Minutes of 17th Project Evaluation & Review Committee (PERC) meeting held under the Chairmanship of Shri Alok Chandra, Economic Adviser, Ministry of Mines on 19-20 July 2018 at Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur. The list of participants is enclosed in Annexure-A.

1. A total of 100 project proposals were received for the year 2018-19. 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 by a team of experts constituted by Ministry of Mines. Based on the guidelines as adopted in 14 PERC, the experts conducted pre-screening of the proposals. After scrutiny of 100 projects, the team of experts short listed 28 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 of PERC. In addition to these 28 projects, the PERC also considered 6 proposals which were suggested for resubmission with certain modifications and comments by the 16th PERC. Thus a total of 34 project proposals were considered. 31 presentations were made and evaluated by the committee during the 17thPERC meeting held on 19th July 2018 at JNARDDC, Nagpur.

2. The following criteria were given to all experts for detailed evaluation of proposals. The evaluation criteria were 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) Do 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 17 PERC meeting were divided into three groups with corresponding expertise, namely (i) Exploration and Geo-Sciences & Mining, (ii) Mineral processing and Recovery waste and (iii) Extraction, Alloys, Products & Specialty Materials. This enabled more time for the PIs to make the presentations as well as detailed interaction. All the three groups met together at the end and selected the projects for recommendation to the SSAG, or asked the PIs to revise and resubmit to the next PERC or not recommended at all. The details are given in the succeeding paragraphs.

Recommendation to SSAG

(i) Recommended with / without modification to SSAG **(12 Project Proposals)**

(ii) To be revised and resubmitted in next PERC **(4 project Proposals)**

(iii) NOT recommended **(18 Project Proposals)**

3. The committee emphasized reduction in the time duration of the projects in most cases from 3 years to 2 years with rational reduction in budget outlay. In addition, a few other revisions were suggested which are specific for each of the recommended projects to be carried out by the PIs/implementing institutions before being considered for SSAG. Broadly, the committee gave weightage to fund those projects with a direct application potential while encouraging a few deserving projects in the academic systems.

4. The details of recommended projects recommended with / without modification to SSAG (12 nos.)

1. Project ID: 6/ 17- PERC /2018-19
Project Title: Development of a Low-cost Portable Optical Reflectance Spectrometer for Mining and Mineralogy.
PI: Dr. Sivarama Krishnan, Assistant Professor : E-mail: srkrishnan@iitm.ac.in
Implementing Institution: Indian Institute of Technology, Madras
Project Cost : Rs. 68.10 lakh (revised) (prev cost -Rs. 49.72 lakhs): **Duration:** 3 years
Objectives : i) Develop a handheld low-cost optical spectrometer for reflectance and fluorescence analysis in the 350 - 800 nm spectra window. ii) Develop a rugged device for remote field application which can run on battery power with possible connectivity to solar charging. iii) Develop a suitable color matching and spectrometry scheme with this device for identification of minerals on site and live. iv) Implement schema for a database on the cloud which this spectrometer can link to via a mobile computing device such as a mobile phone or tablet.
Remarks and Recommendation:
RECOMMENDED with modifications to SSAG i. Proof of concept to be established to specified minerals within one year ii. Recommended a budget of Rs. 10 Lakhs. iii. Advised to interact with geologist and explore the possibility of using this spectrometer for in-organic materials. iv. Advised to collect the existing spectra database for minerals from standard literature and the range of analysis possible by this spectrometer should be addressed. v. Advised to compare this spectra result with the results of spectrometer available currently in market and show the advantages and disadvantages.

2. Project ID: 8/ 17- PERC /2018-19
Project Title: Novel Approach to Recover Individual Valuable Heavy Minerals from Pyriboleferrous Beach and Dune Sand Deposits
PI : Dr. C. Eswaraiah, Email : eswar@immt.res.in
Implementing Institution: CSIR-Institute of Minerals & Materials Technology Bhubaneswar-751013

Project Cost : Rs. 49.495 Lakhs : **Duration:** 3 years
Objectives :
i) To pre concentrate the heavy minerals by dry process using advanced air cyclones, where most of quartz and pyribole minerals can be rejected ii) To pre concentrate the heavy minerals at shore by using sea water iii) To recover individual heavy minerals by total wet process except for the recovery of rutile which is less than 2% iv) Efficient unit operations by suitable modeling and simulation techniques for separation of beach sand minerals having closed range physical properties v) Development of process flow sheet with material balance for commercialization..
Remarks and Recommendation:
RECOMMENDED with modifications to SSAG i) Proof of concept to be demonstrated at lab / bench scale within one year with a budget of Rs. 15 Lakhs.

3. Project ID: 10/ 17- PERC /2018-19
Project Title: Investigation of the dynamics & mechanism of flocculation by polymers and biopolymers for separation of solid particles of high rate thickeners in mineral processing industries.
PI: Dr. Lakshmi Rakesh Kumar Yasarla, Email: yasarla.rakesh@gmail.com
Implementing Institution: CSIR-National Institute for Interdisciplinary Science and Technology (NIIST) Industrial Estate P.O, Thiruvananthapuram - 695 019
Project Cost : Rs. 77.5543 Lakhs : **Duration:** 3 years
Objectives : i) Estimation of total solids in the input stream and of dry mass of the total solids. ii) Estimation of the settling velocities of the flocculated particles and sedimentation process. iii) Optimization process of both flocculation. Techno economic analysis of the flocculation process
Remarks and Recommendation:
RECOMMENDED with modifications to SSAG i) The successful research results shall improve the techno economic benefits for designing and installation of solid liquid separation equipments in mineral

processing units.

ii) Application of the biopolymers shall improve the impact on environmental and climatic change issues.

iii) PI is advised to rationalize the budget to Rs. 60 lakhs

iv) Project duration should be reduced to 2 years.

v) 50% of the project cost should be funded by DST to meet the capital expenditure.

4. Project ID: 13/ 17- PERC /2018-19

Project Title: Use of Overburden Clay as alternate for aggregate

PI: Dr. K.Ramamurthy Email : vivek@iitm.ac.in

Shri V. Manoharan, GM Email : gm.card@nlcindia.com

Implementing Institution: Indian Institute of Technology Madras Chennai-600 036, India & Neyveli Lignite Corporation Ltd. (NLC Ltd)

Project Cost : Rs. 178 Lakhs : **Duration:** 3 years

Objectives :

i) Sampling of mines overburden clay at strategic locations and characterization of these clay materials.

ii) Laboratory/Pilot level separation study with different clay and characterization of extracted sand, clay/silt and wash water used for wet sieving.

iii) Study on alternative technologies for converting clay/silt rejects from the processed clay into value-added large-volume consumption products like bricks, aggregate and pozzolanic material. Conversion of the clay reject into value-added product requires systematic study for arriving at suitable admixtures and processing methods.

iv) Develop treatment plant with capacity required for the pilot-scale plant.

Remarks and Recommendation:

RECOMMENDED with modifications to SSAG

i) PI has proposed suitable treatment methods for mines overburden clay for its use as coarse aggregate in construction and filter medium in sand filters used for water treatment, through laboratory-level research studies as the outcome of the project.

ii) The PI is advised to rationalize the budget to Rs. 40 lakhs Rs. 20 Lakh and Rs. 10 Lakh each in the first, second and third year respectively from Ministry of Mines.

iii) NLC to co-fund as given in the proposal, Rs.8 lakh, Rs.85 lakh and Rs.10 lakh in the first, second and third year respectively.

iv) Project will be reviewed alongwith NLC after the first year.

5. Project ID: 19/ 17- PERC /2018-19

Project Title: Texturally controlled micro-chronological and extraction protocol studies on Pt-Chromite mineralization-Preliminary Studies

PI: Prof. Sajeev Krishnan Associate Professor : E-mail: sajeev@iisc.ac.in

Ms. Indira Ravindran, Director, IBM dirod@ibm.gov.in

Implementing Institution: Centre for Earth Sciences, Indian Institute of Science Bangalore 560 012, India & Indian Bureau of Mines

Project Cost : Rs.459.1116 lakh (Revised) (previous Rs.502.5309 lakh) :**Duration:** 3 years

Objectives :

i) To understand the mineral chemistry of chromite associated ultramafic rocks and their potentiality to PGE mineralisation.

ii) To understand the textural and genesis of PGE in chromite and related ultramafic rocks.

iii) To understand the PGE geochemical cycle in developing and locating new deposits.

iv) To constrain the timing of PGE mineralisation in Chromites using 190Pt186Os geochronometer.

v) To adopt various beneficiation strategies to pre concentrate the PGE minerals.

vi) To dissolve platinum from the pre concentrate using various lixiviants.

vii) To modify and adopt a novel modeling approach for enhancement of leaching¬ efficiency of PGE values.

