Biomedical Waste Management: An Overview

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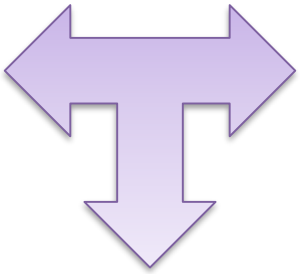
Outline of Presentation

- COVID 19 Issues
- Compliance and Survey
- Requirements
- BMW Rules 2016
- Foundation of BMW Management

Foundation of BMW Management

Principles involved

- Sustainable Development
- Polluter Pays
- Precautionary principle
- Duty of care
- Proximity
- Prior informed consent



International Laws

Basel Convention
Stockholm Convention
Minamata Convention

Indian laws

- **Environment Protection act 1986**
- New Solid Waste Management Rules (SWM), 2016.
- Plastic Waste Management Rules 2016
- e-waste (Management) Rules, 2016
- **Bio-Medical Waste Management Rules,2016**
- Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

BMW Management Rules 2016

- Under the Environment (Protection) Act, 1986, Bio-Medical Waste Management Rules, 2016, came into force from 28th March, 2016 in supersession of the Bio-Medical Waste (Management and Handling) Rules, 1998.
- The rules apply to all persons who **generate**, **collect**, **receive**, **store**, **transport**, **treat**, **dispose**, or **handle** bio medical waste in any form including
  - Hospitals, Nursing Homes, dispensaries, clinics
  - Veterinary institutions, animal house
  - Pathological laboratories, blood banks, clinical establishments, research or educational institutions, forensic Laboratories, research labs
  - AYUSH hospitals
  - Health, surgery, vaccination, blood donation Camps
  - First Aid Rooms of schools

Exemptions

- Radioactive wastes
- Hazardous chemicals
- solid wastes
- The lead acid batteries
- Hazardous wastes
- E- waste
- Hazardous micro organisms, genetically engineered micro Organisms and cells

Responsibilities

- bio-medical waste is handled without any adverse effect to human health and the environment
- **safe, ventilated and secured location for storage of segregated biomedical waste**
- no secondary handling, pilferage of recyclables or inadvertent scattering or spillage by animals
- Transportation to facility as per Schedule I
- pre-treat the laboratory waste, microbiological waste, blood samples and blood bags through disinfection or sterilisation on-site in the manner as prescribed by the World Health Organisation (WHO) or National AIDs Control Organisation (NACO) guidelines and then sent to the CBWTF for final disposal
- phase out use of chlorinated plastic bags, gloves and blood bags within two years from the date of notification of these rules
- Disposal of other wastes as per riding rules
- Training

Salient Features

- ambit of the rules has been expanded
- Phase-out the use of chlorinated plastic bags, gloves and blood bags within two years
- Pre-treatment
- Training
- Establish a Bar-Code System for bags or containers
- Existing incinerators to achieve the standards for retention time in secondary chamber and Dioxin and Furans within two years
- Classification in to 4 categories instead 10 to improve the segregation of waste at source
- Procedure to get authorisation simplified and One time Authorisation for Non-bedded HCFs
- more stringent standards for incinerator to reduce the emission of pollutants
- Inclusion of emissions limits for Dioxin and furans
- No occupier shall establish on-site treatment and disposal facility, if common facility is available within 75 km.

Changes and implications

S.No.	1998/2011 rules	2016 rules	Implication envisaged
1. Title	Management and Handling	Management	Management includes handling
2. Application	Limited to Health Care facilities and all wastes	Ambit expanded and some categories excluded	more clarity, other sources covered
3. Duties of Health care or CBMW facilities	No specified storage dictated	Neat, ventilated , confined storage included., Pretreatment, emission norms, training, immunizations etc.	Minimization of secondary wastes, pilferage, nuisance etc. , safety of workers, air quality, operation etc.
5.Treatment and disposal	Occupier could have own facility	restriction of 75 Km	Viability of CBMWF
6. Segregation	10 categories	4 categories	Improved segregation

