

Central Pollution Control Board
Waste Management - II Division, Delhi

Sub: Minutes of the Nineteenth virtual meeting of the Technical Expert Committee for “Evaluation of proposal for utilization of the hazardous and other wastes under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016”.

1. Nineteenth 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 on 30-31 March, 2020.
2. However, in the wake of COVID-19 pandemic the country goes under National Lockdown and CPCB was not able to conduct the meeting as proposed. Later, it was decided to conduct the virtual meeting.
3. Therefore, nineteenth virtual meeting of the TEC for “Evaluation of proposals received from the various industries for utilization of the hazardous and other wastes under Rule 9 of HOWM Rules, 2016” was organized through mail.
4. The committee members were requested to provide their comments on 07 draft trial run protocols prepared by CPCB vide mail dated 29.04.2020. List of the committee members requested to provide comments is enclosed at **Annexure A**.
5. The technical presentation received from the respective units (listed below) for their proposed utilization of hazardous waste were sent through mail on 08.05.2020 to the committee members:
 - (i) M/s Orient Paper Mills, Madhya Pradesh.
 - (ii) M/s Gateway Mining Tools Pvt. Ltd., Karnataka.
 - (iii) M/s Catapharma Chemicals Pvt. Ltd., Maharashtra.
 - (iv) M/s Mahanadi Waste Management Services, Bhubaneswar, Odisha.
 - (v) M/s IRC Agrochemicals, Kolkata, West Bengal.
 - (vi) M/s Indrox Global Pvt Ltd., Maharashtra.
 - (vii) M/s H&R Jhonson (India) Division, Karnataka.
6. The committee members provided their suggestions and feedbacks through mail and the details of the above proposals along with the recommendations are given in **Annexure-B**:



**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



**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 Orient Paper Mills, Madhya Pradesh	Brine sludge generated during brine purification process falls under the category - 16.3 of Schedule I of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.	Bricks.	Brine sludge generated from brine purification process is added into pan mixer with lime, cement/gypsum, sand and fly ash. The materials, together in proposed composition will be added into Pan Mixer for making a homogenous mixture. The homogenous mixture is carried from pan mixture to brick making machine on a conveyor belt. Bricks manufactured from the machine will be kept for 2-3 days for setting and then 7-10 days for curing and 2 days for sun drying before selling.	<p>The committee observed that 10% brine sludge is proposed. However, trials for 20% and 30% shall also be issued to cover the wide range in the SoP.</p> <p>The committee recommended trial run permission may be granted with following conditions:</p> <ol style="list-style-type: none"> Product (bricks) manufactured with utilisation of hazardous waste (Brine Sludge) shall be tested for TCLP of heavy metals and parameters as per BIS of clay bricks. Fugitive emission shall be monitored for PM10, CaSO₄. Analysis of treated Waste Water w.r.t. Adsorbable Organic Halides (AOX), pH, Phenolic Compounds, B.O.D., C.O.D, Cyanide, Mercury, Heavy Metals (Cd + As + Pb + Cr + Cu + Mn + Ni + Zn). Analysis of Hazardous waste (Brine Sludge) w.r.t. Moisture Content, Nitrogen as nitrate, Total concentration of Heavy metals (Cr, Cd, Cu, Ni, Pb, Zn, As, Mn), Mercury & Flouride. Analysis of Product (Bricks) w.r.t. Acidity Content, Flouride, Mercury, Nitrate, TCLP of Heavy metals (Cr, Cd, Cu, Ni, Pb, Zn, As, Mn) and also As per IS 12894:2002 (BIS of clay bricks) w.r.t. comprehensive strength, water absorption, efflorescence & drying shrinkage.

