Central Pollution Control Board
Waste Management - II Division, Delhi

Sub: Minutes of the twentieth meeting of the Technical Expert Committee organized virtually through mail for "Evaluation of proposal for utilization of the hazardous and other wastes under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016".

1. Twentieth meeting of Technical Expert Committee (TEC) for "Evaluation of proposals received from the various industries for utilization of the hazardous and other wastes under Rule 9 of Hazardous and Other Wastes (Management and Transboundary Movement) (HOWM) Rules, 2016" was organized through mail in the first week of July, 2020.

2. The committee members were requested to provide their comments on 05 draft Standard Operating Procedures (SoPs), 04 proposals for revision in existing SoPs, 05 draft trial run protocols and 03 general issues under Rule 9, vide mail dated 08.07.2020. List of the committee members requested to provide comments is enclosed at ***Annexure A***.

3. The committee members provided their suggestions and feedbacks through mail.

4. The details of the 05 Draft SoPs along with the recommendations are as below:

Sl. No.	Details of the Draft SoP	TEC Recommendation
1.	SoP for Utilization of Spent TiO_2-NaCl cake generated from process residue/waste containing chloride from the catalyst manufacturing industries for recovery of Titanium Dioxide	After detailed deliberation, the committee observed that material mass balance as provided by the unit may be incorporated in the SoP and also standard for TiO_2 dust shall be included in Fugitive emission monitoring. The hazardous waste i.e., Tio2- NaCl cake is a process residue waste which falls under Category 21.1 of Schedule I of HOWM Rules, 2016. The committee also suggested for pollution control system like air to air heat exchanger followed by Bag Filter should be prescribed in the SoP to control dust emission possibly released from Rotary Dryer/Calcination Kiln. PM Emission standard from stack to be decided and it should be less than 50 mg/Nm^3. In view of above, the committee recommended that, after incorporating above information and suggestions, SoP shall be finalized.
2.	SoP for Utilization of Spent Sodium Hypo Chlorite along with Fresh/Spent Caustic Solution for manufacturing of Sodium Hypo Chlorite	After detailed deliberation, the committee observed that material mass balance as provided by the unit may be incorporated in the SoP and utilisation process being an exothermic reaction generates heat which may be mentioned in the SoP. In view of above, the committee recommended that, after incorporating above information, SoP shall be finalized.

3.	SoP for Utilization of ETP sludge generated from Textile Industries to use as a Supplementary fuel along with Coal in Thermic Fluid Heater (TFH)/ Boiler.	After detailed deliberation, the committee observed that range of typical characteristics for parameters of ETP sludge may be incorporated in the SoP and also individual heavy metals analysis results may be included. Ash analysis result shows presence of Chromium which may become Cr^{+6} (hexavalent Chromium) in case encounters water. Therefore, suitability of utilisation of ash and its disposal aspect should be incorporated in the SoP. Also, temporary storage of the ash should be done inside closed shed/ on HDPE lined platform. Boiler and Thermic fluid heater are fundamentally similar in operational principles thus SoP may also include boiler for energy utilisation. In view of above, the committee recommended that, after incorporating above information and suggestions, SoP shall be finalized.
4.	SoP for Utilization of spent sulphuric acid generated during manufacturing of Hydro bromic acid (HBr) as resource material for manufacturing of Bromine (liquid) through bittern route.	After detailed deliberation, the committee observed that analysis report of spent sulphuric acid is missing critical parameters and thus detailed analysis report may be sought. The category of hazardous waste i.e., spent sulphuric acid shall be mentioned as B-15, Schedule II of HOWM Rules, 2016. In hazardous waste processing cases, stricter emission standards should be stipulated. Therefore, PM in source emission should be less than 100 mg/Nm^3 and to achieve this, provisions for installation of APCD such as Bag Filters/ ESPs may be incorporated in the SoP. In view of above, the committee recommended that, after receiving detailed analysis report of spent sulphuric acid the same shall be incorporated with above information and suggestions. The revised draft SoP shall be discussed in subsequent TEC.
5.	SoP for Utilization of ETP Sludge (from secondary clarifier) as fuel in Recovery Boiler	After detailed deliberation, the committee observed that this secondary sludge is actually slurry, hence the category assigned for utilization Category 32.3 of Schedule I of HOWM Rules, 2016 is not correct and appropriate. Also it certainly contains several organic halogens / compounds having high BP (above 100°C), which are together combustible even in the presence of significant moisture, It is necessary to know what kind of organic compounds are there in volatile matter contained therein. Also Heavy black liquor (HBL) is suspected to contain complex mixture of organic compounds / ignitable matter, which along with thickening polymer