S.No.	1998/2011 rules	2016 rules	Implication
8. Authorization	Authorization for 1000 bedded hospitals and larger	One time authorization for non bedded hospitals	Simplicity, synchronization
9. Advisory Committee		No change except additional members	Strengthening of committee
10. Standards for emissions	SPM150 mg/Nm3 No Dioxin/furan 1 s rt in Incinerator	50 mg/nm3 Prescribed now 2 s	More dtringent norms. And design of Incinerators
11. Site for CBMW Facility	No responsibility	State govt. to provide	Facilitation
12. Monitoring of implementation	No provision	MEFCC to overall monitor State govt. To form committee	Better feed back

Segregation

- Human Anatomical Waste
- Animal Anatomical Waste
- Soiled Waste
- Expired or Discarded Medicines
- Chemical Waste
- Chemical Liquid Waste
- Discarded linen, mattresses, beddings contaminated with blood or body fluid
- Microbiology, Biotechnology and other clinical laboratory waste

Contaminated Waste
(Recyclable)
1. Tubing
2. IV bottles
3. IV tubes and sets
4. Catheters
5. Urine bags
6. Syringes (without needles and fixed needle syringes)
7. Vacutainers with their needles cut
8. Gloves.

COLOR CODE

Waste sharps including metals
(both used, discarded and Contaminated)
1.Needles
2. Syringes with fixed needles,
3. needles from needle tip cutter or burner
4. Scalpels
5. Blades
6. Any other contaminated sharp object

- Glassware
- Metallic body parts

Prescribed Treatments

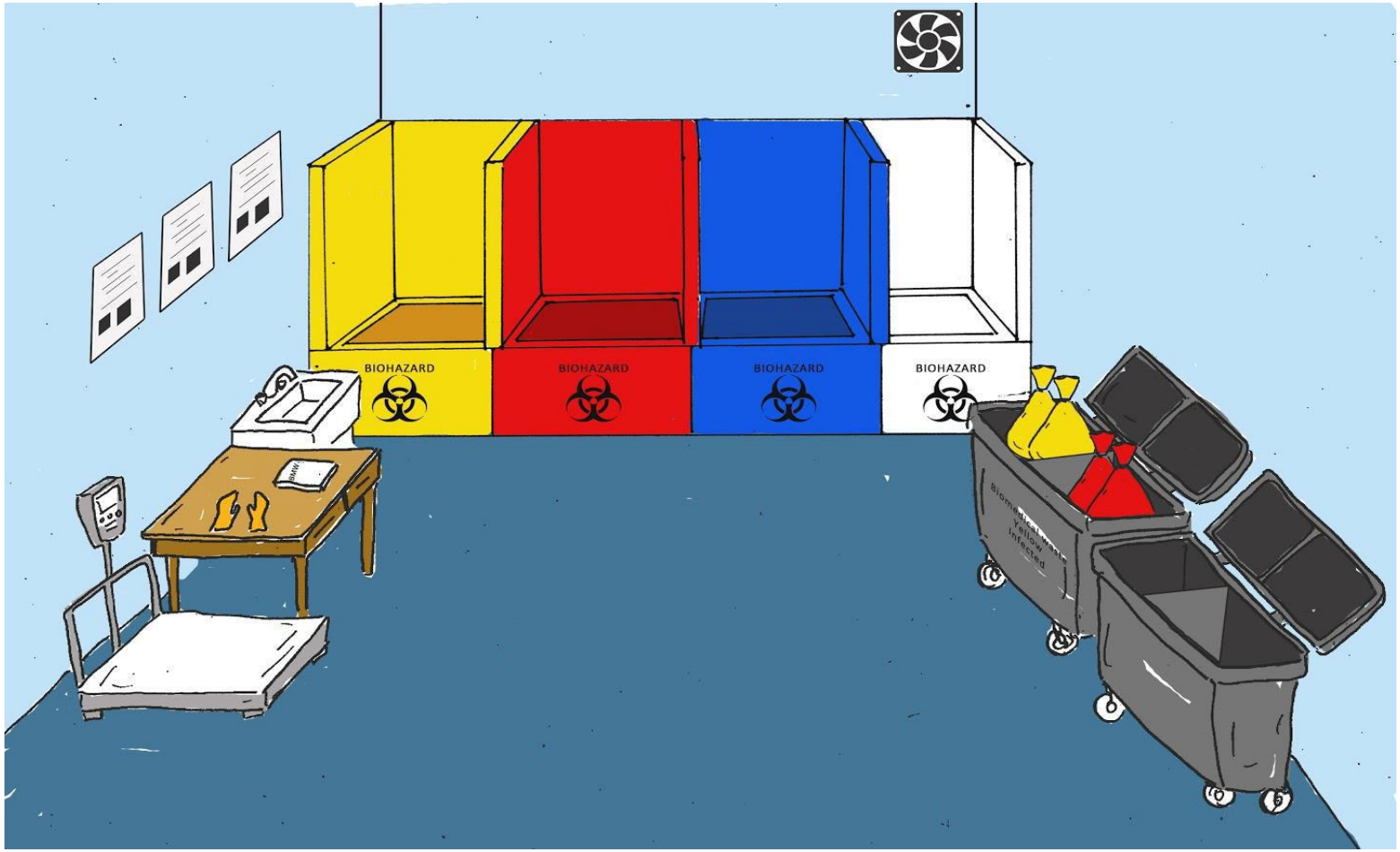
- Incineration or Plasma Pyrolysis or deep burial*
- In absence of above facilities, autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding.
- Encapsulation
- shall be pre-treated before mixing with other wastewater.
- The combined discharge shall conform to the discharge norms given in Schedule III.
- Autoclaving /microwaving / Hydroclaving

