

**Minutes of the First meeting of Technical Expert Committee (TEC) for evaluating proposals for utilization of hazardous and other wastes under Rule 9 of the Hazardous & Other Wastes(Management & Transboundary) Rules, 2016”.**

1. First Meeting of the Technical Expert Committee (TEC) on “Evaluation of proposal for utilization of the hazardous wastes as a supplementary resource or for energy recovery, or after processing” was held on 14.12.2016at CPCB, Delhi. List of the participants is given at Annexure-I.
2. Shri Bharat Kr. Sharma, Additional Director, HWM Division, and Member Convener of TEC welcomed the Chairman and members of the committee.
3. Dr. R. K. Singh, Chairman of TEC, in his address highlighted that while utilization of hazardous and other wastes needs to be encouraged but it requires thorough scientific evaluation so as to ensure that such utilization does not have adverse impact on environment. Thus, utilization proposals need to be critically evaluated and standard operating procedure (SoP) of the same is to be prepared incorporating provisions of environmental safeguards which is to be implemented by SPCBs/PCCs. He stressed that one of the focuses of this TEC is to dispose pendency while not compromising with scientific evaluation.
4. Thereafter, Sh. Bharat K Sharma made brief presentation on procedure being followed by

<b>S.No.</b>	<b>Status of applications received for utilization of HW under Rule 9 of HOWM Rules, 2016</b>	<b>Number</b>
1.	No. of applications received	<b>471</b>
2.	No of application disposed - No. of permission granted - No. of similar application transferred to SPCB/PCC - No. of applications withdrawn - No. of applications rejected	<b>271</b> 114 75 43 39
3.	No of application pending with industry - Pending for trial run - Want of information	<b>53</b> 15 38
4.	No. of application pending with CPCB	<b>132</b>
5.	No of application pending with ZO, CPCB (for trial run verification)	<b>15</b>
<b><u>Utilization Process wise</u></b>		
6.	No. of utilization proposal received by CPCB	<b>89</b>
7.	No. of utilization processes for which SoPs prepared and transferred to SPCBs/PCCs	<b>20</b>

CPCB in processing applications for grant of approval/preparation of SoP for specific hazardous waste utilization, ToR of the TEC and status of applications received at CPCB for grant of approval for utilization of hazardous and other wastes. The said status is as below:

Highlighting pendency of applications, Sh. Sharma proposed that in order to fast track the disposal of application, the TEC may have to initially meet twice a month preferably on non-working days like Saturday/Sunday for the ease of official members. The same was agreed.

In context of constitution of this TEC and recent notification of the Hazardous and Other Wastes (Management and Transboundary movement) Rules, 2016, Sh. Sharma informed that there is need to review CPCB's "Standard Operating Procedure for Processing the Proposals for Utilization of Hazardous Waste under Rule 11 of the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008" ([http://cpcb.nic.in/SOP\\_Rule\\_11\\_05102015.pdf](http://cpcb.nic.in/SOP_Rule_11_05102015.pdf)). He proposed and presented reviewed version of the same. The same was discussed and the TEC recommended that the same may be adopted by CPCB. The reviewed SoP is given at Annexure II.

5. Based on trial verification conducted jointly by CPCB and Chhattisgarh Environment Conservation Board in accordance with the trial run monitoring protocol prepared by CPCB, Draft SoP and Checklist of Minimal Requisite Facilities for utilization of Vanadium sludge (generated from Bayer's process during production of alumina from bauxite) to produce vanadium metal was prepared by CPCB. The same was reviewed by TEC. SoP and Checklist of Minimal Requisite Facilities for the said utilization, as recommended by TEC after incorporating suggestions of the TEC, is given at Annexure III. The aforesaid SoP, if accepted by CPCB, shall dispose about 03 applications.
6. Thereafter, 03 technical presentations about utilization process were made by three of the four invited applicants. Details of utilization proposals and recommendations made by the TEC are given at Annexure IV. The said recommendations pertaining to 03 utilization processes represent about 20 applications received by CPCB and thus similar approach may be adopted by CPCB in processing these applications.
7. In place of the fourth applicant, who had confirmed their participation but later could not come, the committee agreed to evaluate a local proponent's (from NCR) proposal so as to utilize the time slot of the absentee. The said local proponent M/s Maharani Innovative Paints Pvt. Ltd, Palwal, Haryana, made technical presentations about their utilization process and recommendations made by the TEC are also incorporated in the said Annexure IV.
8. Next meeting of TEC is tentatively scheduled to be held on December 30, 2016.
9. The meeting ended with vote of thanks to the Chair.

