

Minutes of 19th PERC (Project Evaluation & Review Committee) meeting held under the Chairmanship of Shri Alok Chandra, Economic Adviser, Ministry of Mines on 6-7 August 2019 at JNARDDC, Nagpur. The list of participants is enclosed in Annexure-A.

1. A total of 130 project proposals were received for the year 2019-20. A two-stage review process was adopted to evaluate the proposals for recommendation to Standing Scientific Advisory Group (SSAG). The first stage comprised of preliminary screening of the proposals done by a team of experts constituted by Ministry of Mines. Based on the guidelines as adopted in 14th PERC, the experts conducted pre-screening of the proposals. After screening, 30 proposals covering five areas, namely (i) Geosciences and Exploration (ii) Mining, (iii) Mineral Processing & recovery from waste (iv) Metal Extraction (Metallurgical processes) and (v) Alloys, specialty materials and product were short listed for further review in the second stage. These 30 (thirty) project proposals were presented by the respective Principal Investigators (PIs) and evaluated by the committee during the meeting at JNARDDC, Nagpur. Furthermore 3 (three) projects as recommended by the 18th PERC were included in presentation. In addition to the above, 14 (fourteen) completed and 4 (four) ongoing projects were reviewed by the committee. As per the terms of reference of PERC, the concerned members recused themselves, to avoid conflict of interest, from the proceedings from that part of the meeting when project(s) related to their institute(s) was under consideration.

2. The following criteria were given to all experts for detailed evaluation both from proposal as well as during presentations by the PIs. The evaluation criteria was also communicated by email to all PIs who were called for the presentations. The evaluation was carried out as per criteria given below:

- (i) Is the problem well defined?
- (ii) Does the proposal adequately cover prior work both in the institution and elsewhere \ Is it similar to any earlier work already sanctioned; has the PI done prior work to prove proof of concept before submitting the project or is the project in the early stage itself
- (iii) Does it address a critical gap in our country's needs and requirements
- (iv) Is the methodology of work well laid out and doable.
- (v) Are the deliverables well defined
- (vi) Is there a translational potential for application / user interface; Can it move to higher TRL?
- (vii) Does the PI and institution have adequate competence to do the proposed research
- (viii) Is there collaboration with another Lab or institution or industry to enhance the quality and quantum and application potential
- (ix) Budget: Is the budget correctly done; Is there deficiency or excess
- (x) Time duration:
- (xi) Any other comments.

The committee experts present in the 19th PERC meeting were divided into two panels with corresponding expertise. This enabled more time for the PIs to make the presentations as well as detailed interaction. Both the panels met together at the end and selected the projects for recommendation to the next level SSAG, or asked the PIs to revise and attempt a resubmission to the next PERC or not recommended at all. The details are given in the succeeding paragraphs.

Final recommendation to SSAG

- (i) Recommended with or without changes to SSAG: **11 Project Proposals**
- (ii) To be revised and resubmitted in next PERC: **2 project Proposals**
- (iii) NOT recommended: **20 Project Proposals**
- (iv) Review of report of completed / ongoing projects: **18 nos.**

3. Based on the detailed review and evaluation, the following 9 new project proposals are being recommended to SSAG. **The details of recommended projects and specific recommendations are given hereunder:**

Project ID: 01/ 19- PERC -NEW /2019-20
Project Title: Recovery Studies of Gold and other values using non cyanide reagents from Tailing Dump of Bharat Gold Mines Ltd
PI: B.R.V. Narasimhan, Principal Scientist, E-mail: narasimhan@nftdc.res.in (M) +91 9908648717
Implementing Institution: Nonferrous Materials Technology Development Centre Kanchanbagh, Hyderabad – 500 058
Project Cost: ₹ 90.43 Lakhs Duration: 1 Year
Objectives: <ul style="list-style-type: none"> • In prevailing price of gold and other values (Pd, Rh and W), it is important to recover them from tailings that has a huge potential as mineable resource. • Application of non-cyanide reagents for leaching of residual gold and other values and hence envisaging on environmentally safe process. • In India, there is no big tungsten deposit and hence it is very pertinent to study co-recovery of tungsten. • Utilization of huge quantities of mill waste • Exploration of using the silica waste after gold values recovery as building material.
Remarks and Recommendation:
RECOMMENDED <ol style="list-style-type: none"> 1) The process has been established. 2) Preliminary work done and results are encouraging which may open up a new flow sheet for recovery of gold and other associated elements in the new findings. 3) BGML is associated with this project.

Project ID: 08/ 19- PERC -NEW/2019-20
Project Title: Process Feasibility studies for the development of High Purity Aluminium through segregation process.
PI: Lokeshwara Rao, Project Director, Email: lokesh@nftdc.res.in , Phone : 040-24342300, 2418 2372 Mobile : 9849604852
Implementing Institution: NFTDC PO. Kanchanbagh, Hyderabad – 500 058
Project Cost: ₹ 33.15 Lakhs, Duration: 1 Years
Objectives: <ul style="list-style-type: none"> • To conduct feasibility studies for the development of process and process equipment to produce High Purity Aluminium: 99.99 – 99.999% • To develop a special cold body system for fractional crystallization • To design energy efficient furnaces with best insulation & Temp controls. • To develop procedures for the chemical analysis of High Pure Aluminium
Remarks and Recommendation:
RECOMMENDED <ol style="list-style-type: none"> 1. Principle is good. Application in defense and space sectors. 2. Prior work has been done and proof of concept demonstrated. 3. An important gap area of high purity aluminium production in the country will be fulfilled on completion of project and further scale up.

Project ID: 09/ 19- PERC -NEW/2019-20
Project Title: Processing of spent and natural graphite for energy and aerospace application.
PI: Mamata Mohapatra (Sr. Scientist) CSIR-IMMT, Mail- mamata@immt.res.in , M- +919437260688
Implementing Institution: CSIR-Institute of Minerals & Materials Technology (Formerly Regional Research Laboratory), Bhubaneswar PIN: 751013
Project Cost: ₹ 92.76 lakhs, Duration: 3 Years
Objectives:

- To develop a scalable, low-cost metallurgical method of recovery high functional graphite with desired composition from a hybrid secondary sources using ligand assisted microwave treatment or solvent milling
- Synthesis of carbon coated graphite from the slurry by photo or ultra-sonicated assisted route
- Evaluation of battery and microwave application of the materials for real application

Remarks and Recommendation:**RECOMMENDED**

1. PI to concentrate on synthesis of carbon graphite materials.
2. Project be restricted to CSIR-IMMT.
3. Capital budget – Nil.
4. All testing and other related work to be outsourced.
5. Project recommended with a revised budget of 23.10 Lakhs for a period of 2 years
- 6. Revised project proposal should be submitted by PI before SSAG.**

Project ID: 12/ 19- PERC -NEW/2019-20**Project Title:** Noble metal extraction by soft chemistry.**PI:** Prof. T. Pradeep Institute Professor Department of Chemistry, Indian Institute of Technology Madras, Mobile :+91- 9445560767, Phone : +91 44 2257 4208, E-Mail: pradeep@iitm.ac.in, Fax: +91 44 22570509**Implementing Institution:** Indian Institute of Technology Madras**Project Cost:** ₹ 62.58 lakhs, **Duration:** 2 Years**Objectives:** Development of a green, cost-effective and simple methodology for metal extraction, using soft chemistry.

- Lab-scale demonstration of gold extraction in solution, from the surface of bulk gold, using specific bio molecules.
- Characterization of the resulting solution using microscopy (SEM and TEM), spectroscopy (Raman and XPS) and mass spectrometry (ICPMS, and ion mobility mass spectrometry) techniques.
- Implementation of the discovered methodology on real mining samples, obtained from Gadag, Kolar, Lawa, Chitoor, and East Singbhum gold mines.