		providing considerable ignitable matter and calorific value even in semi liquid state. As the Detailed Project Report from the concerned unit was discussed by committee members, it was found that the concerned unit want to utilize complex mixture of concentrated HBL with all complex organic compounds, thickened secondary clarifier sludge (slurry), polymer, ESP dust and salt cake. The aforementioned complex mixture of concentrated HBL will be fired in the boiler. Therefore, it is necessary to revise the category of hazardous waste and accordingly SoP shall be redrafted. In view of above, committee recommended that SoP shall be redrafted considering revised category of hazardous waste including detailed mass balance analysis. Revised draft of SoP shall be discussed in subsequent TEC.

5. The details of the 04 proposals for revision in existing SoPs along with the recommendations are as below:

Sl. No.	Details of the SoP	TEC Recommendation
1.	Revision of existing SoP for "Utilization of Aluminum Hydroxide Chloride (AHC) manufactured using spent Aluminum Chloride generated from CPC Blue & 2, 4, 6 Trimethyl Chloride" in STP (prepared by GPCB based on trial run at M/s Arun Industries)	After detailed deliberation, the committee observed that presence of heavy metals and large number of complex organic compounds in Aluminium Hydroxide Chloride/Poly Aluminium Chloride is a matter of concern as it could increase the COD of sewage waste water to be treated in STP and will pass on to generated sewage sludge. In view of above, the committee recommended following: 1. Aluminium Hydroxide Chloride/Poly Aluminium Chloride shall have to comply with the Bureaus of Indian Standards IS: 15573:2018 for TOC i.e. 80 ppm in liquid form before utilization in STP. 2. Only low quantity use of Aluminium Hydroxide Chloride/Poly Aluminium Chloride, just for flocculation of sewage may be permitted. There could be cap of limit on use of Aluminium Hydroxide Chloride/Poly Aluminium Chloride. 3. Cautious measures have to be taken, while using generated sewage sludge after treatment with hazardous waste (Aluminium Hydroxide Chloride/Poly Aluminium Chloride) for farming

		as manure. 4. Permissible Quality of discharge from STP to inland surface water/ soil should be incorporated. Therefore, after incorporating above suggestions, SoP shall be finalized.
2.	Revision in existing SoP of "Utilization of spent H_2SO_4 generated from the manufacturing of dye & dyes intermediate in dye sector" (incorporating utilization of spent HCl like H_2SO_4 as generation and utilization is same)	After detailed deliberation, the committee observed that spent hydrochloric acid generated from dyes & dyes intermediates industries shall be incorporated as per the revised draft SoP. In view of above, committee recommended that SoP shall be finalized for revision.
3.	Revision of existing SoP for "Utilization of Hydro Fluoro Silicic Acid generated from Single Super Phosphate Fertilizer Industries", (utilization of sodium sulphate as raw material instead of sodium chloride as per representation received from M/s Khaitan Chemicals and Fertilizers Ltd., Madhya Pradesh	After detailed deliberation, the committee observed that both Sodium Chloride and Sodium Sulphate are inert salt. The revised SOP shall be encouraged as it conserved resources and fuel and it is a simple process, do not require complicated equipments, like MEE, waste water treatment system, etc. However, condition of Zero Liquid Discharge has to be maintained. In view of above, the existing SoP for "Utilization of Hydro Fluoro Silicic Acid generated from Single Super Phosphate Fertilizer Industries", shall be revised for using sodium sulphate or sodium chloride as raw material.
4.	Revision of existing SoP for "Utilization of spent alkali bromide and spent generated during manufacturing of various pesticides, pharmaceuticals and organic chemicals for recovery of liquid bromine" (for incorporation of Solar Evaporator instead of MEE/AOP/RO as per representation received from M/s Shanro Key Chem Industries Private Limited, Gujarat	After detailed deliberation, the committee observed that open land Solar Evaporation is always likely to carry risk of ground water contamination, down below the solar evaporation land area as well as adjoining fields. The CSMCRI report indicates that there is percolation of brine @ 0.024 cm/day, which is equivalent to 0.24 mm/day. Even at this low percolation rate, there will be chances of ground water contamination due to continuous discharge of brine water over this land for solar evaporation and it will certainly create ground water contamination problem within a period of time. Also, solar evaporation process is only functional properly during bright sunshine days i.e, May/June, while in monsoon months, cloudy days and during winter, the Solar evaporation becomes quite less or sometimes negligible, Thus in absence of adequate evaporation, the solar evaporation land area will be flooded or even the brine water discharged for solar evaporation will overflow to surrounding lands, causing