**Annexure I**

**CENTRAL POLLUTION CONTROL BOARD  
DELHI- 110 032**

**Date:**December 14, 2016

**Venue:** 2<sup>nd</sup>Floor, Conference room, Parivesh Bhawan, CPCB, Delhi- 110 032

**First Meeting of the Technical Expert Committee for “Evaluation of proposal for utilization of the hazardous and other wastes under Rule 9 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.**

**List of Participants**

<b>S. No</b>	<b>Name</b>	<b>Designation</b>	<b>Member of the Committee / Invitee</b>
1.	Dr R.K. Singh	Retired Scientist 'F', Bureau of Indian Standard	Chairman
2.	Prof. Rajeev Gupta	Department of Chemistry, University of Delhi	Member
3.	Shri A.V. Shah	Environmental Engineer, Gujarat Pollution Control Board	Member
4.	Shri Paras Nath	Regional Officer, Ghaziabad, U.P. Pollution Control Board	Member
5.	Shri Deenbandhu Gauda	Additional Director, PCI-I Div, CPCB, Delhi	Member
6.	Shri Bharat K Sharma	Additional Director, HWMD, CPCB, Delhi	Member Convener
8.	Shri G. Rambabu	Scientist-C, HWMD, CPCB, Delhi	Invitee
9.	Ms. Vineeta	Sr. Scientific Assistant, HWMD, CPCB, Delhi	Invitee
10.	Dr. Sandeep Kumar Dixit	Research Associate, HWMD, CPCB, Delhi	Invitee

**Standard Operating Procedure for Processing the Proposals for Utilization of  
Hazardous Waste under Rule 9 of the Hazardous and Other Wastes  
(Management and Transboundary Movement) Rules, 2016**



December 2016

**Central Pollution Control Board**  
Hazardous Waste Management Division  
(Ministry of Environment, Forest & Climate Change, Government of India)  
'Parivesh Bhawan', East Arjun Nagar  
Shahdara, Delhi – 110032

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## **Background:**

The Rule 9 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, stipulates that;

*“(1) The utilisation of hazardous and other wastes as a resource or after pre-processing either for co-processing or for any other use, including within the premises of the generator (if it is not part of process), shall be carried out only after obtaining authorisation from the State Pollution Control Board in respect of waste on the basis of standard operating procedures or guidelines provided by the Central Pollution Control Board.*

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

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

*(3) No trial runs shall be required for co-processing of waste in cement plants for which guidelines by the Central Pollution Control Board are already available; however, the actual users shall ensure compliance to the standards notified under the Environment (Protection) Act, 1986 (29 of 1986), for cement plant with respect to co-processing of waste, Provided that till the time the standards are notified, the procedure as applicable to other kind of utilisation of hazardous and other waste, as enumerated above shall be followed “*

As per the aforesaid provisions of utilization of hazardous and other wastes as a resource or after pre-processing either for co-processing or for any other use, including within the premises of the generator (if it is not part of process), shall be carried out only after taking approval from Central Pollution Control Board (CPCB) and/or obtaining authorisation from the State Pollution Control Board in respect of waste on the basis of standard operating procedures or guidelines provided by the CPCB, as the case may be.

In view of above, below is revised procedure for processing applications received at CPCB for grant of approval and development of standard operating procedures or guidelines for various proposed utilisation of hazardous and other wastes:

### **1. Acceptance of Application for Utilization Proposal of Hazardous Waste**

The following procedure shall be followed for acceptance of applications for CPCB's approval for utilization of a hazardous waste;

- a) The proponent shall submit an application to concerned SPCB/PCC in a prescribed format (given at Annexure-I), with request to forward their application to CPCB after endorsing the consent to establish granted to the proponent within a period of 15 days. The following documents shall be attached ;
  - i. Scanned copies of valid Consent to Establish or Operate under the Air Act & Water Act from the concerned SPCB/PCC.

- ii. Details regarding patented technologies if any adopted by him that may require non-disclosure for public information.
- b) Proponent shall also submit details online at CPCB website w.r.t. characteristics of hazardous waste intended to be utilized, sources, utilization process, product and end-use etc as per the format given in the website i.e. <http://164.100.43.186:8080/HWMD/>.
- c) Upon receipt of endorsement from SPCB, CPCB shall process the application and incomplete applications be communicated to the applicant within 10 days; in case of no response within 20 days from the applicant; the application shall be treated as withdrawn.
- d) In case if the proposal pertains to utilization of similar hazardous waste (i.e hazardous waste for which the utilization permission has already been granted earlier by CPCB) adopting similar process for similar use, for CPCB has already prepared standard operating procedures or guidelines and circulated to all SPCBs/PCCs, the application shall be forwarded to the concerned SPCB/PCC for grant of authorisation on the basis of the said standard operating procedures or guidelines.