Sl. No.	Name of the Industry	HW as Raw Material	Product	Brief Process	Recommendations
2.	M/s Gateway Mining Tools Pvt. Ltd., Karnataka.	Tungsten scrap is listed at Basel No. B-1010, Part D of Schedule-III of Hazardous and Other Wastes (Management and Transboundary Movement) (HOWM) Rules, 2016	Cobalt Oxide, Tungsten Carbide Powder and Yellow Tungsten Oxide Powder	<p>First Phase - Washed raw tungsten carbide scrap will undergo leaching with acetic acid in a fixed bed reactor. After the binding material i.e. cobalt has been removed from the tungsten carbide matrix. The tungsten carbide will then be subjected to crushing by fine grinding to get the required particle size.</p> <p>The leach solution containing cobalt will be neutralized with oxalic acid and the precipitated cobalt oxalate will be separated in a centrifuged and washed.</p> <p>Second Phase-Production of yellow tungsten oxide involves calcination of tungsten carbide powder to produce tungstic oxide, followed by production of sodium tungstate by reaction of tungstic oxide with sodium hydroxide which on reaction with hydrochloric acid precipitates as tungstic acid. This tungstic acid will then be converted to ammonium tungstate by reaction with ammonium hydroxide solution. On further acidification of ammonium tungstate solution with hydrochloric acid, ammonium para-tungstate will be produced. On calcination, ammonium para-tungstate will produce yellow tungstic oxide.</p> <p>The yellow tungstic oxide thus produced will undergo reduction in hydrogen atmosphere to produce tungsten metal.</p> <p>In the same facility, cobalt oxide can be reduced with hydrogen to produce cobalt metal.</p> <p>In the third phase, the tungsten metal powder will be mixed with carbon black and pressed to the desired shapes and sizes under high pressure followed by sintering under high vacuum and high temperature.</p>	<p>The committee recommended that trial run may be permitted to unit with following conditions:</p> <ul style="list-style-type: none"> vi. Products (Cobalt Oxide, Tungsten Carbide Powder and Yellow Tungsten Oxide Powder) manufactured with utilisation of hazardous waste (cemented tungsten carbide scrap) shall be tested for TCLP of heavy metals and acidity contents. vii. Fugitive emission shall be monitored for PM₁₀, HCl, Acetic acid, Oxalic acid, NH₃ and Tungsten and Tungsten carbide. viii. Source emission shall be monitored for PM, HCl vapour and mist, NH₃, Acetic Acid, Oxalic Acid and Heavy metals. ix. Analysis of treated Waste Water w.r.t. pH, B.O.D., C.O.D., NH₃-N, Heavy Metals (Cd + As + Pb + Cr + Cu + Mn + Ni + Zn). x. Analysis of Hazardous waste (Cemented Tungsten Carbide Scrap) w.r.t. General Composition (Tungsten, Cobalt, Iron, Carbon, Aluminium, Titanium, Molybdenum, Chromium) and Total concentration of Heavy metals (Cr, Cd, Cu, Ni, Pb, Zn, As, Mn). xi. Analysis of Product (Bricks) w.r.t. Acidity Content 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
3.	M/s Catapharma Chemicals Pvt. Ltd., Maharashtra	Organic residue containing amines hazardous waste has been listed in the footnote at S. No. 7 (3) "Amines" of Schedule II of Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016	As fuel along with conventional fuel for firing in furnace of thermic fluid heater.	The utilization process of organic residue containing amines involves mixing of organic residue with furnace oil in the ratio of 0.25% to 99.75% as fuel for firing in furnace of thermic fluid heater. The heat generated is used in heating thermic fluid, which is in turn used as heating source for evaporation in distillation and heating reaction vessel.	<p>The committee observed that the utilization process involves mixing of organic residue with furnace oil in the ratio of 0.25% to 99.75% as fuel for firing in furnace of TFH. However, the ratio is too wide, therefore, it is suggested that trials run shall be taken for 20%, 30% and 40%.</p> <p>The committee recommended that trial run may be permitted to unit with 0.25% and 20% under following conditions:</p> <ol style="list-style-type: none"> Fugitive emission shall be monitored for PM₁₀, SO₂, NO_x, HCl Acid mist, VOCs, SVOCs and NH₃. Source emission shall be monitored for PM, SO₂, NO_x, Carbon Monoxide, HCl acid mist, VOCs, SVOCs, NH₃, Dioxin & Furan. Analysis of treated Waste Water w.r.t. pH, B.O.D., C.O.D, NH₃ -N, Nitrites, Nitrates, Cyanide, Phenolic Compounds, Mercury, Heavy Metals (Cd + As + Pb + Cr + Cu +Mn + Ni + Zn), Sulphides (as S), Phosphates (as P). Analysis of Hazardous waste (Organic residue containing amines) w.r.t. Moisture Content, Ash Content, Volatile Matter, Chlorine, Carbon, Hydrogen, Sulphur, Nitrogen, Oxygen, Total concentration of Heavy metals (Cr, Cd, Cu, Ni, Pb, Zn, As, Mn), Amines, Cyanide (CN), Formamide (also known as Methanamide), Ammonical Nitrogen (NH₃ -N), Nitrite & Nitrates.
4.	M/s Mahanadi Waste Management Services, Bhubaneswar,	SPL (Refractory) is categorized as hazardous waste under Schedule II Stream A11 & Stream 72 of HOWM Rules, 2016	De-toxified SPL in manufacturing of Ramming Mass and	The spent refractory of pot lining of aluminium smelters of size 150-250 mm is processed in crushers for size reduction up to 25-30 mm size. Subsequently the size reduction to 16- 200 mesh, is carried out in pulverizer. The pulverized	<p>The committee recommended that trial run may be permitted to unit with following conditions:</p> <ol style="list-style-type: none"> Products (Ramming Mass and Refractory Mortar) manufactured with utilisation of hazardous waste (SPL refractory portion)