		further problems and environmental issues. TEC member from GPCB also clarified that they do not have any existing policy for solar evaporation pond and does not encourage evaporation pond and no such permissions have been given since years. In view of above, committee recommended that proposal for incorporation of Solar Evaporator instead of MEE/AOP/RO in existing SoP for "Utilization of spent alkali bromide and spent generated during manufacturing of various pesticides, pharmaceuticals and organic chemicals for recovery of liquid bromine" shall be rejected.

6. The details of the 03 general Rule 9 related issues alongwith the recommendations are as below:

Sl. No.	**General Rule 9 issues discussed**	**TEC Recommendations**
1	Permission to reject application under Rule 9 which involves only physical changes.	The Committee discussed the issue of only physical change of the Hazardous Waste from liquid state to solid/dry form. If the liquid spent waste have been categorized as Hazardous waste, hence its dried form will still remain hazardous and will need proper handling and disposal due to its hazardous characteristics as per HOWM Rules, 2016. In view of above, committee recommended that applications under Rule 9 which involves only physical changes shall be rejected.
2	Correction in checklist of minimal requisite facilities of existing SoP for utilization of spent Aluminium Chloride generated during manufacturing of CPC Green and 2,4,6-Trimethyl Benzoyl Chloride (Representation received from M/s Dhruv Chemicals, Gujarat)	For issue of Activated Carbon Pre-treatment unit is not required, the committee is in opinion that Spent Aluminium Chloride solution generated from CPC Green manufacturing industries may contains several organic compounds such HCB, CPC-Blue, CPC Green, Mesitylene, 2,4. 6 Trimethyl Benzoyl Chloride and many other complex organic substances; hence Activated Carbon pre-treatment unit is necessary for stripping of various hazardous organic compounds from Poly Aluminium Chloride liquid. The contention of unit that online TOC meter is not possible to install for stack emissions found inappropriate by the committee as Online TOC analysers, which can measure TOC in emissions, are

		available in the market. In view of above, committee recommended that no correction/amendment in the existing SOP for utilization of spent Aluminium Chloride generated during manufacturing of CPC Green and 2,4,6-Trimethyl Benzoyl Chloride published by CPCB is required.
3	Madhya Pradesh Pollution Control Board request for guidance on co-processing of hazardous waste (SPL/Refractory) generated from primary Aluminium smelters in cement industries.	The committee discussed that CPCB has already prepared guidelines for pre-processing and co-processing of hazardous and other waste in cement plant as per HOWM Rules, 2016. In the said Rules, it is mentioned at Rule 9 (3) that there is no separate trail runs are required for co-processing of waste in cement plant for which guideline is already prepared by CPCB. In view of above, SPL from primary Aluminium smelters only for co-processing in cement industries shall be carried out as per CPCB "Guidelines for pre-processing and co-processing of hazardous and other waste in cement plant" and for other use the unit may apply under Rule 9 of HOWM Rules, 2016.

7. The details of the 05 draft trial run protocols along with the recommendations are given in ***Annexure-B.***.

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Annexure A

CENTRAL POLLUTION CONTROL BOARD
DELHI- 110 032

List of Participants for virtual meeting

Sl. No	Name	Designation and Organization	Member of the Committee / Invitee
1.	Dr. R.K. Singh	Retired Scientist 'F', Bureau of Indian Standard, New Delhi	Chairman
2.	Dr. C.S. Sharma	Ex. Additional Director, CPCB, Delhi	Member
3.	Prof. Rajeev Gupta	Department of Chemistry, University of Delhi, Delhi	Member
4.	Prof. Kamal Kishore Pant	Department of Chemical Engineering, IIT Delhi	Member
5.	Dr. A K Swar	Chief Environmental Engineer, State Pollution Control Board, Odisha	Member
6.	Sh. D. M. Thaker	Unit Head, Hazardous Waste Cell, Gujarat Pollution Control Board, Gandhi Nagar, Gujarat	Member
7.	Sh. B. Vinod Babu	Additional Director & Head, WM-I, CPCB, Delhi	Member
8.	Sh. Dinabandhu Gouda	Additional Director & Head, IPC-I, CPCB, Delhi	Member
9.	Sh Abhey Singh Soni	Additional Director & Head, WM-II, CPCB, Delhi	Member Convener
10.	Sh Anil C Ranveer	Additional Director, WM-II Div, CPCB, Delhi	Invitee