Remarks and Recommendation:**RECOMMENDED**

1. The method is worth exploring.
2. HR Funding to be limited for senior consultant only ₹ 19.2 lakhs; Travel cost to ₹ 2 lakhs and other project cost - ₹ 2 lakhs, and contingencies - ₹ 2 lakhs, Consumables/ expendables- ₹ 8 lakhs Subtotal- ₹ 33 lakhs + 5% OH= ₹ 34.65 lakhs.
3. Project is recommended with a revised cost of ₹ 34.65 Lakhs for 2 years
- 4. Revised project proposal should be submitted by PI before SSAG.**

Project ID: 14/ 19- PERC -NEW/2019-20**Project Title:** Production and certification of certified reference materials (CRMs) for the analysis of aluminium alloy.**PI:** R. N. Chouhan, Principal Scientist rnchouhan@jnarddc.gov.in, Telephone: 07104-220017, 220476**Implementing Institution:** Jawaharlal Nehru Aluminium Research Development and Design Centre Wadi, Amravati Road, Nagpur – 440 023 (Maharashtra) Telephone: 07104-220017, 220476**Project Cost:** ₹ 204.70 Lakh, **Duration:** 2 Years**Objectives:** The main objective of the project is to produce certified spectro chemical reference materials (CRMS) for aluminium alloys at JNARDDC with traceability and make them available at an affordable price for the benefit of the aluminium industry, particularly secondary aluminium industry.**Remarks and Recommendation:**

RECOMMENDED

1. CAPEX for casting setup will be considered later: billets for specific alloy systems has to be sourced from NFTDC
2. Project is recommended with a revised budget of ₹ 76.40 Lakhs for a period of 2 years.
3. **Revised project proposal should be submitted by PI before SSAG.**

Project ID: 18/ 19- PERC -NEW /2019-20

Project Title: Optimization of digestion efficiency in Bayer process by ascertaining the ideal size fraction of bauxite feed.

PI: S.B. Rai Principal Scientist [Email- suchitarai1968@gmail.com](mailto:suchitarai1968@gmail.com), suchitarai@jnarddc.gov.in, Mob No. 9423680346

Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre Wadi, Amravati Road, Nagpur – 440 023 (Maharashtra).

Project Cost: ₹ 46.10 Lakh, **Duration:** 1 Years

Objectives: Determination of optimum size of bauxite for digestion by grinding and characterization of various size fractions Technological testing and evaluation of various size fractions of bauxite to optimize digestion efficiency.

Remarks and Recommendation:**RECOMMENDED**

- 1) Complete mineralogical analysis of all bauxite fractions should be identified in the deliverables.
- 2) Material balance should be provided in the final findings.
- 3) The final findings should establish the alumina recoverable from red mud.
- 4) Committee reduced the budget under “Dissemination of Research (workshops, publications)” head by ₹ 5 Lakhs. Final project cost shall be ₹ 41.10 Lakhs.
- 5) **Revised project proposal should be submitted by PI before SSAG.**

Project ID: 26/ 19- PERC -NEW /2019-20

Project Title: Utilization of aluminium dross to achieve zero waste – A bench scale study

PI: Upendra Singh Principal Scientist, Bauxite Division, E-mail: Upendra1970@gmail.com
Mobile: 9422980366,9890191849

Ganesh R Kale, Solid and Hazardous Waste Management Division, CSIR-National Environmental Engineering Research Institute, Nagpur, gr_kale@neeri.res.in, 9823810159

Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre, Wadi, Nagpur and CSIR-National Environmental Engineering Research Institute, Nagpur,

Project Cost: ₹ 88.83 Lakhs, **Duration:** 2 Years

Objectives: The principal objective of the proposed research is Bench scale process demonstration to envisage the technical feasibility and process optimization. Complete utilization of waste aluminium dross to achieve zero waste objectives includes:

- Recovery of maximum metallic Aluminium from low/waste Aluminium Dross.
- Process for Preparation of PolyaluminiumChloride (PAC)/salts from Waste Aluminium Dross.
- Generation of Hydrogen (H₂) Gas using primary Aluminium Dross.
- Residual dross for Refractory Products application.

Remarks and Recommendation:**RECOMMENDED**

- 1) PI was advised to evolve process flow chart for the product PAC and aluminium oxide at the end of the project which will be useful for the secondary industry and SME's.
- 2) Hydrogen part should be removed from the project objective which was proposed by the collaborator NEERI.
- 3) Accordingly project cost shall be reduced by ₹ 14.49 lakhs being the NEERI budget. Revised project cost of JNARDDC shall be ₹ 74.34 lakhs for 2 years.

4) Revised project proposal should be submitted by PI before SSAG.

Project ID: 28/ 19- PERC -NEW/2019-20
Project Title: Value addition of calcined bauxite for possible use as abrasives in waterjet cutting applications
PI: V.E. Annamalai Professor & Head, Mail- annamalaive@ssn.edu.in , Mob-9840359093
Implementing Institution: Dept of Mech Engg, SSN College of Engg, Kalavakkam, Chennai, 603110
Project Cost : ₹ 52.367 Lakhs, Duration: 3 Years
Objectives: <ul style="list-style-type: none"> • The main objective of the project is to study the possibility of using value added calcined bauxite as an abrasive for waterjet applications. • It depends on development of two value addition processes for calcined bauxite, namely surface modification and agglomeration.
Remarks and Recommendation:
RECOMMENDED <ol style="list-style-type: none"> 1. The idea was found to be innovative. 2. Project is recommended with a revised budget of Rs 30 Lakhs and duration of 18 months. 3. Revised project proposal should be submitted by PI before SSAG.

Project ID: 30/ 19- PERC -NEW/2019-20
Project Title: Mineral chemistry, isotope geochemistry, geochronology, and metallogeny of rare and rare-earth metals present in the alkaline-carbonatite complexes associated to the Narmada-Son rift zone, western India
PI: Dr. Amiya Kumar Samal; Department of Geology, Institute of Science, Banaras Hindu University, Varanasi Contact Details: amiyasamal007@gmail.com ; Mob-9580270209
Implementing Institution: Banaras Hindu University, Varanasi
Project Cost: ₹ 49.725 lakhs, Duration: 3 Years
Objectives: Characterization of different rock-units of the complexes with the help of detailed petrography and mineral chemistry [by electron probe micro analyzer (EPMA)]. Identification of minor phases (by XRD and EPMA) is very important as many of them may be rich in REE, Nb-Ta and U-Th. <ul style="list-style-type: none"> • To establish genetic relationship between the different rock-units of the complexes; whether they are derived from similar mantle melts or has different genetic histories. This would be done with the help of whole-rock major, trace and rare-earth element compositions of selected samples. Also some samples will be analyzed for Sr, Nd and Hf (?) isotopic compositions of carbonatite and associated silicate rocks for identifying mantle source (reservoir). • To discriminate variable crystallization ages of different magmas feeding these intrusions. This would be achieved through mineral ages on Zircon, Perovskite and Sr-Nd isotope data on Zircon, perovskite, calcite. • To identify parental carbonatite magmas and their differentiation paths through the analysis of mineral phases using laser ablation ICPMS. If feasible, U-Pb or Ar-Ar dating will be done to identify distinct rock units for establishing a possible model for genesis of the studied alkaline carbonatite complexes
Remarks and Recommendation:
RECOMMENDED <ol style="list-style-type: none"> 1) Recommended to carry out the first phase with a seed money of ₹ 15 Lakhs for one year for desk studies, collection of field samples, identifying mineral phases and chemical analysis. 2) If the encouraging results are obtained, the 2nd phase project may be considered based on review.

4. The following 2 (two) projects were recommended for resubmission to next PERC.

Project ID: 07/ 19- PERC -NEW/2019-20
Project Title: Conversion of manganese mines waste into manganese oxides based layered structures for Super capacitor application.
PI: Kapil Pareek, Assistant Professor, phone: +91-0141-2713395, mobile: +91-9549651019, Email : kapil.cee@mnit.ac.in
Implementing Institution: Centre for Energy and Environment, Malaviya National Institute of Technology Jaipur, JLN Marg Jaipur, Rajasthan.
Project Cost: ₹ 41.5416 lakhs Duration: 3 Years
Objectives: <ul style="list-style-type: none"> • Conversion of manganese mines waste into manganese oxides based layered structures. • Application of manganese oxides based layered structures for super capacitor application as per-industrial benchmark. • Feasibility/ economic analysis of the project.
Remarks and Recommendation:
RESUBMISSION TO NEXT PERC <ol style="list-style-type: none"> 1. Preliminary work not done. 2. The capacity used is just 100gm as input, which can be carried out at lab. 3. Impurities removal study should have been done (ex. Reactive/ Non-reactive SiO₂). 4. After completing proof of concept at lab scale and tying up with capacitor manufacturer the project can be revised and re-submitted with reduced budget and 2 year duration.