Autoclaving/ micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil or for road making, whichever is possible.

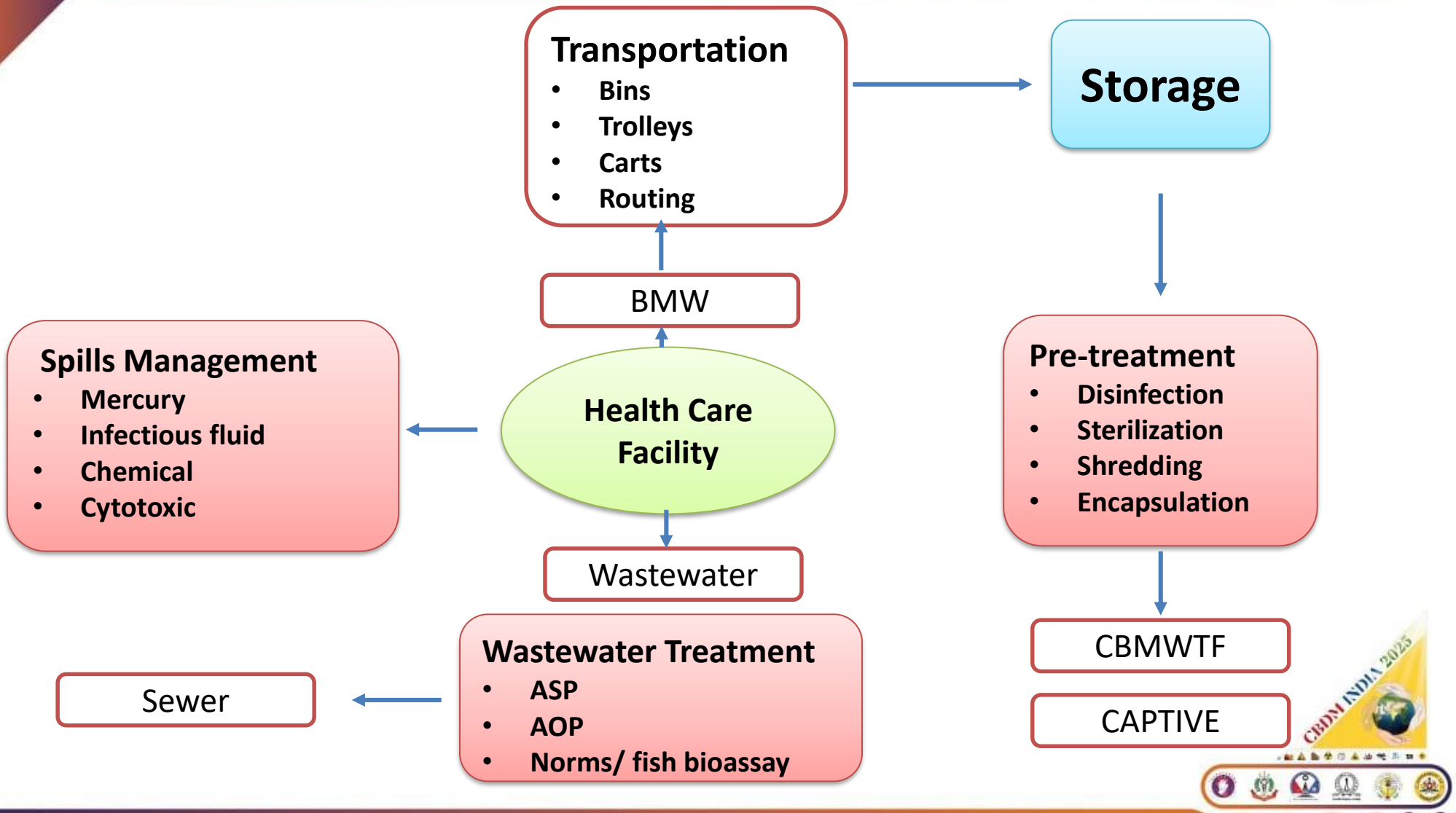
- Disinfection followed by autoclaving followed by recycle