## 2. Processing of New Utilization Proposals

In case the proposal is for new hazardous wastes utilization, for which CPCB has not prepared standard operating procedures or guidelines, CPCB shall follow the following procedure for grant of approvals;

- a) Trial run for utilization of HW shall be conducted for all new utilization proposals.
- b) Complete applications (as per the prescribed format) shall be evaluated\*\* by CPCB and a protocol\*\* for conducting trial utilization study shall be prepared specifying the duration, quantity of hazardous waste to be procured for trial, the parameters to be analyzed for air/water/wastes streams/soil/work-zone air quality etc., permissible standards for applicable parameters, sampling duration, number of samples, chemical mass balance of the principal constituents of concern etc. for the proposed trial run. The same shall be approved by Member Secretary, CPCB.
- c) A formal letter in this regard attaching the aforesaid protocol shall be issued by CPCB to the unit for conducting the said trial run with copy to SPCB/PCC and CPCB (ZO or HO team) within 30 days from receipt of complete application.
- d) Aforesaid trial run can be given for a maximum period of 30 days in a stretch. Validity of such trial run shall be for period of 3 months from the day of issue of trial run permission letter.
- e) Based on aforesaid letter, the unit shall procure the required hazardous waste for trial run from the generating industry as declared by the unit.
- f) NOC for inter State transport of hazardous waste for utilization is not required from SPCB/PCC. However, the sender of hazardous wastes to be utilized shall intimate both the SPCBs before handing over the waste to the transporter in accordance with provisions laid down under the Rule 18(4) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

- g) The unit shall engage an EPA/NABL/ISO17025 accredited laboratory for carrying out the monitoring of trial utilization as per the protocol prepared by CPCB. The laboratory shall have accreditation (EPA/NABL/ISO17025) for the parameters specified for the trial run protocol. In case the unit is unable to engage any laboratory having the said accreditation for any parameters, international labs accredited under ISO 17025 may be engaged for analysis of such parameters.
- h) The unit shall inform CPCB and the concerned SPCB/PCC about their preparedness of carrying out trial run at least 15 days in advance so as to enable CPCB and the SPCB/PCC official in participating in the said trial utilization and monitoring.
- i) The unit shall reimburse the actual expenses incurred by CPCB including the sampling and analysis costs as per EPA notified rates, where EPA rates are available for given parameter.
- j) Trial run monitoring shall be conducted at peak load.
- k) Trial run performance by laboratory shall be carried out in presence of the CPCB & SPCB/PCC officials. CPCB (ZO or Head Office team) shall collect few random samples for verification purpose during the same.
- l) The laboratory engaged shall submit a trial utilization report within 20 days on completion of trial utilization monitoring and other information as prescribed in the monitoring protocol and submit the report to Head Office CPCB.
- m) Inspecting team of CPCB shall submit a separate report (analysis results and information as per the protocol) to Head Office, CPCB, within 20 days from date of trial run. The report shall be very specific with clear cut observations, shortcomings and recommendations with no subjectivity.
- n) In case of major deviation between the results of samples collected by CPCB Zonal office/ Head Office and laboratory engaged, the monitoring shall be repeated.
- o) Standard for selected parameters shall be taken from notified standards under Environment(Protection) Act, 1986, and if not available, CPCB may propose referring international practices/ standards, wherever applicable.
- p) A condition for installing CEMS for air emissions and wastewater discharge, as per the prevailing policy of CPCB or as appropriate, for units shall be imposed.
- q) Based on the trial study reports, individual case shall be examined\*\* for compliance to monitored parameters and requisite infrastructure as per trial run protocol. The matter shall accordingly be placed before Member Secretary/ Chairman, CPCB for granting approval/conditional approval or refusal as the case may be. Accordingly, CPCB, shall issue a letter to SPCB (with copy to proponent) granting approval under Rule-9.
- r) CPCB shall develop a checklist and SOPs for utilization of similar hazardous waste adopting similar process which has been assessed through inspection and trial run.
- s) The unit shall submit monthly and annual information on hazardous waste consumed, its source, products generated or resources conserved to the concerned SPCB/PCC.
- t) The conditions specified in the SOPs shall be part of authorization/consent issued by

SPCB/PCC.

*\*\* Complete applications are evaluated by CPCB considering environmental soundness of the utilization proposal; pollution potential for emissions/discharges; potential for ground/soil contamination; adequacy of the proposed facility for control of pollution; quantity of residue/waste generated; potential exposure to the workers and nearby community; etc. If utilization proposal found satisfactory, trial run monitoring protocol shall be recommended along with emission/discharge/workzone standards. Further, upon satisfactory verification during trial run, CPCB shall grant approval and prepare standard operating procedure or guidelines thereof.*

#### **4. Validity of Approvals**

- a) No validity period for the approvals issued under the Rule-9 shall be specified as long as there is no change in utilization process, raw material and product use, wherever applicable. The conditions specified as part of approval shall be enforced by the concerned SPCB/PCC.
- b) In cases where violations are observed by CPCB or the concerned SPCB/PCC, the approval under Rule-9 shall be cancelled by CPCB or SPCB/PCC, as the case may be.