Project ID: 29/ 19- PERC -NEW/2019-20
Project Title: Development of AI-based Computer vision scrap sorting methodology using visible and multispectral imaging.
PI: Vimal Kishor Jha Senior Scientist, Mail- vimaljha@gmail.com , Mob No. 9923794481
Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Amravati Road, Wadi, Nagpur- 440023
Project Cost : ₹ 62.52 Lakhs, Duration: 2 Years
Objectives: To develop an Artificial Intelligence based computer vision methodology for sorting of aluminium scraps. Following two types of methodologies will be developed as per different requirements; <ul style="list-style-type: none"> • Artificial Intelligence based computer vision methodology using visible imaging to replace manual sorting by automated sorting system. • Artificial Intelligence based computer vision methodology using both visible and multi spectral imaging for precise sorting of different types of aluminium scrap as per their composition.
Remarks and Recommendation:
RESUBMISSION TO NEXT PERC <ol style="list-style-type: none"> 1. PI is advised to undertake preliminary work to establish proof of concept. 2. The research methodology has to be worked out. 3. Industry contribution should be more than 30%.

5. The recommendations with regards to new revised projects (as per 18th PERC) are as below:-

Project ID: 01/ 18rev- PERC /2019-20
Project Title: Development of Novel Nanoporous hollow Fibre membrane based unit for the effective treatment of Mine waste water
PI: Prof. Arun M. Isloor Membrane Technology Laboratory, Prof & Head of Department, Department of Chemistry, National Institute of Technology Karnataka, Surathkal, Mangalore E-mail: isloor@yahoo.com Ph: 9448523990
Implementing Institution: National Institute of Technology Karnataka, Surathkal
Project Cost : ₹ 29.96075 lakhs Duration: 3 years
Objectives: 1. In-house fabrication of polysulfone based hollow fibernanofiltration membranes & their characterization 2. Fabrication of cartridges of above prepared nanofiltration membranes 3. Filtration of the waste and contaminated water collected from mines i.e. M/s Hutti Gold Mine Co. Ltd., Iron ores of M/s NMDC at Donimali and Bailadilla, Uranium Corporation India Limited and few other mines (like Iron ore mines in Bellari area, Underground and open cast Copper mines) using above cartridges 4. Developing a mobile pilot plant prototype of filtration unit for treating mine waster and its commercialization of the pilot plant
Remarks and Recommendation:
RECOMMENDED 1) PI has not complied with all the observations of last PERC. 2) The PI opined that due to financial constraint he has failed to visit CIMFR and other water collection / mine sites as proposed by last PERC. 3) Since the project concept seems to be viable, the PERC recommended to provide a seed money of ₹ 5 Lakhs and advised the PI to comply with all the suggestions in 6 months 4) The PI shall also submit a letter duly endorsed by Director, NIT-K with regards to the compliance of the last PERC recommendations before release of the grant.
Project ID: 02/ 18rev- PERC /2019-20
Project Title: Direct production of Fe-Cr-Ni-Mn stainless alloy from mine waste by thermal plasma process
PI: Dr. A.K. Chaubey, Principal Scientist E-mail: akchaubey@immt.res.in , anil.immt@gmail.com Ph: (0674) 2379204 (O), 09438090232(M)
Implementing Institution: CSIR-Institute of Minerals & Materials Technology Bhubaneswar
Project Cost : ₹ 65.991 lakhs Duration: 3 years
Objectives: The aim and objective of present proposed work is to produce Fe-Cr-Ni-Mn crude stainless steel alloy directly from the low graded chromite, nickel laterite and manganese ores by plasma smelting.
Remarks and Recommendation:
RECOMMENDED 1. The PI has complied with the suggestions of last PERC. 2. The project was recommended with a revised cost of ₹ 38.31 Lakhs with duration of 2 years. 3. Revised project proposal should be submitted by PI before SSAG
Project ID: 03/ 18rev- PERC /2019-20
Project Title: Synergistic Treatment of Wastewater Using Nanomaterials and Algal Technology and its Feasibility Studies: Focus towards Mining Industry
PI: Kiranbala (Dr, Mrs) Assistant Professor E-mail: kiranb@iiti.ac.in Ph: +91-7324306585
Implementing Institution: Discipline of Biosciences & Biomedical Engg., IIT Indore
Project Cost : ₹ 99.50 lakhs Duration: 3 years
Objectives:

1. Screening and selection of algal species from mine environment
2. Investigation of algal response in simulated/actual mine wastewater
3. Optimization of process parameters to improve the treatment/metal accumulation efficiency
4. Synthesis of different kinds of nanoparticles which could enhance the binding contaminants
5. Characterization and Functionality testing
6. Evaluation of nanoparticulate systems to aid algal system to remove the contaminants in wastewater from mines.

Remarks and Recommendation:

Not RECOMMENDED

PI was absent.

6. The list of new projects NOT RECOMMENDED is as below:-

These proposals were not recommended as the (i) objectives are very sketchy and methodology not clear or doable; (ii) proposals not directly in the thrust areas, (iii) outcomes are not relevant or impactful, (iv) there is no visible translational potential; (v) similar projects have already been funded, (vi) it could be directly done as a consultancy project with the industry; (vii) preliminary proof of concept is not done; (viii) the proposed work can be done by PI within the facilities available with them and it does not really need a project proposal; (ix) in a few cases PI has not adequate domain knowledge in mining or minerals or lacking a partner with domain knowledge, (x) casual approach to problem definition and a loose connection made between mining, minerals and waste.

Project ID: 02/ 19- PERC -NEW /2019-20
Project Title: Adsorption of Hydrogen On Natural And Modified clay Minerals From India- Application For H2 Storage
PI: Basanta Kumar Prusty, Associate Professor, Mobile/Telephone: 9474065042(M); 3222-283700 (O), E-mail: bkprusty@mining.iitkgp.ac.in , bkprusty@gmail.com
Implementing Institution: Indian Institute of Technology Kharagpur, Kharagpur – 721 302, WB
Project Cost : ₹ 41.49 Lakh Duration: 3 Years
Objectives: <ul style="list-style-type: none"> • To ascertain the hydrogen adsorption capacity of natural smectite group clay minerals from India; • To modify the natural smectite group clay minerals structurally and ascertain the improvement in H2 adsorption capacity after structural modification. • To investigate the desorption behaviour of H2 from the natural/modified smectite group clay minerals from India
Remarks and Recommendation:
NOT RECOMMENDED <ol style="list-style-type: none"> 1) Preliminary work is done by PI on chemically pure clay but not on naturally occurring clay. 2) The concept applicable to naturally occurring clay is not well defined.

Project ID: 03/ 19- PERC-NEW -NEW/2019-20
Project Title: Design and Development of Autonomous Mobile Robot for 3D
PI: Dr. Bishakh Bhattacharya Professor, Contact Details: bishakh@iitk.ac.in , Phone: +91 9936335473
Implementing Institution: Design and Development of Autonomous Mobile Robot for 3D Mapping and Safety Inspection of Mines
Project Cost : ₹ 1,00,80,300 Duration: 2 years
Objectives: Autonomous Robot development for: Monitoring local conditions (temperature, humidity etc.) in the mine Autonomous navigation (manual override option available) Smart sensors (Thermal IR cameras) and algorithms (AI/ML based) to detect local concentration of minerals in the ore Efficient automated detection of hazards and generating early warnings All terrain drive train to overcome rough terrains 3D reconstruction of mine maps using real time image feeds and point cloud data.
Remarks and Recommendation:
NOT RECOMMENDED PI absent

Project ID: 04/ 19- PERC -NEW /2019-20
Project Title: Investigations into the feasibility of complete extraction of ore from the underground metal mines by modified cut & fill method of Mining
PI: Hemant Kumar, Assistant Professor, Tele: +91-326-2235755 (O), +91-9431964128 (M)

hemant@iitism.ac.in , hemantismd@gmail.com
Implementing Institution Department of Mining Engineering, ISM, Dhanbad- 826004 Jharkhand
Project Cost: ₹ 27.966 Lakhs Duration: 3 Years
Objectives: The objective of the project is to propose an approximately total recovery method of ore from stope by carrying out the feasibility study of drift and fill method through site characterization, numerical modelling and laboratory investigation in pilot scale.
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> 1) Preliminary work is insufficient to establish proof of concept. 2) PI was suggested to interact with metal mining companies with a view to understand the needs of the industry. 3) Multi disciplinary work needs to be undertaken with a team consisting of experts in mining ,geo-technical and geology discipline.