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Annexure B

Recommendation of the Expert Committee for approval of proposals under Rule 9 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

Sl. No.	Name of the Industry	HW as Raw Material	Product	Brief Process	Recommendations
1.	M/s Geomin Metalloys Pvt. Ltd., Madhya Pradesh	Cobalt scrap is listed as metal and metal-bearing wastes at Basel No. B-1010, Part D of Schedule-III of Hazardous and Other Wastes (Management and Transboundary Movement) (HOWM) Rules, 2016.	Cobalt Hydroxide	Cobalt scrap undergoes leaching in water with sodium carbonate (soda ash) at 600 °C. The fused leach solution undergo solid-liquid separation and sodium hydroxide is added into leached liquid. Solid separation goes back to leaching with soda ash again. After reaction with NaOH, Cobalt hydroxide is formed which is washed with water and dried.	The committee recommended trial run permission may be granted with following conditions: i. Product (Cobalt Hydroxide) manufactured with utilisation of cobalt scrap shall be tested for Total concentration of Heavy metals (Sb, Mo, Cr, Cd, Cu, Pb, Zn, As) and acidity content. ii. Fugitive emission shall be monitored for PM_{10}, Cobalt metal/dust/fumes (as Co), Chromium, NaOH. iii. Analysis of cobalt scrap w.r.t. contamination depending upon their source of generation, metals and non-metallic parameters for general composition and possible contaminants.
		Tin scrap in form of tin cuts/scrap, dross and slags generated from tin plates manufacturing industries. Tin scrap is listed as metal and metal-bearing wastes at Basel No. B-1010, Part D of Schedule-III of HOWM Rules, 2016	Refined Tin Metal	Tin Dross/ Slag/ oxides are grinded to size less than 1 mm. Grinded material is taken to rotary dryer cum mixture and reducing agents like soda ash, caustic and carbon is mixed. Mixed compound is taken into pit furnace in a graphite crucible. Temperature is raised to 1200 °C and is maintained for more than 1 hour. Molten material is poured into collection pot and is kept for cooling to obtain crude Tin metal. Crude Material is refined in refining pot at 300 °C by addition of saw dust and casted in ingot mould.	The committee recommended trial run permission may be granted with following conditions: i. Product (Refined Tin Metal) manufactured with utilisation of tin scrap shall be tested for General Composition (Sn, Cu, etc.), Total concentration of Heavy metals (Sb, Cr, Cd, Cu, Pb, Zn, As) and acidity content. ii. Fugitive emission shall be monitored for PM_{10}, Tin (inorganic), NaOH. iii. Source emission shall be monitored for PM, SO_2. iv. Analysis of tin scrap w.r.t. General Composition (Sn, Cu, etc.) and total concentration of Heavy metals (Sb, Cr, Cd, Cu, Pb, Zn, As).

Sl. No.	Name of the Industry	HW as Raw Material	Product	Brief Process	Recommendations
		Tungsten scrap generated from metal cutting industry. Tungsten scrap is listed at Basel No. B-1010, Part D of Schedule-III of HOWM Rules, 2016	Sodium Tungstate and Tungsten Carbide Powder	Continuous Process. 1. For manufacturing of Sodium Tungstate: Heat Tungsten Metal scrap in refining furnace. Add Sodium Nitrate and soda ash and fuse at 300 °C. Fused material to be leached in water having 2% NaOH. Filter and filtrate taken to MS PP tank. HCl added to get sodium tungstate. Filter and separate Sodium Tungstate cake. Water Wash and Filtrate will be recycled by taking to MEE. 2. For manufacturing of Tungsten Carbide Powder: Sodium Tungstate will be leached in ammonia solution. pH will be adjusted by HCl to 6.8. Slurry formed will be filtered and separated. Ammonium Para Tungstate (APT) Cake of yellow color will be formed is dried. APT is fed into oxidation furnace at 600 °C. Oxidized tungsten is reduced to tungsten powder by hydrogen reduction furnace. Tungsten Powder thus formed is mixed with 4% carbon and cobalt. This mixture is sintered in hydrogen reduction furnace. Tungsten Carbide powder is formed.	The committee recommended trial run permission may be granted with following conditions: i. Products (Sodium Tungstate and Tungsten Carbide Powder) manufactured with utilisation of tungsten scrap shall be tested for Total concentration of Heavy metals (Cr, Cd, Cu, Ni, Pb, Zn, As, Mn) and acidity content. ii. Fugitive emission shall be monitored for PM_{10}, HCl, Acetic acid, Oxalic acid, NH_3 and Tungsten (insoluble and soluble compounds) and Tungsten carbide. iii. Source emission shall be monitored for PM, HCl, NH_3, Acetic Acid, Oxalic acid and Heavy metals. iv. Analysis of effluent before MEE w.r.t. pH, NH_3-N, Heavy Metals (Cd + As + Pb + Cr + Cu + Mn + Ni + Zn) v. Analysis of tungsten scrap w.r.t. General Composition (Tungsten, Cobalt, Iron, Carbon, Aluminium, Titanium and Molybdenum) and Total concentration of Heavy metals (Cr, Cd, Cu, Ni, Pb, Zn, As, Mn).