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	Odisha		Refractory Mortar.	fraction is stored in feed hopper for further processing. The process involves the leaching of flourides; decompose the Cyanide and further treatment of leached liquor. An oxidative leaching will be adopted to leach out fluoride and decompose the cyanide to nitrogen. The leached liquor is further processed to recover fluoride and recycle the liquor for further leaching. The leached residues thus obtained will be washed, dried and calcined to refractory material such as ramming mass, refractory mortar and refractory cement.	<p>shall be tested for, Ammonia, Flouride and Cyanide.</p> <p>ii. Fugitive emission shall be monitored for PM₁₀, SO_x, NO_x, NH₃, F and CN.</p> <p>iii. Source emission shall be monitored for PM, Total Flouride, NH₃, HF and HCN.</p> <p>iv. Analysis of treated Waste Water w.r.t. pH, O&G, TSS, B.O.D, C.O.D, Total Cyanide, NH₃, HF and HCN.</p> <p>v. Analysis of Hazardous waste (SPL refractory portion) w.r.t. Cyanide and Flouride.</p>
5.	M/S IRC Agrochemicals, Kolkata, West Bengal	ETP Sludge is considered as Hazardous waste under S. No. 35.3 of Schedule I, Hazardous & Other Wastes (Management and Trans-boundary Movement) Rules, 2016	As a filler for manufacturing of DAP/NPK fertilizer	ETP sludge is generated while addition of Lime, Alum and Polyelectrolyte during effluent treatment process. This sludge is removed from clarifier bottom through sludge pump. The sludge is further thickened in the sludge thickener. The sludge from sludge thickener is pumped in to the sump pit of DAP plant.	<p>The committee recommended that trial run may be permitted to unit with following conditions:</p> <p>i. Products (DAP/NPK fertilizer) manufactured with utilisation of hazardous waste (ETP sludge) shall be tested for Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Barium and Total Cyanide.</p> <p>ii. Fugitive emission shall be monitored for PM₁₀, SO_x, NO_x, NH₃, H₂SO₄ Mist and Total Fluoride.</p> <p>iii. Source emission shall be monitored for PM, Total Flouride, NH₃, HF and H₂SO₄ Mist.</p> <p>iv. Analysis of treated Waste Water w.r.t. pH, O&G, TSS, B.O.D, C.O.D, Total Cyanide, NH₃, HF and HCN.</p> <p>v. Analysis of Hazardous waste (ETP Sludge) w.r.t. (Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Barium and Total Cyanide).</p>