**It shall be the endeavour of CPCB to continuously improve upon the utilization process based on the technology improvements, implementation and experience gained on larger scale. Therefore, the conditions specified in SoPs and Check-list is subjected to change from time to time.**

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**Format\* for obtaining approval from the Central Pollution Control Board under the Rule 9 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016**

<b>1</b>	<b>General Information</b>	
1.1	Name & Address of the Unit:	
1.2	Contact Person and phone number:	
1.3	Products to be manufactured and quantity (MT/Day):	
<b>2</b>	<b>Details of hazardous waste to be utilized</b>	
2.1	Name & address of hazardous or other waste generating industry:	
2.2	Name/Type of the hazardous wastes or other waste including category (as per the Schedule I or II or III) intended for utilization:	
2.3	Detailed characteristics of hazardous waste or other waste proposed for utilization:	
2.4	Process details from which such hazardous or other waste is generated:	
<b>3</b>	<b>Details of utilization of hazardous or other wastes</b>	
3.1	Proposed quantity (in MTA) of hazardous or other waste to be utilized	
3.2	Process details for utilization of hazardous or other waste and its Flow Diagram:	
3.3	Please attach copy of air consent, water consent and authorization:	
3.4	Base line data including characteristics pertaining to air emissions, waste water generation and other solid wastes including hazardous or other waste expected to be generated in the proposed utilization process:	
3.5	Material Balance with and without utilizing hazardous or other wastes, in case the waste is proposed for utilization/co- processing in an already existing process:	
3.6	Details of hazardous or other waste storage facility and process area facility:	
3.7	Quantity of fuel and/or raw material that are expected to be conserve (in % of raw material replaced) from the proposed utilization:	
3.8	Data including characteristics pertaining to air emissions, waste water generation and other solid wastes including hazardous waste expected to be generated during utilization of hazardous or other wastes.	
3.9	Details of findings of laboratory/ pilot scale study, international practice etc.	
3.10	Name of the product (to be manufactured from utilization of hazardous or other waste), if any, its characteristics and where the same will be used and in which process:	

\* To be filled and submitted to the concerned SPCB/PCC by the unit, who desires to utilize hazardous or other wastes as a resource or after pre-processing either for co-processing or for any other use, including within the premises of the generator (if it is not part of process)

## Annexure-III

# Standard Operating Procedure and Checklist of Minimal Requisite Facilities for utilization of hazardous waste under Rule 9 of the Hazardous and Other Wastes (Management and Transboundary movement) Rules, 2016

## Utilization of Vanadium Sludge Generated From Alumina

### Refineries



December, 2016

**Central Pollution Control Board**  
(Ministry of Environment, Forest & Climate Change, Government of India)  
**Parivesh Bhawan, East Arjun Nagar,**  
**Shahdara, Delhi – 110032**

## 22.0 Utilization of Vanadium Sludge:

Type of HW	Source of generation	Recovery/Product
Vanadium Sludge- Category 11.7 of schedule-I of HOWM Rules, 2016	Alumina refineries	Vanadium metal