Remarks and Recommendation:

RECOMMENDED with modifications to SSAG

i) Preliminary studies to be undertaken within one year by IBM and IIS on sample collection and characterization.

ii) The expenditure of Rs 16 lakhs, Rs 8 lakh each for IIS and IBM, is recommended. MoM may provide Rs.8 lakh to IIS. IBM may meet expenditure of Rs 8 lakh from its sanctioned budget, if needed IBM may request for funds in RE 2018-19.

iii) A report to be submitted at the end of one year.

iv) Based on the outcome of the report, a decision will be subsequently taken for

continuity of the project.

6. **Project ID: 21/ 17- PERC /2018-19**
Project Title: Development of Ready-To-Use Assorted Sand for Construction Activities from Zinc Refining Wastes and Marble Powder
PI: Dr. Bhavna Tripathi , Associate Professor : Email: bhavna.tripathi@jaipur.manipal.edu
Implementing Institution: Manipal University Jaipur, DehmiKalan, Jaipur-303007, Rajasthan
Project Cost : Rs. 49.5501 Lakhs : **Duration:** 3 years
Objectives :
i) To compare gradation, void content, particle packing, and physical properties of natural sand with mixture of ISF slag, Jarosite, and Marble Powder in different proportions. ii) To develop ready-to-use assorted sand for applications in concrete and mortar. iii) To study mechanical and durability properties of concrete and mortar mixes prepared by using assorted sand in comparison with control mixes. iv) To study the microstructural properties of concrete and mortar mixes prepared by using assorted sand in comparison with control mixes. v) To assess the leaching potential (TCLP) of heavy metals from assorted sand and concrete/mortar mixes for establishing environmental suitability
Remarks and Recommendation:
RECOMMENDED with modifications to SSAG i. PI has proposed to develop ready-to-use assorted sand for applications in concrete and mortar ii. Proof of concept to be demonstrated within one year with a budget of Rs. 20 Lakhs.

7. **Project ID: 22/ 17- PERC /2018-19**
Project Title: To study the fire retardancy of nano-ATH in polymers
PI: Dr. S.B. Rai, Principal Scientist : JNARDDC Email : suchitarai1968@gmail.com Dr. Smita Mohanty, Sr. Scientist, CIPET, Email : drsmitamohanty@gmail.com
Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre, Wadi, Nagpur & CIPET
Project Cost : Rs. 56.98 Lakhs : **Duration:** 2 years
Objectives :
i) To investigate the effect of nano-ATH as fire retardant filler in polymers ii) To examine the mechanical and flame retardant properties of polymer/ ATH

composites obtained using ATH fillers with different particle size.

iii) New process and product development using aluminium tri-hydroxide and polymer matrix.

Remarks and Recommendation:

RECOMMENDED with modifications to SSAG

i. PI was advised that the nano alumina should be less than 2%.
ii. Dispersion of nano alumina should be ensured with proper melt mixing, selection of proper process parameters and surface modification of nano particles.
iii. It is envisaged that the product has lot of market potential.

8. Project ID: 23/ 17- PERC /2018-19

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

PI: Shir R.N. Chouhan, JNARDDC : Email: rnchouhan@gmail.com

Implementing Institution: Jawaharlal Nehru Aluminium Research Development and Design Centre Wadi, Amravati Road, Nagpur – 440 023 (Maharashtra) & Metal Recycling Association of India

Project Cost : Rs. 53.55 Lakh : **Duration:** 1 years

Objectives :

Establish techno-economic scenario of aluminium scrap recycling industry in the country

Remarks and Recommendation:

RECOMMENDED with modifications to SSAG

i. Manpower has to be increased. At least four to six persons are required to be deputed (one per zone)
ii. PI has to ensure that the man power deputed should be able to speak local language for effective data collection.
iii. Budget allocation should be modified as the manpower requirement is increased within the overall budget presented. It is advised to partially reallocate the money kept for seminar and contingency to travel.
iv. It is advised to map secondary/scrap aluminium in the country in terms of domestic and imports.
v. A monthly report to be generated by the project teams.

9. Project ID: 29/ 17- PERC /2018-19

Project Title: Design and development of new approaches for recovering copper from mill tailings

PI: Dr. Vipin Kumar Assistant Professor : E-mail: vipinmicro1@gmail.com
Implementing Institution: Indian Institute of Technology (Indian School of Mines) Dhanbad – 826 004, Jharkhand, India
Project Cost : Rs. 31.578 Lakhs : **Duration:** 3 years
Objectives :
i) To measure the concentration of copper in and around selected mine sites of varying distance and depth ii) To design the economic bio-reactor for metal bio-activation and metal recovery from mine tailings iii) To optimize the biomass of indigenous plant species and examine the Copper accumulation of selected plant species iv) To determine the optimal field conditions and limiting factors for the copper phytomining
Remarks and Recommendation:
RECOMMENDED with modifications to SSAG i. The project period may be revised to Two (02) years. ii. The cost of project be limited to Rs 17 Lakhs over the complete project cycle. iii. Project proposal should mention the extent of area to be covered for cultivation of Copper-Phytomining Crops. iv. The number of crop cycle to be assessed to be minimum five (05) crops during project period.

10. Project ID: 30/ 17- PERC /2018-19
High performance of rare earth metal as Electrode material for super-capaciter application and fuel cell
PI: Dr. V. Sindhu, Associate Professor : E-mail: sindhusrini@gmail.com
Implementing Institution: Velammal Institute of Technology, Panchetti, Chennai
Project Cost : Rs. 30.96944 Lakhs : **Duration:** 2 years
Objectives :
i) To synthesize thin layer of rare earth oxide/polymer thin film ii) To synthesize the composites of cerium, terbium rare earth oxides with transition metals and conducting polymers iii) To characterize the synthesized films using optical studies using U-Vis spectrometer, Photo luminance, Photocatlytic activity. iv) To investigate their optical, electrochemical, morphological and photovoltaic properties

v) To analyze the effect of rare earth oxide/polymer nanomaterial on Supercapacitors and fuel cells.

Remarks and Recommendation:

RECOMMENDED FOR SSAG

The PI has complied with the following recommendations of last PERC.

i. Materials optimization and specific application from material to electrodes for super-capacitor has been focused in the proposal.
ii. Project duration reduced to 2 years.
iii. The project findings will recommend the way for the further improvement in the efficiency of energy storage devices.

11. Project ID: 32/ 17- PERC /2018-19

Project Title: Development of open cell aluminium foams for heat sink and EMI shielding Applications

PI: Dr. D.P Mondal, Sr. Principal Scientist : E-mail : mondaldp@yahoo.com

Implementing Institution: Advanced Materials and Processes Research Institute(AMPRI), Bhopal

Project Cost : 30.0 lakh: **Duration:** 2 years

Objectives :

i) Development of a process for open cell aluminium foam with uniform and finer cell size with most effective heat transfer.
ii) Effect of cenosphere and red mud addition on the electro-magnetic shielding of aluminium foam.
iii) Component design, fabrication and performance evaluation.

Remarks and Recommendation:

RECOMMENDED FOR SSAG

The PI has complied with the following major recommendations of last PERC.

i. Project focus is now product oriented with product attributes as target.
ii. Two specific applications for product have been taken up.
iii. Duration has been reduced to 2 years and overall budget of Rs. 30 lakhs
iv. The findings of the report will be useful for mining sector and other industrial applications.

12. Project ID: 33/ 17- PERC /2018-19

Project Title: Rare-earth free intermetallic compounds to develop a new generation of high-performance Permanent Magnets

PI: Dr. M Vasundhara , Scientist : Email: mvas@niist.res.in, vasu.mutta@gmail.com

Dr. Ajit Kumar Patra PhD, Email: Email: phyakp@gmail.com, a.patra@curaj.ac.in

Implementing Institution: CSIR-National Institute for Interdisciplinary science and Technology (CSIR-NIIST) Industrial Estate P.O, Trivandrum 695019 & Central University of Rajasthan, Dist. Ajmer

Project Cost : Rs. 42.94 lakh: **Duration:** 2 years

Objectives :

i) Development of binary intermetallic compounds and its composites in the form of bulk and nanostructures in order to achieve a less costly, non–RE-based advanced PM materials

ii) To design and develop the exchange spring magnet compositions with hard magnetic phases of Mn-X nanoparticles along with soft magnetic phases of metallic nanoparticles. The design of the exchange spring magnets by microstructure engineering will be optimized to get maximum properties. Hence this project aims at developing RE-free permanent magnets of energy product of at least 15 MGOe by above said methods.

iii) Development of magnetic nano composites with energy product of at least 15 MGOe, their synthesis and secondary processing methodology and magnet making procedures at lab scale so that industries can scale up.