Project ID: 05/ 19- PERC -NEW/2019-20
Project Title: Preparation, transportation & post-disposal behaviour studies of thickened tailings for eco-friendly stacking
PI: J.K. Pothal, Sr.Scientist Phone: 0674- 2379275, Fax: 0674-2567637, 0674-2567160, E-mail: jkpothal@immt.res.in , Mobile No. : 09437860954
Implementing Institution: CSIR-Institute of Minerals &Materials Technology, Bhubaneswar- 751 013
Project Cost: ₹ 47.3 lakhs Duration: 3 Years
Objectives: In order to design the thickened tailings slurry disposal pipelines for surface stacking, studies will be conducted with the following objectives: <ul style="list-style-type: none"> • Complete characterization of tailings samples including particle size distribution, chemical composition, pH, geotechnical and geomechanical characteristics. • Preparation of thickened tailings slurry using appropriate techniques. • Rheological studies of tailings samples using precision rotational Rheometer (Model: RehoStress 1) and slump tests. Theoretical analysis on pipe flow characteristics of thickened tailings slurry and development of head loss models. • Design & development of appropriate thickener for preparation of high concentration tailings slurry. • Pilot plant studies in existing 50 mm and 100 mm diameter test loops at high solids concentration to determine the pumping and pipe flow characteristics of dense phase slurry. • Design &Installation of a simulated pipeloop test rig foreco-friendly stacking Experimental studies in the simulated testrig • Data analysis and basic design of commercial thickened tailings slurry pipelines for surface stacking using the results of the study • Report preparation
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> 1. Most of the proposed work can be done even without this project proposal 2. There are competitive and better technologies available for slurry disposal 3. Where there is land stress for slurry storage in companies they should come forward to fund this project. 4. Lack of novelty and no industrial partnership

Project ID: 06/ 19- PERC -NEW /2019-20
Project Title: Beneficiation of Low Grade Graphite deposits of Arunachal Pradesh, North-East India
PI: K.M.K.Sinha, Project Leader Principal Scientist, Email: kmk_sinha@rediffmail.com , Mobile No. 9431746760
Implementing Institution: CSIR – Central Institute of Mining and Fuel Research Dhanbad, Jharkhand.

Project Cost: ₹ 42.25 Lakhs, Duration: 1 Years
Objective: The main objective is to characterize the new graphite deposits with respect to various properties and conduct beneficiation studies for its potential.
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> 1) Similar work seems to have been funded by Ministry of Mines earlier. 2) The project should be partially funded by the concerned mining industry. 3) Suggested to conduct a preliminary work and come up with fresh proposal with industry support.

Project ID: 10/ 19- PERC -NEW/2019-20
Project Title: Utilization of Magnesite ore tailing (MoT) and Graphite ore tailing (GoT) as thermal enhancing agents for the production of copper mine tailing geo-polymerized bricks for refractory and castable for thermal comfort.
PI: N. Sakthieswaran Assistant Professor, Contact: 91 -9894105317; 8072033977, Mail sakthistructrichy@gmail.com , sakthieswaran@auttv.ac.in ,
Ms. Sophia M, Designation: Assistant Professor, Address: Department of Civil Engineering, Francis Xavier Engineering College, Tirunelveli, Tamilnadu-627003, Mobile: 8072989766, Email: sophiavarshini1992@gmail.com
Implementing Institution: Anna University Regional Campus, Tirunelveli-627007. Francis Xavier Engineering College Vannarpuram, Tirunelveli-627003.
Project Cost: ₹ 1,13,60,400 Duration: 3 Years
Objectives:
<ul style="list-style-type: none"> • To develop a composite low cost refractory brick using copper mine tailings, magnesite ore tailings and graphite ore tailings. • To determine the chemical, physical and thermal properties of copper tailings, magnesite ore tailings and graphite ore tailings. • To analyze the efficiency of the mine tailings to be used as a thermal comforting building material. • To examine the scalability of the developed refractory brick using mine tailings for industrial production and real time application.
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> 1. No preliminary work has been done. 2. No proof of concept. 3. Difficult to develop a product from magnesite, graphite and copper tailings and use it for construction purpose.

Project ID: 11/ 19- PERC -NEW/2019-20
Project Title: Development of a novel Hydraulic hoisting technology for efficient transport of ores/ minerals for Indian Mining industries.
PI: P.K.Senapati, Sr.principal Scientist & Head, Phone: 0674 - 2379362, Fax: 0674-2567637(Admin.), 0674-2567160 (Director) E-mail: pksenapati@immt.res.in , Mobile No. : 094370 02838
Implementing Institution CSIR-Institute of Minerals & Materials Technology, Bhubaneswar - 751 013, Odisha, India
Project Cost: ₹ 66.0 lakh, Duration: 3 Years
Objectives: In order to develop a novel type hydraulic hoisting technology by integrating with mine dewatering system for lifting of ores and minerals (like bauxite, limestone, copper etc.), studies will be conducted with the following objectives:
<ul style="list-style-type: none"> • Complete characterization of ore/mineral samples including particle size distribution chemical composition, pH, geotechnical and geomechanical characteristics • Design & installation of a hydraulic hoisting system comprising of motive water pump, hydro-lift feeder, high pressure slurry pipeline to surface, concentrator etc. • Installation of a demonstration unit to integrate the mine dewatering with the

<p>hydraulic hoisting system to simulate the field condition.</p> <ul style="list-style-type: none"> • Experimental investigation of flow behaviour, pressure drop & concentration of coarse grained ores-minerals water mixture in horizontal, vertical & inclined pipe sections. • Analysis of degradation rate of ore/mineral samples influenced by flow velocity, interfacial slip. • Data analysis and basic design of hydraulic hoisting system for commercial underground/surface mining operations. • Report preparation
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> 1) Concept is not clear 2) PI advised to discuss the project with a few mining companies to find the gap areas. 3) The project may be freshly submitted after addressing the above issues with an industry partner.

Project ID: 13/ 19- PERC -NEW/2019-20
Project Title: Development of Chemo sensing based Copper Estimation Kit for On-site Quantitative Analysis of Copper in Ore
PI: Pratik Sen Email: psen@iitk.ac.in , Mob. No.: +91- 9453105194
Implementing Institution: Institute of Technology Kanpur, Kanpur – 208016, UP
Project Cost: ₹ 36.81 Lakhs, Duration: 3 Years
Objectives: The overall aim and objective of the present proposal is to design, synthesize, characterize and utilize advanced molecular material for metal ion detection and estimation in a cost effective way. The project also aims to design simple kit for different metal ions, which can be used in the field.
Remarks and Recommendation:
NOT RECOMMENDED
It appears to be more of a fundamental R&D proposal without proof of concept.

Project ID: 15/ 19- PERC -NEW/2019-20
Project Title: Development of modified loofasurface immobilized microalgae (LIMA) scaffold for multi heavy metals bio sorption for refining mining waste water”.
PI: Rahul Shrivastava Professor, shrivastavarm1972@gmail.com , M- 91-9981753702
Implementing Institution: National Institute of Technology, Bhopal, MP
Project Cost: ₹ 44,95,500 Duration: 3 Years
Objectives: <ul style="list-style-type: none"> • To develop adapted hydrophobic hydrophilic loofa for microalgae immobilization. • To explore potential of organized loofa scaffolds for heavy metals removal capacity. • To eradicate heavy metals hazardous waste from mining area using biomimeticloofaim mobilized microalgae. • Designing and fabrication of the set-up capable of removing multi heavy metals. • Setting up pilot plant for the demonstration of LIMA technology to remove multi heavy metal
Remarks and Recommendation:
NOT RECOMMENDED
Absence of preliminary work to establish proof of concept including collection of mine water and determining the effects of contaminants.

