

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# Two day workshop on "The Legal, Regulatory & Compliance Framework on Chemical & Wastes in India"

sl	Name	29th Nove	mber 2019	30th November 2019		Remarks
No	Name	Forenoon	Afternoon	Forenoon	Afternoon	
46	Ms.Rhea Roy Mammen Assistant Professor, M S Ramaiah Law College, Bengaluru					
47	Ms.Saumya Shaji Assistant Professor Jagran Lakecity University, Bhopal	and the	Journer .	Journe St.	Journet	Well Degamiseq. An emichig experience.
48	Ms.Shivani Misra Student National Law School of India University, Bengaluru	Shiven	Shierani	Sucreand.	Shivan	
49	Ms.Smita Pandey Assistant Proffessor Symbiosis Law College, Pune	Spander	Randert	Blandert	Slandert	Very well organized Thank you
50	Ms.Surbhi Anand Student National Law School of India University, Bengaluru	Jurbing Aravely	Jurbhi Ananal	Surbind	Justins	
51	Ms.Tejaswini JV Assistant Professor, University of Mysore	24.	249	24	alles	Shering prover experience was most strenning

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sl	Name	29th Nove	mber 2019	30th November 2019		Remarks
No	Hume	Forenoon	Afternoon	Forenoon	Afternoon	Actilations
53	M≰.Bharani Bharathi B, Student, School of Law, CHRIST (Deemed to be University)	Barran	Baran	Barami	Barrowi	MV: BARANI BHARATHIE
54	Ms.Ayushi Goyal, Student, School of Law, CHRIST (Deemed to be University)	Ayuth	Ayushi	Augustin	Ayuthi	
55	NS. SANDHYA KS DEPUTY MANAGER (ENVI RONHENT) HAL, RIRCRAFT DIVISION	21/1/12	29/11/11	Jule 30/11/12	Jul 23/10/19	
56	SRUTHI.S STUDENT, Ramaiah college of law	Southiz	Hours &	Jun Kuis	Autris	
57	ROSHNI K.T Asst. Prof. CMRSOLS Bloce	Rost.	fæg.	Rost	fost.	

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sl	Name	29th November 2019		30th November 2019		Remarks
No	Name	Forenoon	Afternoon	Forenoon	Afternoon	incition (s
58	Dr.S.		e.			
59	Lianne D'Sourga	time	tion.	digge	diegung	
60	Maxita Romachandran	flanta.P	Hanta R	Hauta.R	Hauta.R	
61	Priyadarshini Venkatesh	Puppbushinin-	Piyoobustin	Tiycular divicit	Reyarburlini.	
62 63-	Nayana JM Sundar P.L.	Ompus Ref	Automa .	Organs	Dayang	