Remarks and Recommendation:

RECOMMENDED FOR SSAG

The PI has complied with the following major recommendations of last PERC.

i. PI is in the process of making the similar compositions of nanomaterials with further enhancement in the Ms Values.
ii. The scalability potential has been included in the proposal.
iii. The Budget and its allocation have been revised.
iv. The letter of contribution from CSIR for 30% has been submitted by the PI..
v. The outcome will be the development of Mn-based inter-metallic for making high energy product magnets.

5. The details of 4 (four) projects"to be revised and resubmitted in next PERC" are as below :-

1. Project ID: 16/ 17- PERC /2018-19
Project Title: Development of graphene based membranes from graphite ore for desalination
PI: Dr. (Mrs). Sreeja Kumari.S.S , Scientist, E-mail: sreejakumari@niist.res.in Mrs. N. Vasumathi, Sr. Scientist, CSIR-NML, Chennai : vasumathi@csirmc.res.in
Implementing Institution: CSIR-National Institute for Interdisciplinary Science and Technology Industrial Estate P.O, Thiruvananthapuram - 695 019. CSIR – NML, Madras Centre, Chennai
Project Cost : 73.2486 Lakh: **Duration:** 3 years
Objectives :
• Develop a non-hazardous and non-petroleum based environmentally friendly flotation reagents for beneficiation of low grade graphite ore. • Synthesis of graphene from graphite ore in large quantity (200g/Batch) by indigenous dual drive planetary ball milling and development of graphene based composites. • Optimization of the synthesis technique and precursor materials. The milling critical speed, reaction time and precursor materials will be tune in order to achieve high quality graphene. • Studying the desalination performance of the fabricated membranes and comparing with the conventionally used membrane for desalination.
Remarks and Recommendation:
To be revised and resubmitted to next PERC i. Proof of concept of graphite beneficiation to be established before re-submission.

2. Project ID: 17/ 17- PERC /2018-19
Project Title: "Recovery of scandium metal from acid leach liquor from titanium mineral industries"
PI: Dr. M. SUNDARARAJAN Senior Scientist : E-mail: rajanmsundar77@yahoo.com
Implementing Institution: CSIR-National Institute for Interdisciplinary Science and Technology (NIIST) Industrial Estate P.O, Thiruvananthapuram - 695
Project Cost : 63.3293 Lakh: **Duration:** 3 years

Objectives :
i) Solvent extraction separation of scandium values from the leach solution. ii) Preparation of high purity scandium oxide and its hydro-fluorination to scandium fluoride. iii) Calciothermic reduction of scandium fluoride to scandium metal.
Remarks and Recommendation:
To be revised and resubmitted to next PERC i. PI is advised to characterize the input feed liquor from actual operation. ii. Concentration of scandium in the strip liquor after solvent extraction to be demonstrated in preliminary studies.

3. Project ID: 18/ 17- PERC /2018-19
Synergistic Treatment of Wastewater Using Nanomaterials and Algal Technology and its Feasibility Studies: Focus towards Mining Industry
PI: Dr (Mrs) Kiran Bala, Assistant Professor : E-mail: kiranb@iiti.ac.in
Implementing Institution: Discipline of Biosciences & Biomedical Engg., IIT Indore
Project Cost : Rs. 99.50 Lakh : **Duration:** 3 years
Objectives :
i) Screening and selection of algal species from mine environment **ii)** Investigation of algal response in simulated/actual mine wastewater **iii)** Optimization of process parameters to improve the treatment/metal accumulation efficiency **iv)** Evaluation of nano-particulate systems to aid algal system to remove the contaminants in wastewater from mines.
Remarks and Recommendation:
To be revised and resubmitted to next PERC i. This project is trying to retrofit available technology and solve assumed problems of mine water. Considering this, the project objectives be recast with clarity and revised with clear problem definition. ii. The PI is required to get consent from mining company to carry out the project. iii. The cost of project needs to be revised drastically. iv. Capital equipments proposed in proposal shall be sought/ used from existing research lab like MECL/IIT Kanpur/ IIT Delhi etc. v. Proposal to be revised and submitted to the next PERC.

4. Project ID: 24/ 17- PERC /2018-19
Improving fracture resistance of rocks through adhesive bonding for underground mining applications
PI: Dr Rashmi Ranjan Das, Assistant Professor : Email: drrrdas@iitism.ac.in
Implementing Institution: Indian Institute of Technology (ISM), Dhanbad
Project Cost : Rs. 14.73467 Lakhs : **Duration:** 3 years
Objectives :
i) To study the effect of crack orientation angles (β = 300, 450 and 800) on ultimate fracture load of the granite based rock in absence (Fu) in absence of any polymeric adhesive, ii) To determine the load causing the crack to grow (Fg) and the corresponding crack branching angle (θc) in a granite based rock specimen with different crack orientation angles (β) = 300, 450 and 800 in absence of any polymeric adhesive. This data would be used for validating the FEM model to be developed for detailed analysis of fracture growth in the rock specimen.
Remarks and Recommendation:
To be revised and resubmitted to next PERC i. Project may be resubmitted with suitable low hardness materials with practical application in mining / civil infrastructure industry. ii. Fresh proposal can be resubmitted with above mentioned changes in the proposed rock mass.

6. The details of 18 (Eighteen) projects Not recommended are as below :-

1. Project ID: 1/ 17- PERC /2018-19
Project Title: Arsenic removal as a pretreatment of metal extraction
PI: Dr. Barsha Dash, Scientist : Email: barshadash@immt.res.in
Implementing Institution: CSIR-Institute of Minerals and Materials Technology, Bhubaneswar-751013
Project Cost : 23 Lakhs **Duration: 2** years
Objectives :
i) To remove Arsenic from the copper concentrate before regular metallurgical operations. ii) To see the feasibility of removal of Bi, Pb and silica from the concentrate/ores
Remarks and Recommendation:
NOT RECOMMENDED i. Problem area is not focused and more general.

ii. The quantum of NaCl (Sodium Chloride) required for processing itself is a bottle neck for achieving the objectives of the project. iii. The project proposal does not have practical application.

2. Project ID: 2/ 17- PERC /2018-19
Project Title: Investigation on flowing film concentration equipment to improve their efficiency for processing low-grade iron ore fines and tailings
PI: Dr.Pankaj Kumar Jain, Assistant Professor : Email panku@iitism.ac.in
Implementing Institution: Indian Institute of Technology (Indian School of Mines) Dhanbad, Jharkhand 826004
Project Cost : 81.458 Lakhs : **Duration:** 3 years
Objectives :
i) Density based separation using organic liquids ii) To generate float – sink data reflecting density – grade distribution iii) Application of knowledge of density – grade distribution and operating cut density to beneficiate iron ore fines and tailings spirals and Wilfley table
Remarks and Recommendation:
NOT RECOMMENDED i. There is no such issue of iron ore tailing. ii. Scalability of the process is an issue. iii. Cost benefit analysis is very unfavourable.

3. Project ID: 03/ 17- PERC /2018-19
Project Title: Country-wide GIS-based prospectivity modeling of India for REE deposits.
PI: Prof Alok Porwal : Email : aporwal@iitb.ac.in
Implementing Institution: Indian Institute of Technology,/ Bombay,
Project Cost : 50.7408 Lakhs : **Duration:** 3 years
Objectives :
Targeting and delineating zones potential for REE primary REE Deposits.
Remarks and Recommendation:
NOT RECOMMENDED Absent

4. Project ID: 4/ 17- PERC /2018-19
Project Title: Investigation, Development and Optimisation of a comprehensive blast Design for hard rock mine incorporating rock mass quality, rock energy, explosive energy

and fragmentation
PI: Dr. Manoj Kumar Mishra, Associate Professor :mkmishra@nitrkl.ac.in
Implementing Institution: National Institute Of Technology, Rourkela- 769 008
Project Cost : Rs. 46.051 Lakhs : **Duration:** 3 years
Objectives : i) Determination and classification of Rock mass quality and rating of the iron ore mines ii) Determination of static and dynamic properties, strain energy of the rock mass iii) Optimisation of the different influencing parameters and development of model iv) Prediction of cost benefit analysis Detailed methodology
Remarks and Recommendation:
NOT RECOMMENDED i. This proposal is trying to link nonrelated parameters to improvise fragmentations for specific area like iron ore mines in Odisha. ii. The PI does not have clarity on the parameters influencing the blasting in mines. iii. Research component is insignificant in the proposal.