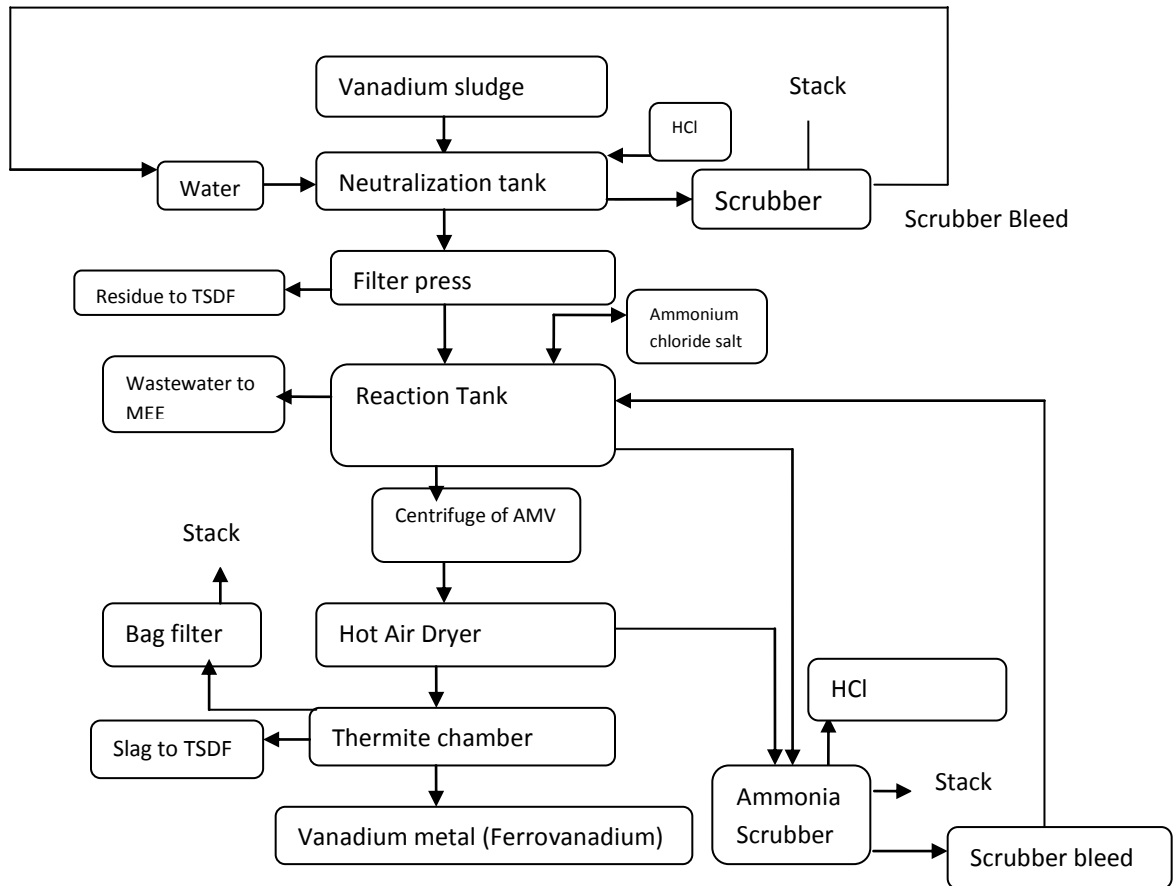
## 22.1 Source of Waste

- i. Vanadium sludge is generated in Bayer's process in production of alumina from bauxite, which involves treating bauxite with alkali under high pressure forming Bayer's liquor that contains substantial amount of vanadium salts as impurities. Vanadium sludge gets precipitated, when vanadium containing bayer's liquor is cooled down or air is blown through. Vanadium sludge contains 10-20% vanadium as vanadium pentoxide.
- ii. Vanadium sludge contains about 38-45% moisture, 10-20% vanadium pentoxide, 8-15% sodium oxide and 2.5-3.0% alumina.

## 22.2 Proposed Process

The utilization process involves mixing of vanadium sludge with water followed by neutralization of solution with hydro chloric acid. Then solution is filtered through filter press and mother liquor containing dissolved  $V_2O_5$  reacts with ammonium chloride powder resulting into precipitation of ammonium meta vanadate (AMV) in the solution, which is centrifuged and washed for recovery of vanadium pentoxide from mother liquor. The centrifuged precipitate is dried in hot air oven dryer and recovers the vanadium metal after thermite process.

### Process Flow Diagram



### **22.3 Product Usage / Utilization**

The recovered vanadium metal is used in steel industry as additive. It is used for the production of rust resistant, spring and high speed tool steels. It is also added to steels to stabilise carbides.

### **22.4 Standard Operating Procedure (SoP) for utilization**

This SoP is applicable only for the utilization of vanadium sludge generated from Alumina refineries industries during Bayer's process in production of alumina from bauxite to produce vanadium metal suitable for utilization in steel industry.

- (1) The vanadium sludge should be transported in HDPE/jambo bags mounted on vehicles fitted with requisite safeguards ensuring no spillage of waste.
- (2) There should be a designated space for unloading of vanadium sludge jambo bags. The receiving storage area shall be placed above the ground and contained with low raise bund wall & acid-alkali proof floor with slope to collect spillages, if any, into collection pit.

- (3) The unit shall store hazardous waste as well as ammonium chloride salt under cool, dry and well-ventilated covered storage shed(s) within premises, as authorized by the concerned State Pollution Control Board/Pollution Committee under Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016 so as to eliminate rain water intrusion.
- (4) There shall be no manual handling of vanadium sludge and ammonium chloride salt. Mechanical loading or bucket elevator shall be used for transfer of vanadium sludge and ammonium chloride salt to the reaction tank.
- (5) The entire process area shall have leak-proof and acid-alkali proof floor tiles with adequate slope to collect spillages, if any, into a collection pit. The spillages from collection pit shall be transferred to reaction tank, as the cases may be, through chemical process pump.
- (6) Neutralization tank should be connected with scrubber followed by stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher. Stack shall have easy access to port hole for conducting stack emission monitoring. If water alone is used as scrubbing medium in the scrubber, the bleed water from scrubber shall be used as water for mixing vanadium sludge.
- (7) Transfer of hydrochloric acid shall be done only through separate chemical pipeline to reaction tanks.
- (8) There shall be separate storage area for HCl tank in HDPE tank or acid proof tank above the ground with low raise bund wall & acid/alkali proof floor with slope to collect spillages, if any, into collection pit.
- (9) The neutralized liquid from neutralization tank shall be filtered through filter press to remove particles from the liquid prior to transfer of the same to the reaction tank.
- (10) This mother liquor shall be transferred to reaction tank through mechanized/chemical process pump.
- (11) Transfer of ammonium chloride salt to reaction tank shall be carried out through bucket/mechanized system.
- (12) Precipitated ammonium meta vanadate shall be separated from mother liquor by gravity separation and the slurry transferred to centrifuge through slurry pump or any other mechanical process.
- (13) The recovered ammonium meta vanadate (AMV) from centrifuge after washing can be transferred to dryer unit manually.
- (14) Unit shall maintain proper ventilation in the work zone and process areas. All personnel involved in the plant operation shall wear proper personal protective equipment such as Chemical goggles, impervious gloves of chemically resistant material (rubber or neoprene), Body suits, aprons, and/or coveralls of chemical resistant material and impervious boots of chemically resistant material.
- (15) Ammonia gas, release during oxidation of ammonium meta vanadate in hot air dryer at temperature of around 350°C to produce vanadium pentoxide, shall be channelized

through duct to a scrubber (preferable with venture scrubber) and released through stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher. HCl shall use as an absorbing media for recovery of ammonium chloride, shall be reused in the reaction tank, if possible.