Project ID: 16/ 19- PERC -NEW /2019-20
Project Title: The Chemical Analysis and Method Development to Extraction of Commercial Rare Earth Elements of Indian Mines Phosphate Plant Tailing.
PI: Ramesh Chandra Professor, Tel: +91-11-27667593, E-Mail. acbrdu@hotmail.com
Implementing Institution: Department of Chemistry, University of Delhi, New Delhi-110007
Project Cost: ₹ 67,58,400 Duration: 3 Years

Objectives: The chemical analysis Indian mines plant tailing use analytical methods for their precise and accurate determinations of concentration required in all valuable studies, such as, X-ray fluorescence spectrometry (XRF), including ICP-MS, ICP-TOFMS, HR-ICP-MS etc. Method Development to Extraction of Commercial Rare Earth Elements of Indian Mines Phosphate Plant Tailing by Gravity separation will conduct using a laboratory shaking table, while flotation will conduct in a Denver D- 12 flotation cell. This project is aimed at characterizing the distribution of REEs in upgrade sand tailings before their extraction with solvent and ion-exchange resin. Sand tailings will subject to gravity separation and froth flotation in order to concentrate the REEs before leaching with dilute nitric acid and extraction with solvent and ion exchange resin.

Remarks and Recommendation:

NOT RECOMMENDED

- 1) Project not well defined and lacks clarity.
- 2) PI is not familiar with Indian phosphate mines and beneficiating operating plants.

Project ID: 17/ 19- PERC -NEW/2019-20

Project Title: Utilisation of waste Foundry sand from Belgaum Foundry Cluster and Red Mud from HINDALCO, Belgaum in combination for production of special hard tiles for civil applications.

PI: Rituparna Sen Principal Investigator Professor & Head, Email: rsen63@gmail.com, Ph: 9831509654 / 9674535055

Implementing Institution: Govt. College of Engi. & Ceramic Technology Kolkata -700010 Jointly with ACS College of Engineering.

Project Cost: ₹ 42,36,250 **Duration:** 2 Years

Objectives: The project is aimed at utilization of both foundry wastes (appx 150 foundry units in Belgaum generating 100 tonnes of waste foundry sand per month in sand reprocessing unit) along with RED MUD (a waste from HINDALCO aluminium industry in Belgaum) for effective utilization of both the wastes in combination towards a successful ceramic product for common civil engineering applications where extra strength is a requirement like paver tiles in mining areas

transporting tones of minerals, tiles which are regularly used for skidding steel billets in steel industries over which 10-15 tonnes of heavy billets are carried for heat treatment operations every hour etc to name a few. The process utilizes sodium hydroxide (appx 3-5 percent) present in RED

MUD as a glass forming agent in combination with silica (appx 85-90 percent) present in waste foundry sand as a glassy bond which imparts extra strength of the developed products in combination with other impurities like iron oxide etc. The chemical composition of the red mud is in line with the batch for production of ceramic products. The proposed project aims at utilization of such a hazardous by-product to a non-hazardous ceramic product for community utilization. Sintering of red mud foundry sand combination to a ceramic product will confine leach-ability of alkaline component thus drastically reducing hazardous effect of the material.

Remarks and Recommendation:

NOT RECOMMENDED

PI is absent

Project ID: 19/ 19- PERC -NEW /2019-20

Project Title: Development of a process for the production of synthetic rutile (TiO₂) from ilmenite ore

PI: Sanjay Prasad, Principal Scientist, E mail:sprasad@nmlindia.org, Mobile: 9931160558

Implementing Institution: CSIR National Metallurgical Laboratory Jamshedpur- 831007.

Project Cost: ₹ 213.59 Lakhs, **Duration:** 3 Years

Objectives: The objective of the present work is to develop an economically viable technology for the production of synthetic rutile by direct reduction of a weathered ilmenite using carbon followed by leaching with acid at a pilot scale of 100kg/batch.

Remarks and Recommendation:

NOT RECOMMENDED

The laboratory can scale up with industrial partner by themselves

Project ID: 20/ 19- PERC -NEW /2019-20

Project Title: An Innovative Microwave Assisted Digestion And Ultrasonic Technique For The Extraction Of Strategic Lithium Values From Lepidolite And Spodumene Useful For Synthesizing Ultrapure Nano Lithium Compound For Multifarious Applications.

PI: Sarika Verma Principal Scientist (Email & MobileNo.) :-drsarikaverma@hotmail.com, 09425005438

Implementing Institution: Advanced Materials and Processes Research Institute, Hoshangabad Road, Near Habibganj Naka, Bhopal, Madhya Pradesh - 462026

Project Cost: ₹ 69,86,812 **Duration:** 2 Years

Objectives:

- Designing and development of novel technology for the microwave assisted digestion and ultrasonic technique for the extraction of Lithium values in lepidolite and spodumene in an appropriate ration, reaction conditions and process parameters.
- Designing and development of technology for the synthesis of ultrapure nano lithium compound using the above obtained extracted lithium value material in an appropriate ration, reaction conditions and process parameters.
- To develop a plausible mechanism and hypothesis of the novel process for the microwave assisted digestion and ultrasonic techniques for the extraction of lithium values from Lepidolite and Spodumene for synthesis of ultrapure nano lithium compound.
- Possible interaction with Industry for up scaling/know-how transfer of the proposed novel technology

Remarks and Recommendation:

NOT RECOMMENDED

1. Input percentage of lithium content in lepidolite and spodumene is low.
2. Tenor of ore and supply chain confirmation not done.
3. Prior work not done
4. Pre-treatment and mineral beneficiation has not been considered.

Project ID: 21/ 19- PERC -NEW/2019-20

Project Title: Anchor system for deep-water offshore mining.

PI: Satyajeet Nanda Associate professor, Mail-Satyajeet_nanda@yahoo.co.in, Satyajeet.nandafce@kiit.ac.in, Mobile: 9556547940

Implementing Institution: Kalinga Institute of Industrial Technology (KIIT) Deemed to be University, Bhubaneswar, Odisha-751024

Project Cost: ₹ 45,90,140 **Duration:** 3 Years

Objectives:

- Preliminary design of proposed anchors based on the theoretical experimentation using FE analysis and anchor kinematics (O,Neil et.al. 2003).
- 2. The physical model test will be carried out to on the various DIDA anchors Kaolin and transparent clay will be used soils during the physical model test.
- 3. Using the objectives 1 & 2, the predictive method will be purposed for three-stage installation of DIDA anchor.

Remarks and Recommendation:

NOT RECOMMENDED

Absence of practical application in the present scenario.

Project ID: 22/ 19- PERC -NEW/2019-20

Project Title: Next Generation Novel Metal-Oxide Super-fullerene: Option for the Encapsulative Separation of Arsenic and Fluorides in Conjunction with Efficient Removal of Toxic Heavy Metals from the Mining Waste.

PI: Somenath Garai, Assistant Professor E-mail: sgarai@nitt.edu, somgor@gmail.com, Tel.No.: +91-8247085726

Implementing Institution: National Institute of Technology Tiruchirappalli, 620015

Tamil Nadu, INDIA
Project Cost: ₹ 74.8 Lakh, Duration: 2 Years
Objectives: The HSAB principle (anciently referred by Pearson) has often been validated and is extremely useful, particularly because of its predictability of chemical reactions involving compounds of very diverse system. The polyoxometalate based Super-Fullerenes have their inner surfaces decorated with thiolates residues (soft bases) in order to capture traces of toxic heavy metal ions (soft acid). Additionally, the facile reversible capture of the arsenates/arsenites or the fluorides available in the mining waste at higher concentration is the basic objective of this research proposal.
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> 1. Preliminary work has not been done 2. Scientific part has been worked out but the design required to run plant has not been submitted. 3. Proposed process is expensive.

Project ID: 23/ 19- PERC -NEW/2019-20
Project Title: Development of Aluminium based Nano Composites by Ultrasonication Assisted Direct Reduction Technique (Ultra-Red)
PI: Sreekumar Vadakke Madam (PI) Assistant Professor, Mob:+919400010768, Mail- vm.srees@gmail.com
Implementing Institution: Malviya National Institute of Technology Jaipur Jawahar Lal Nehru Marg, Jhalana Gram, Malviya Nagar, Jaipur, Rajasthan-302017
Project Cost: ₹ 46,37,300 Duration: 3 Years
Objectives: In the light of the need of new aluminium based MMNCs and novel processing techniques, core objective of the project is outlined as: Introduction of new set of aluminium based nano-composites with improved microstructure. In particular, the objective is achieved by the advantage of a novel technique for direct alloying of aluminium from reactive oxides without the assistance of traditional metal recovery stages.
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> 1. Existing grain refinement techniques are cheaply available in the market in comparison with proposed technique. 2. Industry partnership must be worked out.