5. Project ID: 5/ 17- PERC /2018-19
Project Title: Development of In-Situ Drilling and Leaching Technology for Eco-Friendly Extraction of Chromium from Chromite Ore.
PI: Ashok N.Bhaskarwar, Professor : ashoknb@chemical.iitd.ernet.in
Implementing Institution: Indian Institute of Technology, HauzKhas, New Delhi-110016.
Project Cost : Rs.87.8709 Lakhs : **Duration:** 3 years
Objectives : i) Investigation on anin-situ crushing and leaching technique for Chromite ore with possible implementation at Sukinda Mines, Jajpur. ii) Development of a concentric cylindrical mining equipment for drilling and extraction of Chromite.
Remarks and Recommendation:
NOT RECOMMENDED i. This is hypothetical approach to replace conventional mining of chromite by insitu drilling & adopting leaching by deploying multiple 57 mm diameter hole. ii. The project proposal is not practical and economic unviable.

6. Project ID: 7/ 17- PERC /2018-19
Project Title: Development of synthesis process of rare earth based nano-composites from

secondary sources: possible application as microwave absorbing material
PI: Dr. Mamata Mohapatra, Assistant Prof. Email : mamata@immt.res.in Dr. Balamati Chaudhary, CSIR-NAL
Implementing Institution: CSIR-Institute of Minerals & Materials Technology (Council of Scientific and Industrial Research) Bhubaneswar-751013 Odisha, INDI A & CSIR-National Aerospace Laboratories
Project Cost : Rs.68.68 Lakhs : **Duration:** 3 years
Objectives :
i) To develop a scalable, low-cost hydrometallurgical method of recovery metal ion with desired composition from a hybrid secondary sources(low grade ore and secondary sources of Sm or Nd) using ligand assisted leaching routes ii) Synthesis of nano material(ferrites or oxides) from leached solution by photo orultra-sonicated assisted route iii) Evaluation of microwave absorption properties of the materials for real application
Remarks and Recommendation:
NOT RECOMMENDED i. The project proposal does not seem to feasible.

7. Project ID: 9 / 17- PERC /2018-19
Project Title: Liquefaction analysis of backfill mines for rehabilitation
PI: .ShrutiShukla, Assistant professor : Email: sdv@amd.svnit.ac.in
Implementing Institution: Sardar Vallabhbhai National Institute of Technology, Surat
Project Cost : Rs. 48.74775 Lakhs : **Duration:** 3 years
Objectives :
i) To make the abandoned site of mine, free from producing any hazardous waste, any poisonous gases and any kind substances which are found to be dangerous for living human being. ii) To make the abandoned mine site easily approachable and also to make it fruitful for vegetation growth or agricultural outcomes. iii) To carry out liquefaction analysis and to get the values of Cyclic Resistance Ratio(CRR), Cyclic strain ratio (CSR), (N1)60 etc. to determine the probability of liquefaction.
Remarks and Recommendation:
NOT RECOMMENDED i. Consent letter from industry partner has not been obtained.

ii. The presentation was focused on arresting the probable calamity due to collapse of back fill by the liquefaction phenomenon in case of earthquake specifically at NLC which seems too far from reality. iii. Objectives listed in the proposal are totally different from the presentation. iv. The objectives in proposal are not appropriate for undertaking research.

8. Project ID: 11 / 17- PERC /2018-19
Project Title: Development of pervious geopolymeric concrete using mine waste rock fragments and copper tailings
PI: P.Maria Antony SebatinVimalan, Assistant Professor : Email : vimalan14@gmail.com
Implementing Institution: St. Mother Theresa Engineering College Vagaikulam, Thoothukudi –628102
Project Cost : Rs. 62.64 Lakh : **Duration:** 3 years
Objectives : i) To evaluate the viability of using copper tailings and waste rock in Geopolymeric Concrete. ii) Physical, mechanical properties and Mineralogical characterization of Pervious Geopolymeric Concrete for large scale construction material.
Remarks and Recommendation:
NOT RECOMMENDED ii. Lack of basic work / preliminary studies. PI has not studied / characterized basic raw materials. iii. Not carried out any studies regarding its economically viability.

9. Project ID: 12 / 17- PERC /2018-19
Project Title: Development of super light weight high strength Mg Metal matrix composites (MMCs) by powder metallurgy process for high temperature application in automotive and aerospace industries
PI: Dr. P. Ravindran Associate Professor : Email- : energyravindran@gmail.com
Implementing Institution: St.Mother Theresa Engineering College Mudivaithanendal Post, Vagaikulam Tuticorin-628 102
Project Cost : Rs. 53.1 Lakhs : **Duration:** 3 years
Objectives :
i) Fabrication of AZ31, AZ31-SiC, AZ31-Gr and AZ31-SiC-Gr composites

manufactured by powder metallurgy technique using micro and nano level powders.

ii) To reveal the effect of hybridization on the composites.

iii) Investigate the micro mechanisms of plastic deformation that occur during the high temperature sliding wear of magnesium alloy.

Remarks and Recommendation:

NOT RECOMMENDED

i. Lack of novelty and PI is not clear about idea projected.
ii. There is no clarity about the components/product which needs to be replaced with Mg-MMCs
iii. The PI has not interacted with any automobile or relevant industries for identifying suitable applications.
iv. Advised to do in-house R&D work and contact industries such as NAL, HAL, automobile industries, etc to identify the suitable application.

10. Project ID: 14/ 17- PERC /2018-19

Project Title: Geochemical Signatures of Scheelite and Potential for Exploration, Feasibility studies and process development of Tungsten concentrate and Light Rare Earth Elements (LREE's) as by-products from waste(tailings) dumps of Hutti Gold Mines Co Ltd (HGML)

PI: Dr P.V. Sunder Raju., Principal Scientist, Email: perumala.raju@gmail.com;
And Dr P. Sangurmath, GM, HGML

Implementing Institution: CSIR-National Geophysical Research Institute, Uppal, Hyd & Hutti Gold Mines Company Ltd., Karnataka

Project Cost : Rs. 114.04 Lakhs : **Duration:** 3 years

Objectives :

i) Characterization of ore body with scheelite and gold
ii) Ore petrography wherever possible, gold and Multimetal mineralization
iii) Application of insitu- LA-ICPMS for trace element composition
iv) Process development at NFTDC or IMMT for extraction of tungsten concentrates and LREEs as by product

Remarks and Recommendation:

NOT RECOMMENDED

i. This project is basically exploitation of identified scheelite at the mines of HGML. ii. There is no research component but there may be scope for exploitation of mineral if HGML finds it economical. As of now, scheelite is dumped with waste rock. iii. GM, HGML is a Co-PI in the project proposal and it would be appropriate for HGML to take up the project if it is commercially viable.

11. Project ID: 15/ 17- PERC /2018-19
Research studies on feasibility of setting up an Electronic grade silicon production in lab scale unit from Silica mined in NLC India mines and solar cell fabrication and characterization
Dr. R.Joseph Daniel., Associate Professor : Email: josuma.au@gmail.com
Implementing Institution: Annamalai University, Annamalainagar – 608 002.
Project Cost : Rs. 94.58 Lakhs : **Duration:** 1 years
Objectives :
i) Conducting extensive studies to establish the suitability of silica mined at NLCIL and preparing the technical report and the proposal for setting up a EG silicon wafer manufacturing plant at NLCIL. ii) Establishing the necessary facilities to fabricate in-house solar cell modules from silicon wafers as starting material and conducting research studies to standardizing the process flow for fabricating international standard silicon PV cell modules.
Remarks and Recommendation:
NOT RECOMMENDED i) PI has proposed for setting up a lab scale electronic grade silicon production unit. ii) Proof of concept to be established with metallurgical grade to solar grade. iii) Neyveli Lignite Corporate Ltd. (NLC) may fund the concept.