Sl. No.	Name of the Industry	HW as Raw Material	Product	Brief Process	Recommendations
6.	M/s Indrox Global Pvt Ltd., Maharashtra	Waste hydrochloric acid which is considered as Hazardous waste category - 13.1, "Spent pickling liquor", under Hazardous & other Wastes (Management and Transboundary movement) Rules, 2016	Fe ₂ O ₃ and regenerated HCl	<p>a) <u>Feeding and Concentration of Spent acid (Waste Pickling Liquor – WPL):</u></p> <p>WPL will be pumped from tank farm and fed to vapor separator. The venture cycle pump will continue to draw liquid from the vapor separator and feed it to the venture scrubber in order to quench incoming hot gas from the roaster and scrub the particulate matter. During this mixing of hot gas and liquid, a lot of water is evaporated and the liquid is concentrated. The liquid/ vapor mixture returns to the separator through a tangential entry and the hot gas containing combustion products and all HCl vapors (that will be generated subsequently in the roaster during acid spray) proceed to the absorber. The concentrated liquid generated in the separator is called Concentrated Pickle Liquor (CPL).</p> <p>b) <u>Acid spray to the roaster:</u> The CIL pump is supplying CIL to the roaster. In the roaster, the CIL comes in to contact with hot combustion product and reacts with the O₂ and H₂O to form Iron oxide.</p> <p>c) <u>Absorption of HCl and gas scrubbing:</u> The HCl containing gas exits from the vapor separator and enters the bottom of the absorber, which is a packed column. A predetermined quantity of the scrubber water is sprayed at the top of the absorber packing. HCl containing gas flows up through the absorber and comes in to contact with the spray water and most of the HCl is dissolved in water. Concentration of Regenerated HCl</p>	<p>The committee observed that a similar SoP for Utilization of Spent HCl generated from steel rolling mills for producing Ferric Chloride is already available.</p> <p>The committee recommended that trial run may be permitted to unit with following conditions:</p> <ol style="list-style-type: none"> Products (Fe₂O₃ and regenerated HCl) manufactured with utilisation of hazardous waste (Spent pickling liquor) shall be tested for TCLP/STLC test for constituents like of heavy metals (Arsenic, Chromium, Mercury, Nickel and Lead). Fugitive emission shall be monitored for PM₁₀, SO₂, NO_x, HCl mist, Chlorine. Source emission shall be monitored for PM, SO₂ and HCl mist. Analysis of treated Waste Water w.r.t. pH, B.O.D., C.O.D., NH₃-N, Heavy Metals (Cd + As + Pb + Cr + Cu + Mn + Ni + Zn). Analysis of Hazardous waste (Spent pickling liquor) w.r.t. heavy metals (Arsenic, Chromium, Mercury, Nickel and Lead).

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				in water (18% to 20% as per requirement) is achieved by controlling the spray water flow rate to the absorber.	
7.	M/s H&R Jhonson (India) Division, Karnataka	Resin and Glue waste is considered as Hazardous waste under category S. No. 23.1, under Hazardous & other Wastes (Management and Trans-boundary movement) Rules, 2016	Supplementary fuel in chain stove for energy recovery	It has been proposed to utilize Resin and Glue waste obtained from the demolition of the windmill, as a fuel in the Chain stove (furnace) along with coal as an alternative fuel. Loading of Resin and Glue waste into the hopper by using loader. Mixture of 70:30 ratios of coal and Resin and Glue waste respectively will be feeded to chain stove. The fuel will get fired at around 900 ^o C temperature in chain stove chamber.	The committee observed that FRP waste is not included in Cat-23.1 of Schedule I as proposed by the unit and shall be asked to send the FRP waste to cement industry for co-processing. And also the complete combustion of FRP at 900 ^o C may not take place and thus hazardous gases such as dioxin and furan may be generated. Therefore, committee recommended that trial run may be permitted to unit with following conditions: <ul style="list-style-type: none"> i. Fugitive emission shall be monitored for PM₁₀, SO₂, NO_x, VOC (Formaldehyde), HCN, Barium, Heavy Metals. ii. Source emission shall be monitored for PM, HCL mist, SO₂, NO_x, CO, VOC, SVOCs, Total PAH, H₂S, Barium and Heavy metals (Cr, Cd, Cu, Ni, Pb, Zn, As, Mn, Hg, Se). iii. Analysis of treated Waste Water w.r.t. pH, O&G, TSS, B.O.D, Phenolic Compounds, C.O.D, Cyanide, NH₃-N, Barium, Heavy Metals (Total Chromium, Cd, Cu, Ni, Pb, Zn, Fe, As, Mn, Hg, Se). iv. Analysis of solid powder generated from the spraying chamber and Ash generated shall be tested TCLP/STLC for Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Barium, Cyanide, Manganese and Total PAH.