Project ID: 24/ 19- PERC -NEW /2019-20
Project Title: A Process For Metal Recovery From Low Grade Ore/Secondary Ore
PI: Sudipta Sarkar, Associate Professor, srkarfce@iitr.ac.in ; sarkarsudipta@gmail.com , Mobile No. 8954386690
Implementing Institution: Indian Institute Of Technology Of Roorkee, Uttrakhand-247667
Project Cost: ₹ 60.36 lakhs Duration: 3 Years
Objectives:
<ul style="list-style-type: none"> • To develop a chelating ion exchange membrane(CIXM), either heterogeneous or homogeneous, that will be able to selectively take up copper ions from the background of other co-occurring cations. • To identify and test a suitable ligand as a leaching agent which shall have following attributes: i) be biorenewable, nonvolatile and nontoxic; ii) form labile complexes with copper at circum-neutral pH; iii) have no sorption affinity onto CIXM; iv) be soluble over a wide range of pH. • To develop a process configuration in which the ligand in objective 2 shall leach the metals from the heap of low grade or secondary ore by forming labile metal-ligand complex, and the CIXM mentioned in objective 1 shall recover and concentrate the copper to form a copper rich solution. • To generate pertinent experimental evidences to validate the basic premise of the

<p>proposed environmentally benign solution mining (leaching) process for selective extraction of copper and other metals from low-grade ores;</p> <ul style="list-style-type: none"> To assess the key process variables such as the concentration of the leaching agent, mass ratio of CIXM to low-grade/secondary ores, intraparticle diffusivity for sorption onto CIXM which are useful for scale-up and retrofitting into existing solution mining facilities.
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> Similar work has already being carried out. Leaching is not established properly in copper processing. PI was advised to focus on e-waste.

Project ID: 25/ 19- PERC -NEW /2019-20
Project Title: Detoxification and Extraction of Valuables from Jarosite Residue Generated in Zinc Industries
PI: Sushanta Kumar Sahu of the Principal Investigator, (Principal Scientist) Phone: 0657-2345273, E-mail:sushanta@nmlindia.org
Implementing Institution: Indian Institute Of Technology Of Roorkee, Utrakhand-247667
Project Cost : ₹ 65,83,576 Duration: 2 Years
Objectives:
<ul style="list-style-type: none"> Abatement of pollution due to stockpiled jarosite in the zinc industries by way of recovery of value added products of heavy metals – Transformation of treated jarosite into iron powder
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> Starting material not characterized Prior work not done. Proposed project is at 100-500gm scale which can be done with existing facilities. Value on envisaged metals that can be extracted is far less than the cost of processing.

Project ID: 27/ 19- PERC -NEW/2019-20
Project Title: Ecological and Social Risk Assessment Tool for Exploration and Mining Projects
PI: V.B. Mathur Director, Contact Details-(Email & Mobile No.) : dwii@wii.gov.in , +919412054648
Implementing Institution: Wildlife Institute of India (WII) Address, Chandrabani Dehradun – 248001 Uttarakhand, India, WWF-India.
Project Cost : ₹ 89,74,000 Duration: 2 Years
Objectives: To develop a decision support tool for avoiding, regulating and remediating ecological and social risks to and from mining projects.
Remarks and Recommendation:
NOT RECOMMENDED
<ol style="list-style-type: none"> Project is not well defined and aims at data mining. Objectives does not address generically for mining with regards to ecology and social problems

7. REVIEW OF COMPLETED / ONGOING PROJECTS – 18 NOS.

The following 14 (fourteen) projects were reviewed by the PERC and recommendations are as below:-

Project ID: 1/ 19- PERC /FN RP/2019-20
Project Title: Development of viable technique for assessment of reclaimed land and for safety of structures under settling environment
PI: Dr.P.C.Jha, Scientist-V pcjha@nirm.in
Implementing Institution: National Institute of Rock Mechanics, Champion Reefs, Kolar Gold Fields-563117, Karnataka
Project Cost : ₹ 137 Lakhs Duration: 3 years
Objective : This project was aimed at developing a credible geophysical technique for identification of area having a settlement/ subsidence risk
Remarks and Recommendation:
<ol style="list-style-type: none"> 1) The final report was accepted and PI was advised to return the unspent amount along with UC and statement of expenditure. 2) The committee appreciated the work carried out. A one page write up on the outcome of this project should be submitted to Ministry of Mines.
Project ID: 2/ 19- PERC /FN RP/2019-20
Project Title: Estimation of seismic hazard in and around the mines out areas of Kolar Gold Fields
PI: Dr.C.Srinivasan, Scientist-V(Dr. VR Balasubramaniam) eegd.nirm@gmail.com
Implementing Institution: National Institute of Rock Mechanics, Kolar Gold Fields, Karnataka
Project Cost : ₹ 63.57 Lakhs Duration: 3 years
Objectives :
Monitor Seismic activities over old mining region Identify the regions within depth of 200 m Estimate seismic hazard
Remarks and Recommendation:
<ol style="list-style-type: none"> 1) The final report was accepted. 2) The committee appreciated the work carried out. A one page write up on the outcome of this project should be submitted to Ministry of Mines. 3) The committee recommends to release the balance funds on receipt of UC and statement of expenditure.
Project ID: 3/ 19- PERC /FN RP/2019-20
Project Title: Integrated approach for development of process models and pilot production of aluminium alloy extrudates using porthole dies
PI: Mr.V.N.S.U.Viswanath Ammu, vishy1060@gmail.com
Implementing Institution: Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC), Nagpur
Project Cost : ₹ 298.06 Lakhs Duration: 3 years
Objectives :
I.Flow stress data generation for various grades of aluminium alloys at different strain rates and temperatures.
II. Development of process models for aluminium alloy extrudates based on flow stress data, numerical simulation and press trials.
III. Pilot scale production of extruded components.
Remarks and Recommendation:
<ol style="list-style-type: none"> 1. Establishment of facilities accomplished. 2. Dies and product prototypes done and dissemination of workshops done. 3. This facility can now to be worked towards revenue generation. 4. Final report was accepted. 5. The committee recommends to release the balance funds on receipt of UC and

statement of expenditure.

Project ID: 4/ 19- PERC /FN RP/2019-20

Project Title: Production of geopolymer based construction material from pond ASH: an industrial waste

PI: Dr.Muktikanta Panigrahi muktikanta2@gmail.com
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Implementing Institution: Gandhi Institute of Engineering and Technology, Gunupur, Odisha
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Project Cost : ₹ 13.805 Lakhs Duration: 3 years

Remarks and Recommendation:

PI absent

Project ID: 5/ 19- PERC /FN RP/2019-20

Project Title: Multi Centric Study of dust related diseases in stone mines and development of sustainable preventive program

PI: Dr. Subroto S.Nandi, Sr. Research Officer(O H)

Implementing Institution: National Institute of Miners Health, JNARDDC, Campus, Amravati Road, Wadi, Nagpur-440023

Project Cost : ₹ 260 Lakhs Duration: 3 years
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Objectives : To determine dust exposure profile and prevalence

Remarks and Recommendation:

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| <ol style="list-style-type: none"> 1) The final report was accepted. 2) The committee appreciated the work carried out. A one page write up on the outcome of this project should be submitted to Ministry. 3) The write up should include details of the precautions like periodic check up, monitoring the levels of silica level in environment etc which can be taken up to reduce prevalence of silicosis in affected areas. 4) PI advised to submit the UC and statement of expenditure and return the unutilized balance funds to the Ministry. |
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Project ID: 6/ 19- PERC /FN RP/2019-20

Project Title: Synergistic utilization of aluminium industrial wastes for development of geopolymeric building materials

PI: Dr. Mohamed Najjar P.A., Scientist IV najarp@gmail.com Mr. Saket Jain, Director

Implementing Institution: Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC), Nagpur and Swarnalata Holdings, Raipur, Chattisgarh (Jointly)