12. Project ID: 20/ 17- PERC /2018-19
Project Title: Structural study of the BaulaUltramafic Complex using micro-mesoscopic structures and trace of melt inclusions: Its implication on developing a new strategy for prospecting and exploration of rare minerals of PGE in Bangur and extension areas of Kendujhar and Balasore Districts, Odisha
PI: Prof. Tapas Kumar Biswal : Professor : Email: tkbiswal@iitb.ac.in

Implementing Institution: IIT Bombay
Project Cost : Rs. 26.4789 Lakhs : **Duration:** 3 years
Objectives :
i) Structural mapping of the BaulaUltamafic Complex vis a vis Bangur PGE mineralized zone. ii) Melt inclusion study of PGE bearing zones, in olivines of Bangur Gabbro and in the mineralized veins (sulphide) to understand the fluid condition of mineralization. Temperature of homogenization, pore fluid pressure and stress orientation from Fluid Inclusion Plane will be estimated. This will throw light on stress orientation at the timing of faulting and mineralization.
Remarks and Recommendation:
NOT RECOMMENDED Absent

13. Project ID: 25/ 17- PERC /2018-19
Project Title: Development of a communition process for improving the ball mill efficiency and selective size output through hydro- squeezing
PI: Dr. Harsha Vardhan, Associate Professor : Email- harshanitk@gmail.com
Implementing Institution: National Institute of Technology Karnataka, Surathkal
Project Cost : 27.025 Lakhs : **Duration:** 3 years
Objectives :
i) Studies on mineralogical characterization of iron ores to identify the operating window through matrix mapping for ball mill communition process. Evaluation and gap analysis of conventional ball mill process. ii) Development of new process to bridge the gaps to improve the ball mill efficiency and built-in flexibility for selective size output. iii) Demonstration of the new concept through lab scale equipment design development, bench scale tests and results.
Remarks and Recommendation:
NOT RECOMMENDED i) The proposal requires ball mill manufacturer's consent / support. ii) The proposed methodology is not an ideal technical solution.

14. Project ID: 26/ 17- PERC /2018-19
Project Title: Enhancement in the recovery of large and smaller particles in a floatation column using micro-nanobubble technology
PI: Dr. Neelkanth Nirmalkar, Email: n.nirmalkar@iitrpr.ac.in
Implementing Institution: Indian Institute of Technology, Ropar, Nangal Road, Rupnagar, Punjab 140001
Project Cost : Rs. 64.595 Lakhs : **Duration:** 3 years
Objectives :
i) Fabrication of nanobubble generator and its characterization. ii) Characterization of deposition of nanobubbles on hydrophobic surface. iii) Fabrication of flotation cell and experiments on it iv) Molecular dynamics simulations of the interaction between nanobubble and mineral surface
Remarks and Recommendation:
NOT RECOMMENDED i) The range of (%) enhancement of recovery of phosphate and coal is not clarified. ii) Technology of micro nano bubble yet to be demonstrated. iii) PI has not identified a suitable industry partner. iv) The minerals to be explored are not clear. v) The project may be taken up by the industry.

15. Project ID: 27/ 17- PERC /2018-19
Project Title: Development of hybrid hydrogel beads for simultaneous metal recovery and treatment of acid mine drainage.
PI: Dr. R. Selvakumar Associate Professor : E-mail: selvabiotech@gmail.com;
Implementing Institution: PSG Institute of Advanced Studies, P.B. No:1609, Coimbatore- 641004, Tamilnadu
Project Cost : 36.67 Lakhs : **Duration:** 3 years
Objectives :
i) To develop an extremophilic acid tolerant, sulfate-reducing bacterial consortium that can reduce metal sulfate present in mine tailings. ii) To develop hollow core, acid tolerant, biodegradable polymer-based hydrogel matrix that can entrap the developed bacterial consortium. iii) To study the effects of hybrid nano-bio beads on metal recovery and treatment of AMD.

iv) To determine the remediation efficacy testing using appropriate model plant

Remarks and Recommendation:

NOT RECOMMENDED

i. The PI does not have clarity on the objective.
ii. The focus should be on coal mines tailings.
iii. The proposal requires a proper study and clear objective with focus on specific mines.
iv. The scalability of the project is also a major issue.

16. Project ID: 28/ 17- PERC /2018-19

Project Title: Feasibility Study of Low Grade Magnesite Powder as a Potential Additive with Building Materials for Enhanced Thermal Comfort

PI: Dr. S. Suresh , : E-mail: ssuresh@nitt.edu

Implementing Institution: National Institute of Technology Tiruchirappalli

Project Cost : 51.232 Lakhs : **Duration:** 3 years

Objectives :

i) To analyses the thermal, physical and radiative properties of low grade Magnesite (LGM) powder.
ii) To realize the role of low grade Magnesite (LGM) ore powder as additive with different composition(0-35% by weight) in Mortar and to determine the optimum composition.
iii) To experimentally investigate the thermal comfort performance of the optimized admixture in the simulatedreal time building scenario.

Remarks and Recommendation:

NOT RECOMMENDED

i. Project idea looks very general. PI has not undertaken any preliminary in-house R&D / feasibility study.
ii. PI has not characterized the raw materials for Mg which plays a major role on thermal properties.
iii. In house R&D work on brick/concrete with different Mg concentration should have been carried out before submitting the proposal.

17. Project ID: 31/ 17- PERC /2018-19

Project Title: Treated Ferromanganese Slag as an adsorbent Media for Arsenic and Fluoride lons from Water

PI: Dr. Abhijit Maiti Assistant Professor : E-mail ID mabhifpt@iitr.ac.in
Implementing Institution: IIT Roorkee, Rorkee (UTTARAKHAND)
Project Cost : 47.104 Lakhs : **Duration:** 3 years
Objectives :
1. To treat the ferromanganese slag and make it useful oxidant for harmful arsenite ions and simultaneously remove different ions from water. 2. To develop the commercial water filter by using the treated slag to remove arsenic and other ions from contaminated ground water and arsenic contaminated mining wastewater.
Remarks and Recommendation:
NOT RECOMMENDED i. The work is repetitive and lack novelty.

18. Project ID: 34 / 17- PERC /2018-19
Project Title: Development of open cell aluminium foams for heat sink and EMI Shielding Applications
PI: Dr. J.R. Nataraj, PhD email: natarajjr@rvce.edu.in
Implementing Institution: R.V. College of Engineering, Bengaluru
Project Cost : (Revised proposal not received) **Duration:** 3 years
Objectives :
• To develop Cr-free nickel based metal alloy as filler materials for welding stainless steel. • To generate phase diagrams for developed alloys • To optimize the chemical composition of the Cr-free nickel based alloy based on phase diagram, mechanical properties and corrosion resistance. • To characterise the weld joints (Base metal stainless steel) for mechanical and corrosion properties.
Remarks and Recommendation:
NOT RECOMMENDED i) PI absent.

7. Besides, the progress reports of 28 ongoing projects and draft final technical reports of 12 projects were also placed before the committee for recommendations. The committee gave their comments/ recommendations on these reports.

8. The details of draft final reports of completed projects reviewed by the committee with recommendations (12 nos.) :

1. Name of the project: Study of toxic fumes and development of Carbon nanotubes based sensing Device, CIMFR and Amity University (Jointly)

Duration: 3 Year F.No. 14/6/2009-Metal IV

Name of implementing institute: Central Institute of Mining & Fuel Research, Dhanbad and Amity Institute of Advance Research & Studies , Amity University, Sector –125, Noida.

Date of SSAG approval: 40th SSAG held on 28.4.2010

Total cost: Rs. 47.44 lakhs, share of MOM Rs. 47.44 lakhs [CIMFR- Rs. 27.684 lakhs, Amity University Rs. 19.756 lakhs]

1st installment: Rs. 26.580 lakh dt 30.9.2010,

2nd installment: Rs. 8.928 lakh (CIMFR) &Rs. 6.102 lakh (Amity) dt 8.1.2014.

Recommendations/ Remarks of PERC:

1. PI was advised to hand over the equipment to Ministry of Mines.

2. The final report was recommended for acceptance and project closure.

3. Recommended to release the balance project funds subject to submission of utilization certificate and statement of expenditure.

2. Name of the project: Mineral syste-matics and pre-concentration of PGE values from low grade chrome ores of Boula mines, Orissa.

Duration :3 years F.No. 14/23/2010-Metal IV

Name of implementing institute: Institute of Minerals & Materials Technology, Council of Scientific & Industrial Research, Bhubaneswar-751013, Orissa

Date of SSAG approval: 41st SSAG held on 7.6.2011

Total cost: Rs. 93,62,840/-, Share of MOM Rs. 93,62,840/-

1st installment: Rs. 49,31,160/- dt 9.9.2011,

2nd installment: Rs. 33,56,160/- dt 6.12.2013.,

3rd installment: Rs. 9,67,968/- dt 7.9.2015

Recommendations/ Remarks of PERC:

PI was absent.