The reaction tank should be covered with FRP (or any suitable acid/alkali proof) lid connected to the aforesaid common scrubber through a suction duct with isolation valve.

- (16) Vanadium pentoxide along with aluminium powder, iron chips and  $\text{CaF}_2$  shall be charged in thermite furnace for exothermic reaction at temperature of about  $1800^\circ\text{C}$ - $1900^\circ\text{C}$ . Thermite furnace shall be connected with bag filters which shall be connected to stack of minimum 30 meters height above the ground.
- (17) The slag generated during thermite process shall be stored in designated area and shall be sent to TSDF for disposal.
- (18) Treatment and disposal of waste water:

The following are the sources of wastewater from utilization process;

- a) Spent mother liquor
- b) Scrubber bleed from Neutralization tank, if not used in utilization process
- c) Floor washing/reactor wash/vehicle wash/spillages, etc.

The Spent mother liquor, after reuse during the utilization process, shall be collected in separate tank for treatment with sodium hydroxide or calcium hydroxide followed by further treatment in Multiple Effect Evaporator (MEE). MEE salt should be sent to TSDF for encapsulation and secured land filling. Depending upon waste water quality generated from Floor washing/reactor wash/vehicle wash/spillages Scrubber bleeds and Scrubber bleed from Neutralization tank, if any, there may be requirement of effluent treatment plant if the same cannot be directly treated in MEE.

The condensate of MEE and treated waste water shall be used for neutralization in its HW utilization process/floor washing/reactor wash/vehicle wash/spillages etc. and there shall not be any discharge of treated waste water.

- (19) It shall be ensured that vanadium sludge is procured from the industries who have valid authorization for the same from the concerned SPCB/PCC as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- (20) The unit shall submit quarterly and annual information on hazardous wastes consumed, its source, products generated or resources conserved (specifying the details like type and quantity of resources conserved) to the concerned SPCB.
- (21) The residue generated from filter press, ETP sludge (if any), residue from scrubber and bag filter, MEE residue, product spillages etc. shall be collected and temporarily stored in HDPE drums / bags in a dedicated hazardous waste storage area and sent to TSDF within 90 days from generation of the waste. Such storage area shall be covered with proper ventilation.

- (22) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of vanadium sludge waste shall be entered:
- Address of the sender
  - Date of dispatch
  - Quantity procured
  - Seal and signature of the sender
  - Date of receipt in the premises
- (23) A log book with information on source and date of procurement of each type of the said hazardous wastes, quantity, date wise utilization of the same, quantity of vanadium metal manufactured, hazardous waste generation and its disposal, etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.
- (24) Transportation of vanadium sludge and filter press & MEE residues generated during utilisation shall be carried out by the sender or receiver (utilizer/TSDf operator) as per the authorization issued by concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
- (25) The unit shall maintain record of hazardous waste utilised, residues generated and disposed as per Form 3 & shall file annual returns in Form 4 as per Rule 20 (1) and (2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, to concerned SPCB.
- (26) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit shall be liable to implement immediate response measures, environmental site assessment and remediation of contaminated soil/groundwater/sediment etc. as per the "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Wastes and Penalty" published by CPCB.
- (27) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

## **22.5 Standards**

- (1) Emissions from stack connected to neutralization tank followed by scrubber shall comply with the following:
- i. PM - 150mg/Nm<sup>3</sup>
  - ii. HCl vapour & mist -35mg/Nm<sup>3</sup>
- (2) Emission from stack attached to reaction vessel and thermite chamber reaction vessels shall comply with the following:
- i. PM - 150mg/Nm<sup>3</sup>
  - ii. Ammonia - 5mg/Nm<sup>3</sup>.

(Ammonia standard has been arrived based on emission of ammonia measured during trial utilization study)

- (3) Emission from stack connected to Bag Filters shall comply with PM emission of 150mg/Nm<sup>3</sup>.
- (4) Stringent emission standards may be prescribed by the concerned SPCB/PCC. Other emission/discharge standard shall be as per norms prescribed by concerned SPCB/PCC.
- (5) Fugitive emissions in the work zone shall comply with following standards (Reference: OCCUPATIONAL SAFETY AND HEALTH STANDARDS 1910.1000):

Ammonia -25 ppm (18 mg/m<sup>3</sup>) TWA\*  
Respirable dust (PM10) - 5000 µg/m<sup>3</sup> TWA

*TWA - Time-weighted average  
The Permissible Exposure Limit is 8-hour TWA.*

*A ceiling limit is one that may not be exceeded for any period of time, and is applied to irritants and other materials that have immediate effects.*

- (6) Monitoring of the specified parameters for source emission and work zone shall be carried out by NABL/EPA/ISO 17025 accredited laboratories quarterly and the results shall be submitted quarterly to the concerned SPCB/PCC.