Project Cost : ₹ 40 Lakhs Duration: 3 years

Objectives :

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| <ul style="list-style-type: none"> • Geopolymerization of rejects materials of aluminium industry • Synergistic effect of these materials with other industry rejects for preparing mortars and mix designs. • Develop building materials from geopolymer mix designs . • Emphasis on soda leaching and pH, mobility of toxic components, physical changes if any. • Scope of value addition of the products with respect to market and demand. • Mini pilot plant trial and cost estimation |
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Remarks and Recommendation:

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| <ol style="list-style-type: none"> 1) The final report was accepted. 2) The committee appreciated the work carried out. A one page write up on the outcome of this project should be submitted to Ministry. The write up should include the details of the industry partner for commercializing the work. 3) The committee recommends to release the balance funds on receipt of UC and statement of expenditure. |
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Project ID: 7/ 19- PERC /FN RP/2019-20

Project Title: Development of standard protocol of field audiometry for notifying noise induced hearing loss
PI: Dr Subroto Nandi, Scientist, snandi76@rediffmail.com
Implementing Institution: National Institute of Miners Health, JNARDDC, Campus, Amravati Road, Wadi, Nagpur-440023
Project Cost : ₹ 23.60 Lakhs Duration: 3 years
Objectives : <ol style="list-style-type: none"> 1. Scientific validation of field audiometry with standard protocol 2. To prescribe maximum permissible background noise levels for conducting Audiometry 3. To propose guidelines for conducting Audiometry to enforcement agency i.e., DGMS
Remarks and Recommendation: <ol style="list-style-type: none"> 1) The final report was accepted. 2) The committee appreciated the work carried out. A one page write up on the outcome of this project should be submitted to Ministry. 3) PI advised to submit the UC and statement of expenditure and return the unutilized balance funds to the Ministry.

Project ID: 8/ 19- PERC /FN RP/2019-20
Project Title: Developing downstream application of strip cast aluminium alloys (AA8011 & AA3004)
PI: Shr R. N. Chouhan, Scientist (JNARDDC, Nagpur)rnchouhan@jnarddc.gov.in Dr.Rajesh K.Khatirkar (VNIT,Nagpur)rajesh.khatirkar@gmail.com R&D team (NALCO)
Implementing Institution: JNARDDC, Nagpur, VNIT, Nagpur and NALCO, Bhubaneswar (Jointly)
Project Cost: ₹ 31 Lakhs Duration: 2 years
Objectives: To develop downstream applications of strip cast Al alloys by optimizing the cold reduction and annealing temperature to achieve texture suitable for increasing the formability and to improve the surface finish by anodizing treatment.
Remarks and Recommendation: <ol style="list-style-type: none"> 1. Scientific work has been fairly well done and most of the project objectives have been met. 2. Draft final report submitted has been accepted. 3. PI advised to include a section on commercial application in the report. 4. The committee recommends to release the balance funds on receipt of UC and statement of expenditure.

Project ID: 9/ 19- PERC /FN RP/2019-20
Project Title: Postural risk analysis of mining equipment operators and its relation to musculoskeletal disorders
PI: Dr Bibhuti Bhusan Mandal, bbmandal@gmail.com , M:9423638180
Implementing Institution: National Institute of Miners' Health, Nagpur
Project Cost : ₹ 37.66 Lakhs Duration: 2 years
Objectives : <ul style="list-style-type: none"> • To determine prevalence and type of MSDs among operators of selected mining equipment • Postural analysis and identification of risk factors in operation of mining machinery with higher prevalence of MSD • To establish relationship between Ergonomic risk factors & occurrence of MSD • Suggest intervention strategies for prevention/control of risk of MSDs in mining machinery operators.
Remarks and Recommendation: <ol style="list-style-type: none"> 1) The final report was accepted. 2) The committee appreciated the work carried out. A one page write up on the

outcome of this project should be submitted to Ministry. The write up should include a table of the existing system, modification suggested and explore the possibility of ease of implementation.

- 3) PI advised to submit the UC and statement of expenditure and return the unutilized balance funds to the Ministry.

Project ID: 10/ 19- PERC /FN RP/2019-20

Project Title: Effect of modified seed properties in precipitation of aluminium hydroxide from bayer liquor

PI: Dr Mrs. Suchita Rai, suchitarai1968@gmail.com

Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur

Project Cost : ₹ 44.99 Lakhs **Duration:** 2 years

Objectives :

- New process and product development in precipitation
- Explore the possibility of using modified seed hydrate to enhance the yield. This would be accomplished by changing the surface properties due to thermal activation/ grinding
- To reduce the energy consumption by establishing parameter sto produce gibbsitic/ boehmitic alumina hydrate
- Study on kinetics/ mechanism of precipitation with respect to seed surface property by using thermally activated seed (TAS)
- Comparison of precipitation kinetics with TAS and conventional seed

Remarks and Recommendation:

- 1) The final report was accepted.
- 2) The committee appreciated the work carried out. A one page write up on the outcome of this project should be submitted to Ministry. The write up should include the implications of the outcomes and utility for alumina producing companies
- 3) The committee recommends to release the balance tranche of funds on receipt of UC and statement of expenditure of funds.

Project ID: 11/ 19- PERC /FN RP/2019-20

Project Title: Large scale digital database creation of Bauxite & Laterite deposits of Maharashtra State Using geo-informatics technology

PI: Dr.Pravin G. Bhukte(JNARDDC)pg_bhukte@yahoo.com

Dr. Ajay S Deshpande(MRSAC)info@mrsac.maharashtra.gov.in

Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC, Nagpur & Maharashtra Remote Sensing Application Centre, Nagpur (Jointly)

Project Cost : ₹ 69.5484 Lakhs **Duration:** 2 years

Objectives :

Creation of database on Bauxite and Laterite deposits of Maharashtra related to geology, geomorphology & technological characterization by using GIS and remote sensing technology.

Remarks and Recommendation:

- 1) The final report was accepted.
- 2) The committee appreciated the work carried out. A one page write up on the outcome of this project should be submitted to Ministry. The data and maps should be utilized by the state DGM and other exploration agencies for formulating new exploration project proposals.
- 3) Committee noted the letter of appreciation received from Directorate of Geology and Mining, Govt of Maharashtra.
- 4) The committee recommends to release the balance tranche of funds on receipt of UC and statement of expenditure of funds

Project ID: 12/ 19- PERC /FN RP/2019-20

Project Title: Estimation of Morphodynamicity and its remedial action using Red-mud

based concrete at coastal zone of Eastern Odisha
PI: Mr. Mukesh J. Chaddha, Senior Principal Scientist & HOD Alumina Division, Phone: 07104 222742 E-Mail: mukeshchaddha1@yahoo.com Dr. B. Hanumantha Rao, Assistant Professor, School of Infrastructure IIT, Bhubaneswar, Argul campus Jatni, Khurdha-752 050 Email: bhrao@iitbbs.ac.in , 9439739910
Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur and IIT, Bhubaneswar
Project Cost : ₹ 30 Lakhs Duration: 6 months
Objectives: The main objectives of the research work are: i. Study the key processes of morphodynamicity of coastal zone of odisha (at kendraparha) with the aid of data (viz. wind, wave, tidal current, soil, coastline type) available in the past and present. ii. Simulate the morphodynamicity using numerical modeling technique in order to critically understand the process and propose site specific suitable remedial measures that most feasible for the study area. iii. Develop a commercial process for the use of red mud as a raw material for manufacturing of red mud and geopolymer blocks of size 500 mm
Remarks and Recommendation:
<ol style="list-style-type: none"> 1) The final report was accepted. 2) The committee advised the PI to come out with definite conclusions whether the findings of phase-I are implementable with regards to installing blocks. 3) The PI shall meet the district authorities of the concerned area for identifying the location and work out the feasibility of implementing the proposal of installing blocks for erosion control. 4) The PI should submit the conclusion within 3 months period. 5) The next phase of the project shall be considered based on above findings.