3. Name of the project: Beneficiation of low grade iron ore and tailings by selective flocculation, Indian Scholl of Mines, Dhanbad.

Duration:3 years F.No. 14/20/2012-Metal IV

Name of implementing institute: Indian School of Mines, Dhanbad-826084 (Jharkhand)

Date of SSAG approval: 43rd SSAG dt. 18.12.2012

Total cost: Rs. 25.82 lakh

1st installment: Rs. 21.86 lakh dt 18.3.2013

Recommendations/ Remarks of PERC:

1. PI was advised to resubmit the final report incorporating following changes:

(i) Report should mention whether the product can substitute HGMS.

(ii) cost-benefits analysis.

4. Name of the project: Development of Super Thermal Aluminium (STAL) conductor for Indian Power Sector; JNARDDC, Nagpur & NFTDC, Hyderabad (Jointly)

Duration 3 years F.No. 14/20/2013-Metal IV

Name of implementing institute: Jawaharlal Nehru Aluminium Research Development & Design Centre, Nagpur and Non-Ferrous Technology Development Centre, Hyderabad.

Date of SSAG approval: 44th SSAG dt.18.122013

Total cost: Total 495.40 lakh [Rs. 226 lakh (JNARDDC, Nagpur) and Rs. 269.40 lakh (NFTDC, HYderabad)]

1st installment: Rs. 10 lakh (JNARRDC) and Rs. 10 lakh (NFTDC) dt 13.1.2014 & Rs. 56 lakh (JNARDDC) Rs. 64 lakh (NFTDC) dt. 13.8.2014,

2nd installment: Rs. 112 lakh to JNARDDC & Rs. 124 lakh to NFTDC dt 15.7.2015,

3rd installment: Rs. 43.2 lakh (JNARDDC) &Rs. 63.90 lakh (NFTDC) dt 29.8.2016

Recommendations/ Remarks of PERC:

1. The development of Super Thermal Aluminium (STAL) conductor for Indian Power Sector is a joint project of JNARDDC, Nagpur & NFTDC, Hyderabad wherein the former is responsible for development of material and its characterization followed by development of process and equipment for pilot scale operations by NFTDC.

2. The draft final report of JNARDDC has been received.

3. Stranding of wire to produce cable should be done.

4. The PIs were advised to prepare a combined final report of both JNARDDC and NFTDC and resubmit to the Ministry. The final report should contain a chapter on commercial applications of the product and cost-benefit analysis. PI, NFTDC was advised to be personally present for the review next time.

5. Name of the project: Development of copper bio-leaching methodology/ technique from tailing waste at Hindustan copper limited, Khetri,

Duration:3 years F.No. 14/22/2013-Metal IV

Name of implementing institute: Civil Engineering Department, Birla Institute of Technology & Science, Pilani, Rajasthan-333031

Date of SSAG approval: 44th SSAG dt 18.12.2013

Total cost: Rs. 30.38 lakh

1st installment: Rs. 16.38 lakh dt 2.5.2014 (1stinstt.),

2nd installment: Rs. 7.38 lakh dt 24.8.2016,

Recommendations/ Remarks of PERC:

1. PI was advised to get in touch with Hindustan Copper Ltd. for commercialization of the project findings.

2. The final report was recommended for acceptance and project closure.

6. Name of the project: Value addition in mine waste tailing materials through geopolymer formation; Christ University, Faculty of Engineering Kaniminike, Kumbalagodu, Bangalore-560060

Duration:3 years F.No. 14/15/2013-Metal IV

Name of implementing institute: Deptt. of Mechanical Engineering, Christ University,Faculty of Engineering, Kumbalagodu, Kaniminike, Bangalore- 560060.

Date of SSAG approval: 44th SSAG dt 18.12.2013.

Total cost: Rs. 12 lakh

1st installment: Rs. 5 lakh dt 5.5.2014

Recommendations/ Remarks of PERC:

1. PI was advised to resubmit the final report with the following inclusions.

(i) Compare the developed product with IS specifications.

(ii) Certification tests from BMPTC / CBRI/ IIT-Roorkee to be carried out.

(iii) Include cost benefit analysis in final report.

2. Recommended to release of balance fund, subject to submission of utilization certificate and expenditure statement.

7. Name of the project: Recoverable reserve estimation using non-gaussian copula-based orebody simulation along with open pit and stope optimization techniques, National Institute of Technology, Rourkela, Orissa and Indian Institute of Technology, Kharagpur (Jointly)

Duration 3 Years F.No. 14/23/2013-Metal IV

Name of implementing institute: Department of Mining Engineering, National Institute of Technology, Rourkela, Orissa- 769008 and Department of Mining Engineering, Indian Institute of Technology, Kharagpur, W.B-721302

Date of SSAG approval: 44th SSAG dt. 18.12.2013.

Total cost: Rs. 24.52 lakh

1st installment: Rs. 4.53 lakh to National Institute of Technology, Rourkela and Rs. 4.53 lakh to IIT, Kharagpur dated 8.5.2014,

2nd installment: Rs. 3.53 lakh (NIT) &Rs. 3.53 (IIT) dt 18.10.2016

Recommendations/ Remarks of PERC:

1. The final report was recommended for acceptance and project closure.

2. PI was advised to submit a one page write-up to Ministry regarding application of final project outcome so that it can be utilized by mine users in future.

3. Recommended to release the balance funds on submission of utilization certificate and statement of expenditure.

8. Name of the project: Development of hard and high temperature refractory material/aggregate from saprolite

Duration:3 Years F.No. 14/35/2014-Metal IV

Name of implementing institute: Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC),Amravati Road, Nagpur

Date of SSAG approval: 45th SSAG dt 4.12.2014

Total cost: Rs. 40.91200 lakh

1st installment: Rs. 26.88607 lakh dt 15.12.2014,

2nd installment: Rs. 8.19420 lakh dt 16.6.2016,

3rd installment: Rs. 5.24856 dt 21.9.2017

Recommendations/ Remarks of PERC:

1. The project objectives have been met.

2. The final report was recommended for acceptance and project closure.

3. PI was advised to generate bulk samples from nearby industries and tie up with industry for commercial production.

4. Recommended to release the balance project funds on submission of utilization certificate and statement of expenditure.

9. Name of the project: Development of TDR based wireless system for slope stability monitoring in opencast mines

Duration: 2 Years F.No. 14/59/2014-Metal IV

Name of implementing institute: National Institute of Technology, Rourkela - 769008, Odisha

Date of SSAG approval: 45 SSAG dt 4.12.2014

Total cost: Rs. 22.588 lakh

1st installment: Rs. 15.12 lakh dt 15.12.2014,

2nd installment: Rs. 9.6012 lakh dt 21.9.2016 (2nd& additional grant)

Recommendations/ Remarks of PERC:

1. The project objective has been met. The final report was recommended for acceptance and project closure.

2. The PI was advised to reinstall the TDR based wireless system (Time Domain Reflectometry) model at NALCO Mines for which NALCO will bear expenses and make logistics arrangements.

3. Recommended to release the final project balance on submission of utilization certificate and statement of expenditure.

10. Name of the project: Purification of commercial rare earth oxides, e.g. Ceria, by molten salt fusion and re-crystallization.

Duration:2 years F.No.14/8/2014-Metal IV

Name of implementing institute: Non-Ferrous Material Technology Development Centre (NFTDC), Hyderabad.

Date of SSAG approval: 45th SSAG dt. 4.12.2014

Total cost: Rs. 108.28 lakh

1st installment: Rs. 68.35 lakh dt 16.12.2014,

2nd installment: Rs. 35.93 lakh dt 4.7.2016

Recommendations/ Remarks of PERC:

PI & Co-PI absent.

11. Name of the project: Physico-chemical processing of low grade chromite ore for beneficiation and agglomeration of fines for recovery of metal values

Duration: 3 years F.No.14/23/2014-Metal IV

Name of implementing institute: Jadavpur University, Kolkata

Date of SSAG approval: 45th SSAG dt 4.12.2014

Total cost: Rs. 47.00 lakh

1st installment: Rs. 25.37 lakh dt 25.12.2014,

2nd installment: Rs.10.82 lakh dt. 9.1.2018,

Recommendations/ Remarks of PERC:

1. The up-gradation of low grade chromite ore has been achieved at lab scale. The valuation of chromite is found to increase with increasing metallic chromium contained in the product.

2. The findings indicate that alumino-thermic smelting technique can be applied in low power electric arc furnace for the production of carbon free ferrochrome which has very prominent strategic applications.

3. PI was advised to approach TATA or any other relevant industry for taking up the next stage of commercialization of the process.