## **22.6 Siting of Industry**

Facilities for processing of vanadium sludge should preferably be located in a notified industrial area or industrial park/estate/cluster.

## **22.7 Size of Plant & Efficiency of utilisation**

1000 kg of vanadium sludge may yield 175 kg of vanadium metal. Other raw materials required are 3000 litre water, 363 litre HCl, 240 kg ammonium chloride salt, 79 kg iron chips, 95 kg aluminium and 11 kg calcium fluoride. Requisite facilities of adequate size shall be installed accordingly.

## **22.8 On-line detectors / Alarms / Analysers**

Online detectors/alarms/analysers are not recommended for batch type processing units. However, in case of continuous process operations, SPCB/PCC may recommend online stack monitoring for PM emission in stack attached to thermite process.

## **22.9 Checklist of Minimal Requisite Facilities**

<b>S. No.</b>	<b>Requisite Facilities</b>
1.	Storage shed(s) for storage of vanadium sludge in jambo bags or bags suitable for alkaline salt only under cool, dry, well-ventilated covered storage shed(s) within premises.
2.	Covered hazardous waste storage area to store residues generated from ETP(if any),



	scrubber residues, MEE salt, slag, product spillages etc. in HDPE bags/drums.
3.	Acid-alkali proof flooring in process area including the areas of reception, storage and handling of vanadium sludge, ammonium chloride salt and HCl.
4.	Chemical pumps for transfer of acidic liquids and slurry pump (optional) for transfer of reaction mass from reaction vessel.
5.	Neutralization tank adequate size with suction hood connected to scrubber followed by stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher.
6.	Chemical pumps for transfer of mother liquor and leached liquid solution.
7.	Reaction vessels of adequate size covered with FRP (or any suitable acid-alkali proof) lid with suction hood connected to scrubber followed by stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher
8.	Hot Air Dryer with fume / dust extraction system with suction ducts and may have common scrubber and stack of Reaction vessel or separate scrubber followed by stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher.
9.	Centrifuge for recovery and washing of ammonium meta vanadate precipitate.
10.	Filter press unit for removal of silica and other particles.
11.	Separate storage tank and pipeline for HCl.
12.	Multi effect evaporator (MEE) for treatment of neutralised mother liquor/floor washing/tank and vehicle washing so as to achieve zero liquid discharge.
13.	Thermite chamber with pollution control device equipped with bag filters attached to stack of 30 meters height above ground level.
14.	Buffer storage tank with adequate capacity to store minimum one week of spent mother liquor/floor washing/tank and vehicle washing generated so as to store the same in case of unforeseen circumstance/breakdown of MEE.
15.	First aid and appropriate fire fighting equipment.

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**Annexure IV**

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

S.N.	Name of the Industry	HW as Raw Material	Product	Process	Recommendations
1.	M/s Arun Industrial Products Plot No: 320/C, Village: Varsola, Ta: Vansoli, Dist: KHEDEDA - 387130	Spent Aluminum Chloride (Category: B10 of Schedule II of HOWM Rules, 2016), generated from production of various Pharma/dye & dye intermediates/Chemicals.	Aluminum Hydroxide Chloride to be used in manufacturing of Pulp and paper.  (Utilization of Aluminum Hydroxide in ETP has been withdrawn during the technical presentation by the unit)	The utilization process includes mixing of aluminum chloride solution with Aluminum Hydroxide /Alumina and Sodium Hydroxide/ Sodium bicarbonate followed by addition of Calcium Hydroxide and water at ambient temperature in a Reactor. After the 3 hrs Aluminum Hydroxide Chloride is formed as product.	<p>The committee observed that the unit has no information about the process and raw materials/by-products during generation of Spent Aluminum Chloride. The committee, therefore, recommends that the industry shall submit following details within three weeks, as agreed by the unit:</p> <ol style="list-style-type: none"><li>1.Name of the units from where Spent Aluminum Chloride would be procured.</li><li>2.List of raw materials and chemical reactions of each of the industrial processes from where Spent Aluminum Chloride would be procured.</li><li>3.Complete assay of (i) spent Aluminum Chloride from each of the industrial processes from where Spent Aluminum Chloride is to be collected, and; (ii) product i.e. Aluminum Hydroxide Chloride manufactured by utilizing the above Aluminum Chloride.</li></ol> <p>The assay report shall also include individual concentration of all raw materials and products/by-products/possible organic compounds during generation of such Spent Aluminum Chloride.</p> <p>In case of problem in getting information about list of raw materials and chemical reactions as (2) above, as apprehended by the unit, it is suggested that the unit may approach Gujarat PCB along with list of units as (1) above, requesting to provide process details of the listed units (from</p>