- Autoclaving followed by mutilation, shredding, encapsulation or cementing

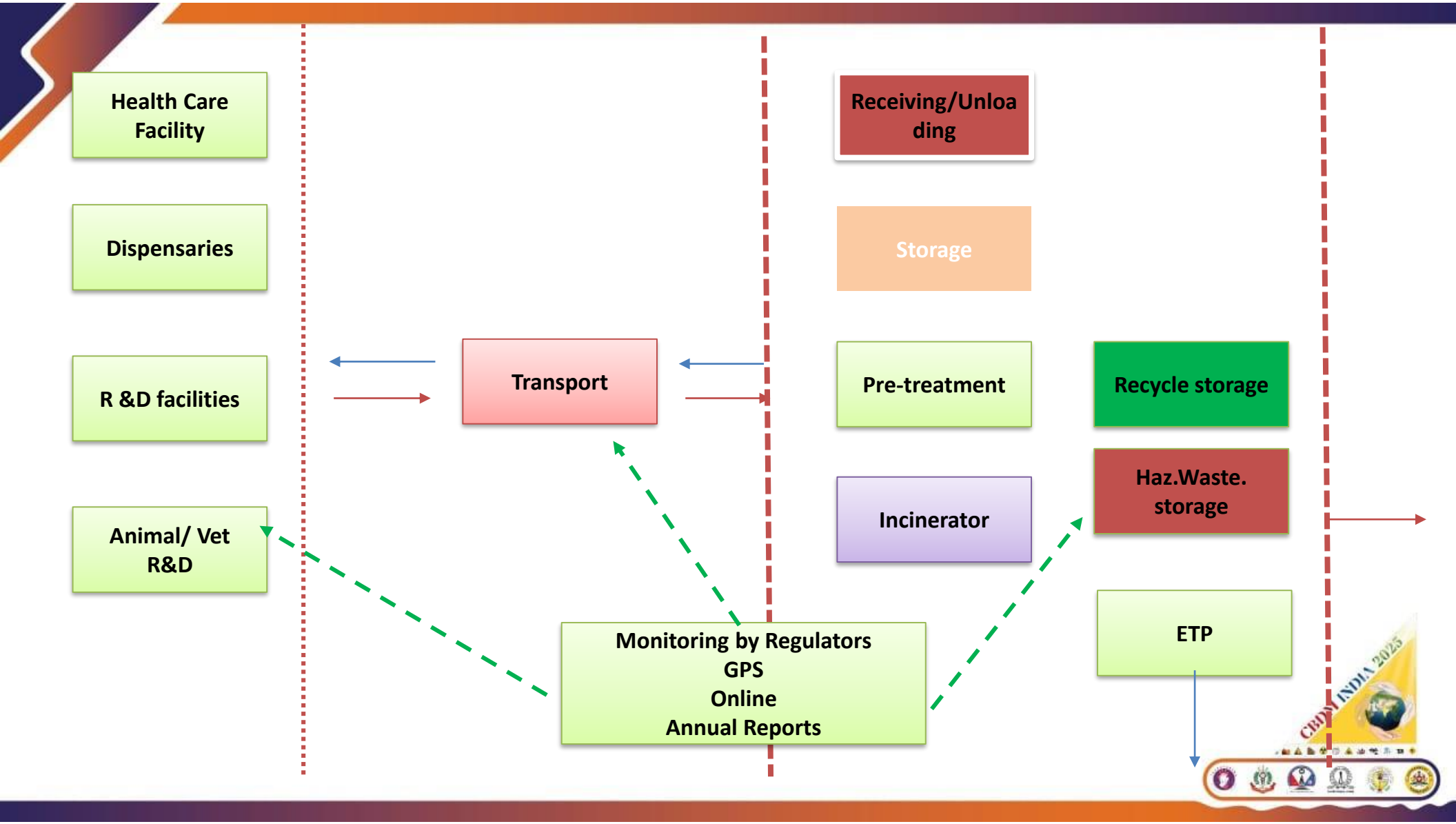
Ideal Storage



Requirements within HC Facility



Common BMW Treatment Facility














Survey Photographs

Compliance Survey Principles

Documents

- Consent
- Statutory Permissions, EC, Fire safety etc.
- Emergency Preparedness
- Annual/Periodic reports
- All forms/formats/reporting

Health Care Facility

- All records
- Segregation/collection/transport within
- Storage/Pre-treatment
- Awareness/ implementation

End to End Survey

CBMWTF Infra structure

- **Space, layout, location**
- **Vehicles, loading area**
- **Storage**
- **Treatment Units**
- **Incinerators and APC systems**
- **ETP**
- **Instrumentation**
- **Drains**
- **Safety systems**
- **Human resource, adequacy, competency and awareness**

CBMWTF Operations

- **GPS, Waste Collection and receiving**
- **Unloading, weighing, segregation**
- **Storage, color codes, dedicated area**
- **Pre-treatment operations, temp., pressures, time, handling, PPE**
- **Incineration, loading, temperature, pressures, stack, APC system operation**
- **Residue disposal and ETP**

Post-Covid Status (Common facilities)

Quantity → 70 to 80 % Increase due to COVID waste

Composition → Incinerable , mostly PPE (Plastic and fibres)

Incinerators →
- Most impacted technology/equipment

Design Issues
- Thermal capacity limitations /MOC
- Feeding
- Upgradation

Environmental Issues
- Soot and tar
- Dioxin/ furan
- Residues

Technology Alternatives

Non-burn Technologies

Disinfection ⇨ **Storage** ⇨ **Disposal Or Recycle**

Chemical 1 % hypo etc. ⇨ **7 days minimum** ⇨ **Deep burial**
Plastic and fibre recycle
Plastic blocks for construction

WHO Guidelines

THANK YOU