4. The final report was recommended for acceptance and project closure.

5. Recommended to release the requested amount of project grant upon receipt of utilization certificate, expenditure statement and submission of proof of engagement with the industry.

12. Name of the project: Study of alkaline-carbonatite complexes as potential resource for REEs, NB-TA and U-TH

Duration: 3 years F.No. 14/49/2014-Metal IV

Name of implementing institute: Indian Institute of Technology, Roorkee- 247667, Uttarakhand.

Date of SSAG approval: 45th SSAG dt 4.12.2014

Total cost: Rs. 38.57500 lakh

1st installment: Rs. 25.891 lakh dt 9.2.2015,

Recommendations/ Remarks of PERC:

1. PI requested for release of the balance project funds and extend the duration upto 31st Dec 2018.

2. PI was advised to send the final report to CMD, MECL and GSI for exploring the usage of research findings.

3. Recommended for extension of time duration upto 31st Dec 2018 without any cost escalation.

4. Recommended to release of balance fund, subject to submission of utilization certificate and expenditure statement.

9. The details of ongoing projects reviewed by the committee with recommendations (28 nos.):

1. Name of the project: Development of viable technique for assessment of reclaimed land and for safety of structures under settling environment, NIRM, Karnataka.

Duration: 3 years F.No. 14/37/2012-Met.IV

Name of implementing institute: National Institute of Rock Mechanics, Champion Reefs, Kolar Gold Fields-563117, Karnataka.

Date of SSAG approval: 43rd SSAG dt. 18.12.2012

Total cost: Rs. 137 lakhs

1st installment: Rs. 59.50 lakh dt 28.1.2013

Recommendations/ Remarks of PERC:

1. PI presented the draft final report.

2. PI was advised to add one more chapter in the final report including the possible usage, cost, and advantages along with its utility during disaster management

3. PI was advised to submit the final report incorporating above suggestions.

4. Recommended to release of project funds upon submission of utilization certificate and statement of expenditure.

2. Name of the project: Estimation of seismic hazard in and around the mines out areas of Kolar Gold Fields, NIRM, Karnataka.

Duration:3 years F.No. 14/29/2012

Name of implementing institute: National Institute of Rock Mechanics, Kolar Gold Fields, Karnataka.

Date of SSAG approval: 43rd SSAG dt. 18.12.2012

Total cost: Rs. 63.57 lakh

1st installment: Rs. 56.71 lakh dt 28.1.2013.

Recommendations/ Remarks of PERC:

1. PI submitted that work has been completed. PI was advised to submit the draft final report.

2. Recommended to release balance project funds upon submission of utilization certificate and statement of expenditure.

3. Name of the project: Integrated approach for development of process models and pilot production of aluminium alloy extrudates using porthole dies

Duration: 3 Years F.No. 14/12/2014-Metal IV

Name of implementing institute: Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC), Nagpur.

Date of SSAG approval: 45th SSAG dt. 4.12.2014

Total cost: Rs. 298.06 lakh

1st installment: Rs. 50.52 lakh dt 15.12.2014

2nd installment: Rs. 194.02 lakh dt 21.7.2016

3rd installment: Rs.48.168 lakh dt. 22.11.2017

Recommendations/ Remarks of PERC:

1. PI presented the draft final report which was accepted and further informed that one day national seminar will be held for sharing the outcomes of the project with Indian extruders.

2. PI was advised to explore the possibilities of commercializing the outcomes of the project.

3. Recommended for submission of the final report, incorporating above suggestions, to the Ministry.

4. Name of the project: Development of Nickel containing steel from chromite over burden

Duration: 3years F.No. 14/51/2014-Metal IV

Name of implementing institute: Indian Institute of Technology, Kharagpur and Institute of Minerals & Materials Technology, Bhubaneswar (Jointly)

Date of SSAG approval: 45th SSAG dt 4.12.2014.

Total cost: Rs. 107.6214 lakh [Rs. 50.8164 lakh (IMMT), Rs. 56.805 lakh (IIT)]

1st installment: Rs. 26.8638 lakh (IMMT), Rs. 26.901 lakh (IIT) dt 15.12.2014

2nd installment: Rs. 11.7138 lakh (IMMT) & Rs. 16.601 lakh (IIT) dt 28.9.2017

Recommendations/ Remarks of PERC:

1. PI presented the progress of the project and requested for extension for carrying out large scale studies (with 10 kg of raw material)

2. Recommended for extension of project duration upto 31st March 2019 without any cost implications.

3. Further, committee opined that the recommendation of PERC during 2nd review (May 2018) should be complied.

4. Recommended to release of next installment subject to submission of utilization certificate and expenditure statement.

5. Name of the project: Development of low density emulsion explosives for energy efficient blasting in environmentally sensitive areas

Duration: 3 years F.No. 14/22/2014-Metal IV

Name of implementing institute: Indian School of Mines, Dhanbad-826004, Jharkhand

Date of SSAG approval: 45th SSAG dt 4.12.2014

Total cost: Rs. 29.134 lakh

1st installment: Rs. 18.95 lakh dt 16.12.2014

Recommendations/ Remarks of PERC:

1. PI presented the draft final report.

2. PI was advised to include following points in the final report.

i. Potential buyers.

ii. Cost wise comparison with existing conventions products.

iii. Cost benefit analysis.

3. PI was advised to submit the final report incorporating above suggestions.

6. Name of the project: Synthesis, characterization and photocatalyticperformance of metal doped semiconductor nanomaterials

Duration: 3 years F.No. 14/28/2014-Met.IV

Name of implementing institute: Aligarh Muslim University, Aligarh-202002

Date of SSAG approval: 45th SSAG dt 4.12.2014

Total cost: Rs. 28.5375 lakh

1st installment: Rs. 19.5285 lakh dt 29.12.2014

2nd installment: Rs. 4.3785 lakh dt 18.2.2016.

3rd installment: Rs. 4.16745 lakh dt 28.9.2017

Recommendations/ Remarks of PERC:

1. PI and Co-PI were not present.
2. Research fellow was sent to present the work to PERC
3. PI shall present the progress report in next PERC.

7. Name of the project: Production of geopolymer based construction material from pond ASH: an industrial waste

Duration: 3 year F.No.14/54/2014-Metal IV

Name of implementing institute: Gandhi Institute of Engineering and Technology, Gunupur, Odisha.

Date of SSAG approval: 45th SSAG dt 4.12.2014

Total cost: Rs. 28.95500 lakh

1st installment: Rs. 13.805 lakh dt 29.12.2014

2nd installment: Rs. 9.30 lakh dt 8.2.2016

3rd installment: Rs. 5.265 lakh dt 28.9.2017

Recommendations/ Remarks of PERC:

1. PI presented the draft final report.
2. PI was advised to include following points in the final report.

i. Cost effectiveness of product.

ii. Compare properties of developed product with available IS specifications/ standard.

3. PI was advised to submit the final report incorporating above suggestions.

8. Name of the project: Prospecting/Exploration of Platinum group of metals within Nega Hills ophiolite at Thengahu Ridge-Moke area, Phek District, Nagaland.

Duration: 3year F.No. 14/66/2014-Metal IV

Name of implementing institute: Directorate of Geology and mining, Government of Nagaland, Nagaland:Dimapur

Date of SSAG approval: 45th SSAG dt 4.12.2014

Total cost: Rs. 49.50 lakh

1st installment: Rs. 7.425 lakh dt 29.12.2014

2nd installment: Rs. 39.90 lakh dt 18.2.2016

Recommendations/ Remarks of PERC:

1. PI presented the progress of the project and requested for extension upto 31st March 2019 due to delay in sample analysis from NGRI.

2. Recommended for extension of time till 31st March 2019 without any cost implications.

9. Name of the project: Multi Centric Study of dust related diseases in stone mines and development of sustainable preventive program, NIMH, Nagpur.

Duration 3 years F.No.14/26/2012-Met.IV

Name of implementing institute: National Institute of Miners Health, JNARDDC, Campus, Amravati Road, Wadi, Nagpur-440023.

Date of SSAG approval: 43rd SSAG dt. 18.12.2012 (Approved in 45th SSAG)

Total cost: Rs. 260 lakh

1st installment: Rs. 111.31203 lakh dt 5.3.2015, Rs. 143.68797 lakh dt 2.6.2017 (Balance of 1stinstt.)