Sl. No.	Name of the Industry	HW as Raw Material	Product	Brief Process	Recommendations
		Vanadium/Tantalum/ Niobium alloy scrap is listed as metal and metal-bearing wastes at Basel No. B-1010, Part D of Schedule-III of HOWM Rules, 2016.	Metal Powder of Vanadium /Tantalum/ Niobium	Vanadium, Tantalum and Niobium alloy scrap undergoes oxidation in oxidation furnace at 350 °C, 650 °C and 1000 °C respectively. At different gauss the metal powder of desired product obtained at their respective magnetic flux density.	The committee recommended trial run permission may be granted with following conditions: i. Products (Metal Powder of Vanadium/ Tantalum/ Niobium) manufactured with utilisation of Vanadium/ Tantalum/ Niobium alloy scrap shall be tested for acidity content and possible contamination. ii. Fugitive emission shall be monitored for PM_{10}, Vanadium in dust, Vanadium fumes Tantalum, Titanium Dioxide and Hafnium. iii. Analysis of Vanadium/ Tantalum/ Niobium alloy scrap w.r.t. general composition and possible contamination depending upon their source of generation.
2.	M/s Vyshnavi Enterprises, Karnataka.	Waste/expired powder from powder coating industries for recycling. Powder Coating material categorized as hazardous waste at S. No. 21.1 of Schedule I of the HOWM Rules, 2016	Recycled Powder	The used/waste powder and expired powders collected will be segregated as per colour if possible. The used/waste powder is screened by a magnetic separator to remove any ferrous contaminants. Other raw materials 7-10% (resin, hardener, pigment, additive, filler) are weighed in exact quantity and put in a container. The ratio depends on each batch and the type of finishing required in end product. The container will be mixed during a determined time so that the raw materials are well mixed. A rotating drum/mixer can be used for this process. The container is brought to the extruder after control on homogeneity.	The committee recommended that trial run may be permitted to unit with following conditions: i. Products (Recycled Powder) manufactured with utilisation of hazardous waste (waste/expired powder) shall be tested for TCLP/STLC of As, Cd, Cr, Cu, Hg, Ni, Pb, Zn, Ba, Cn, Mn and Fe. ii. Fugitive emission shall be monitored for PM_{10}, Total VOC, Polychlorinated biphenyl (PCBs). Bisphenol-A. iii. Source emission shall be monitored for PM, VOCs, Polychlorinated biphenyl (PCB), Bisphenol-A (BPA).

Sl. No.	Name of the Industry	HW as Raw Material	Product	Brief Process	Recommendations
				In the extruder, ingredients are warmed up to a sort of paste, mixed and kneaded. On molecular scale resin and hardener will be mixed together. The pigments and additives will be dispersed in the weak mass. The paste, leaving the extruder is immediately flattened between two cylinders and cooled down on a conveyer. At the end of the cooling conveyer, the continuous powder plate is broken down into little pieces (named "chips") that will be caught up in containers. The containers with "chips" go to the grinding machine. The chips are ground to a determined standard particle size by means of a centrifugal separator. Too small pieces are removed. Too big pieces finish in the grinding machine until they attain an acquired particle size. When an optimum particle size is obtained, powder is placed in either boxes or bags. Screening the powders ensures only powder of the correct particles size is passed through. This is critical because this will have a direct impact on the quality.	

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