S.N.	Name of the Industry	HW as Raw Material	Product	Process	Recommendations
					<p>where Spent Aluminum Chloride would be generated and procured).</p> <p>Upon receipt of the above information, the matter may be discussed in subsequent TEC meeting in presence of proponent.</p>
2.	M/s. Coromandel International Limited 71/71-A/72/73/74/75/83, GIDC, Nandesari, Dist: Vadodara-391 340, Gujarat, INDIA	Spent Sulphuric Acid (category: 26.3 of schedule I of HOWM Rules, 2016) generated during production of various Dyes and Dye Intermedia tes/Pharm a	Single Super Phosphat e	Single Super Phosphate (SSP) manufacturing involves grinding of Rock Phosphate in a Milling section to fine powder and sent to the mixer through Screw Conveyor. Spent Sulphuric Acid is added to mixer in fixed ratio which produced Single Super Phosphate as semi solid mass. This semi solid mass is conveyed through a moving conveyer called Den. In the Den after solidifying, SSP is converted in powder form. Scrubbers are attached to Den and Mixer. Silicon Tetra Fluoride is used as scrubbing media	<p>The committee recommends that the industry shall submit following details:</p> <ol style="list-style-type: none"> <li>1. Complete assay of (i) spent Sulphuric Acid from each of the industrial processes from where Spent Sulphuric Acid is to be collected, and; (ii) product i.e. Single Super Phosphate (SSP) manufactured by utilizing the above spent Sulphuric acid. The assay report shall also include individual concentration of all raw materials and products, by-products and possible organic compounds during generation of such spent Spent Acid.</li> </ol> <p>Committee recommends for trial run upon submission of the aforesaid information by units based on which trial run monitoring protocol may be prepared by CPCB wherein all the aforesaid raw materials, products/by-products and possible organic compounds shall be included as parameters for their concentration verification in the spent acid and SSP during the trial run in presence of CPCB and SPCB officials. Further, the SSP so produced during the trial may be tested for eco-toxicity. In case, the same found non-toxic, standards of the said parameters may accordingly be prescribed in the spent Acid as well as SSP while developing SoP for the said utilization.</p>
3.	M/s.Aarti Industries Limited. (Organic Division) Plot no. 801/23, Phase III, GIDC, Vapi - 396 195	Spent Sulphuric Acid (category: 26.3 of schedule I of HOWM Rules, 2016) generated during production of various Dyes and Dye Intermedia tes/Pharm a	Single Super Phosphat e	Spent H2SO4 (20%) is concentrated using two step distillation process. In first step, spent acid (20% H2SO4) is converted into spent acid (42% H2SO4), where water is distilled under vacuum and concentrated Acid is obtained as the bottom product. Water vapors are separated by two vapor separators prior to condensate. In second step, spent acid (42% H2SO4) is converted into spent acid (70% H2SO4)	

S.N.	Name of the Industry	HW as Raw Material	Product	Process	Recommendations
				<p>with same procedure in a different feed tank. The condensate generated during the both steps is sent back to originator i.e. Apex Pharmachem Pvt. Ltd. and Aarti Industries Ltd.</p> <p>The manufacturing of Single Super Phosphate includes the mixing of above spent acid (70% H<sub>2</sub>SO<sub>4</sub>) with Rock Phosphate which gives the slurry of Single Super Phosphate containing 10-12% moisture which is finally granulated and dried. The vent gasses are scrubbed using Silicon Tetra fluoride as Scrubbing media from which Sodium Silica Fluoride is obtained as by product.</p>	
4.	M/s Maharani Innovative Paints Pvt. Ltd. 49TH KM, Main Mathura Road, Village Prithla, Tehsil & Distt. Palwal-121102 Haryana	Used Waste Thinner (Category: 20.1 of schedule I of HOWM Rules, 2016) generated during washing of colour line with thinner while colour change during painting in automobile industry	Low grade Primer (to be used as in automobile industry)	The process includes filtration by bolting nylon filter cloth followed by sedimentation of Used Waste Thinner in a tank. The residue is sent for disposal to common TSDF. The filtrate is homogenised in stirrer followed by blending with Additives and Resins for proper bonding. After that it is grinded in Beed Mill where pigment is also added as per the required colour. The same is again filtered to get 250 to 400 mess size product.	The committee recommended that the unit shall provide (i) assay for the possibility of 'Carcinogenic Compounds' in their collected used waste thinner; and (ii) Assay reports of the paints and other paints/resins/polymers/etc. used by their suppliers. Upon receipt of the same, the committee recommends for trial run and trial run monitoring protocol may include various parameters and standards thereof as prescribed in the IS15489:2013 for Paint besides applicable parameters (as per the aforesaid assay reports) and standards thereof in work zone as per OSHA standards.