Project ID: 13/ 19- PERC /FN RP/2019-20
Project Title: Status report on work carried out nationally and internationally on Red Mud to benchmark future investigation in the country
PI: Dr. S.B. Rai, Principal Scientist. Alumina Division, suchitarai1968@gmail.com, 9423680346 suchitarai@jnarddc.gov.in
Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur
Project Cost : ₹ 30 Lakhs Duration: 1 Year
Objectives: To prepare status report on work carried out nationally and internationally on red mud
Remarks and Recommendation:
<ol style="list-style-type: none"> 1) The final report was accepted. 2) The committee appreciated the work carried out. 3) A write up should be submitted to the Ministry of Mines, which should include the details of red mud composition, recoverable alumina, operating conditions like size distribution, time and temperature etc. 4) The committee recommends to release the balance tranche of funds on receipt of UC and statement of expenditure of funds

Project ID: 14/ 19- PERC /FN RP/2019-20 (Revised)
Project Title: Synthesis, characterization and photocatalytic performance of metal doped semiconductor nanomaterials
PI: Dr. M. Muneer : readermuneer@gmail.com
Implementing Institution: Aligarh Muslim University, Aligarh-202002
Remarks and Recommendation:
<ol style="list-style-type: none"> 1) The draft final report was presented before the last PERC. 2) The 18th PERC advised the PI to submit revised project report clearly highlighting objectives, deliverables, and future action to take work forward for commercial application.

- 3) The PI has complied with the suggestion of last PERC. The committee observed the project was well done and additional work also done.
- 4) The revised final report submitted by the PI was accepted.
- 5) The committee recommends to release the balance tranche of funds on receipt of UC and statement of expenditure of funds

The following 4 (four) ongoing projects were reviewed and recommendations are as below:-

Project ID: 1/ 19- PERC / ANN REV/ 2019-20
Project Title: Nano Processing of Industrial Rejects for use as additives in Mix designs for improved pozzolanic reaction efficiency
PI: Dr Priyanka Nayar, E-Mail: priyankanayar_26@yahoo.co.in Dr Mangesh Madurwar, E-Mail: mangesh_bits@yahoo.com
Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur and VNIT, Nagpur
Project Cost: ₹ 49.77170 Lakhs Duration: 2 years
Objectives: i. To utilize the abundantly available industrial wastes; Aluminium industrial waste (Red Mud, Fly Ash), Steel industry waste (Refractory waste, Granulated Blast Furnace Slag, Plant Sludge) in useful manner by making it nano using either top down or bottom up approach and increasing its surface to volume ratio in order to use it for industrial catalytic. ii. To utilize the abundantly available industrial wastes; Aluminium industrial waste (Red Mud, Fly Ash), Steel industry waste (Refractory waste, Granulated Blast Furnace Slag, Plant Sludge) in useful manner by making it nano using either top down or bottom up approach and increasing its surface to volume ratio in order to use it for industrial catalytic and adsorbent activities. iii. To process the wastes in such a way so as to enrich any of the three major components and using that enriched residue as precursor to get either individual nano-particles or mixed nano-composites. iv. To explore suitable applications of these nano-particles / nano-composites as additives in mix design for better pozzolanic reaction and overall reduced use of binding agent to promote the use of industrial wastes / rejects.
Remarks and Recommendation: 1) The committee noted the project is proceeding as per schedule 2) PI was advised to include techno-economics of the product to be developed in the final findings. 3) The committee advised to focus on materials other than fly ash which are not used before. 4) The committee recommends to release the next tranche of funds subject to submission of UC and statement of expenditure.

Project ID: 2/ 19- PERC / ANN REV/ 2019-20
Project Title: Fabrication of Advanced Ceramic Nano-coatings for Automotive Applications
PI: Dr Parvati Ramaswamy, PHD, Email: Parvati.ramaswamy@christuniversity.in Dr Priyanka Nayar, Junior Scientist, Bauxite Department, JNARDDC, Nagpur: E-Mail:priyankanayar_26@yahoo.co.in
Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur and Christ University
Project Cost: ₹ 43.75920 Lakhs Duration: 3 years
Objectives: i. Use organic binders to prepare micron sized agglomerates of commercially available non-plasma sprayable nano-sized ceramic compositions feed stock materials such as Stabilized Zirconia, Alumina, Alumina –Titania etc. ii. Use the micron sized spherical agglomerates consisting of nano-structured feed material into a plasma spray equipment to form nano-structured Plasma Spray Coatings

on aluminium / aluminium alloy substrates.

iii. Deposition of homogenous alumina nanocoatings on aluminium/aluminium alloy substrates using sol-gel technique

iv. Characterization of the as-synthesized nano-structured coatings for structural phase and microstructure, and very importantly adhesion to the aluminium and its alloy metal substrates.

v. Study the potential of using the above developed fine quality ceramic nano-coatings for certain automotive applications e.g. Zirconia based nano-coatings for engine components, wear resistant alumina/alumina-titania coatings for wear resistant piston rings etc.

Remarks and Recommendation:

1. YPSZ has been prepared and commercialized.
2. Spin coating has novelty. Alkoxide is expensive and accordingly it may be difficult to scale up.
3. Committee opined that bottom up approach may be difficult for product development.
4. PI was advised to explore the possibility of conversion of alumina gel into alumina nano powder and spray coating of the same.
5. Progress so far is satisfactory.
6. Remaining funds of first tranche and the next installment for both institutions may be released.

Project ID: 3/ 19- PERC / ANN REV/ 2019-20

Project Title: Techno-economic Survey of Aluminium Scrap Recycling in India

PI: Mr. RN Chouhan, Pr Scientist, JNARDDC

Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur and MRAI

Project Cost: ₹ 53.55 Lakhs **Duration:** 1 year

Objectives: Main objective of the proposed survey is to “establish techno-economic scenario of aluminium scrap recycling industry in the country”.

Remarks and Recommendation:

1. Methodology should be worked out by the PI.
2. PI should make the database of recyclers. (Major, Minor recyclers, source of materials etc)
3. Recyclers attributes should be brought out in the final findings.
4. Data collection and value added information should be culled out.
5. Recommended to release the balance tranche of funds subject to submission of UC and statement of expenditure of fund received.

Project ID: 4/ 19- PERC / ANN REV/ 2019-20

Project Title: To study the fire retardancy of nano-ATH in polymers

PI: Dr. Suchita Rai, Pr Scientist, JNARDDC

Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur and CIPET

Project Cost: ₹ 31.30 Lakhs **Duration:** 2 year

Objectives:

- To investigate the effect of nano-ATH as fire retardant filler in polymers
- To examine the mechanical and flame retardant properties of polymer/ ATH composites obtained using ATH fillers with different particle size.
- New process and product development using aluminium trihydroxide and polymer matrix.

Remarks and Recommendation:

1. PI should extend work to improve other polymer matrices and other fillers such as nano alumina.
2. Benchmarking needs to be done with existing proven solutions.
3. PI should explore for flame retardancy application in electrical cables and improve the dielectric nature.

4. Progress of the project is satisfactory.
5. Recommended to release the balance tranche of funds of first year and 2nd year installment subject to submission of UC and statement of expenditure of fund received.

The PERC meeting concluded with thanks to the chair and the experts.

LIST OF PARTICIPANTS OF 19TH PERC MEETING HELD AT JNARDDC, NAGPUR**ON 6-7 August 2019**

Sr no	Name	Portfolio
1.	Shri Alok Chandra Economic Adviser (Mines), Delhi	Chairman
2.	Dr. Pradeep Singh Director Technical (Mines), Delhi	Member
3.	Shri H.K. Mallick Deputy Secretary (Mines)	Member
4.	Dr. K. Balasubramanian Director, NFTDC Hyderabad	Member
5.	Prof. T.C. Rao Ex. Director, RRL Bhopal	Member
6.	Dr. A. Agnihotri Director, JNARDDC	Member
7.	Prof. Suddhasawa Basu, Director, CSIR-IMMT	Member
8.	Dr. H.S. Venkatesh Director, NIRM	Member
9.	Shri Subrata Kar GM (R&D), NALCO, Bhubaneswar	Representative Member
10.	Shri Vinay Kumar Singh GM, HCL	Representative Member
11.	Dr. S. Kamalakaram DGM (Exploration), MECL, Nagpur	Representative Member
12.	Dr. C. N. Ghosh Chief Scientist & Head, CIMFR, Dhanbad	Representative Member
13.	Dr. Shravan Kumar Dep of Fuel & Mineral Engg. IIT (ISM), Dhanbad	Representative Member

Leave of absence granted to other members.