Recommendations/ Remarks of PERC:

1. The project has been completed.

2. PI was advised to submit the draft final report and also return the unutilized funds to the Ministry.

10. Name of the project: Novel synthesis routes for high purity kesterites (CZTS:Cu-Zm-Sn-S; Cu-Zn-Sn-Se) and development of cost kesiterite based solar PV cells and modules

Duration: 3 year F.No.14/34/2014-Metal IV

Name of implementing institute: Nonferrous Materials Technology Development Centre, Hyderabad

Date of SSAG approval: 45th SSAG dt 4.12.2014

Total cost: Rs. 101 lakh

1st installment: Rs. 42.712 lakh dt. 21.5.2015

2nd installment: Rs. 21.704 lakh dt 29.7.2016

3rd installment: Rs. 15.1956 lakh dt 21.9.2017

Recommendations/ Remarks of PERC:

1. PI presented the progress of the project and requested for extension upto 31st March 2019 considering the pending work related to :-

a) Exploration of non vacuum deposition of kesterite using plasma spray process.

b) Testing of cell in solar simulator, module integration and Module tesing.

c) Design and development of solar cell test bench for higher suns (1 to 500 suns)

2. Recommended for extension of time till 31st March 2019 without any cost implication.

11. Name of the project: Thin Film and Thin wire sensors for metallurgical industries

Duration:3 years F.No. 14/97/2015-Metal IV

Name of implementing institute: Non-ferrous technology development centre, Hyderabad

Date of SSAG approval: 46th SSAG dt. 2.12.2015

Total cost: Rs. 179.49 lakh

1st installment: Rs. 114.75 lakh dt 29.12.2015

2nd installment: Rs. 46.68 lakh dt 28.9.2017

Recommendations/ Remarks of PERC:

1. The project is progressing as per schedule.

2. PI was advised to undertake the remaining work relating to optimization of required multi-layers.

3. Establishing the response time and the resolution of the deposited TFTC and functional testing.

4. The 3rd year installment may be released as per schedule on submission of utilization certificate.

12. Name of the project: Synergistic utilization of aluminium industrial wastes for development of geopolymeric building materials

Duration:3 years F.No. 14/34/2015-Metal IV

Name of implementing institute: Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC), Nagpur and Swarnalata Holdings, Raipur, Chattisgarh (Jointly)

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 40 lakh

1st installment: Rs. 13 lakh dt.29.12.2015

2nd installment: Rs. 21 lakh dt 21.9.2017

Recommendations/ Remarks of PERC:

1. PI was advised to approach building material certifying agencies for obtaining the desired test certificate.

2. PI shall also contact Western Coalfields Ltd (WCL) to verify the property requirements of materials used for underground construction works (tunnels, explosion resistant wall etc) and check the suitability of geopolymenr products for WCL's applications.

3. National Highways Authority of India (NHAI) may be approached for using geopolymer as pre-cast concrete.

4. Progress of the project is satisfactory and the 3rd year installment may be released on submission of utilization certificate and statement of expenditure

13. Name of the project: Recyclability strategy or value-added utilization of iron/ manganese ore tailing/low grade ore:evaluation of energy storage capacities

Duration:3 years F.No. 14/74/2015-Metal IV

Name of implementing institute: Institute of Mineral & Materials Technology, Bhubaneswar

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 35 lakh

1st installment: Rs. 25 lakh dt. 29.12.2015

Recommendations/ Remarks of PERC:

1. PI has generated leaching data on two types of low grade ore using pure, combination of sulphuric acid/oxalic acid and both.

2. PI has requested for extension of the project by one year for undertaking trials to fabricate a model for the iron and manganese based oxalate or their heated product for possible energy storage application

3. Recommended for extension of the project duration by four (04) months without any cost escalation. The 2nd installment of funds is recommended for release on submission of utilization certificate and statement of expenditure.

14. Name of the project: Assessment and prediction of land surface deformation due to underground metal mining in northern aravali range of hills using microwave remote sensing data sets and ground based observation

Duration:3 years F.No. 14/39/2015-Metal IV

Name of implementing institute: Indian School of Mines, Dhanbad

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 45 lakh

1st installment: Rs. 25.6 lakh dt. 29.12.2015

2nd installment: Rs. 9.7 lakh dt 21.9.2017

Recommendations/ Remarks of PERC:

1. PI presented the progress of the project.

2. PI was advised to submit the final report within schedule time.

3. Recommended to release balance project funds based on utilization certificate and statement of expenditure.

15. Name of the project: Rare earth mineral concentration in the beach sands of uttarakannada coast: their economic viabilities and sustainable mining

Duration:3years **F.No. 14/75/2015-Metal IV**

Name of implementing institute: SDM College of Enginerring and technology, Dhavalagiri, Dharward.

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 29.44 lakh

1st installment: Rs. 18.20560 lakh dt 29.12.2015

Recommendations/ Remarks of PERC:

1. PI was advised to show on map how much area has been covered.

2. PI has to properly assign sr. number to bore holes for taking the samples.

3. Recommended to release the next tranche of fund upon receipt of utilization certificate and statement of expenditure.

16. Name of the project: Development of standard protocol of field audiometry for notifying noise induced hearing loss

Duration 3 year **F.No. 14/25/2015-Metal IV**

Name of implementing institute: National Institute of Miners' Health, Nagpur

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 40 lakh

1st installment: Rs. 23.60 lakh dt. 29.12.2015.

Recommendations/ Remarks of PERC:

1. PI has completed the scientific validation of field audiometry with standard protocol.

2. PI was advised to undertake the next phase of work to prescribe maximum permissible background noise levels for conducting Audiometry in Indian scenario.

3. The progress of project is satisfactory and it should be completed in time.

4. Recommended to release the next tranche of funds as per schedule on submission of utilization certificate and statement of expenditure.

17. Name of the project: Study the feasibility of treatment of seepage water from chromite mine quarries of Odisha.

Duration:3 year **F.No. 14/41/2015-Metal IV**

Name of implementing institute: National Institute of Tehchnology, Rourkela, Odisha

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 32 lakh

1st installment: Rs. 16 lakh dt 29.1.2016

2nd installment: Rs. 8 lakh dt 21.9.2017

Recommendations/ Remarks of PERC:

1. Progress of the projects was found to be satisfactory.

2. PI should undertake research to design and develop a bioreactor to treat the mine seepage water to meet the objective of providing safe water free from chromium contamination.

3. The next installment of funds is recommended for release as per schedule upon submission of utilization certificate and statement of expenditure.

18. Name of the project: Developing downstream application of strip cast aluminium alloys (AA8011 & AA3004)

Duration 2 year **F.No. 14/35/2015-Metal IV**

Name of implementing institute: JNARDDC, Nagpur, VNIT, Nagpur and NALCO, Bhubaneswar (Jointly)

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 31 lakh

1st installment: Rs. 15 lakh (JNARDDC), Rs. 6 lakh (VNIT) Dated 4.2.2016

2nd installment: Rs.4.5 lakh (JNARDDC), Rs.4.5 lakh (VNIT) dt. 31.3.2018

Recommendations/ Remarks of PERC:

1. PIs have requested for extension of project duration due to delay in setting up of anodizing lab

2. After technical evaluation, time extension is recommended upto 31st March 2019 without any cost escalation.

19. Name of the project: Mineralogical and geochemical characterization of Indian glauconites for alternative potassium fertilizers

Duration 3 year **F.No. 14/77/2015-Metal IV**

Name of implementing institute: Indian Institute of Technology, Bombay and National Geophysical Research Institute, Hyderabad (Jointly)

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 55 lakh [Rs. 27.5 lakh (IIT Bombay), Rs. 27.5 lakh (NGRI Hyderabad)]

1st installment: Rs. 12.5 lakh (IIT Bombay), Rs. 12.5 lakh (NGRI Hyderabad) Dt 29.2.2016

2nd installment: Rs. 7.5 lakh (IIT, Bombay) & Rs. 7.5 lakh (NGRI) dt 29.9.2017

Recommendations/ Remarks of PERC:

1. PI was advised to get permanent magnetic separation of dry glauconite done from Indian Bureau of Mines (IBM)

2. PI should explore possibility of extracting potash for fertilizers.

3. Extension will be considered in next PERC meeting, if required

4. Recommended to release the 3rdinstallmentof funds as per schedule on submission of utilization certificate and statement of expenditure.

20. Name of the project: Simulation of simultaneous rock fractures at multiple scales

Duration 3 year F.No. 14/22/2015-Metal IV

Name of implementing institute: Birla Institute of Technology & Science, Pilani, K K Birla Goa Campus, Goa

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 30 lakh

1st installment: Rs. 13.30 lakh Dt 10.3.2016

2nd installment: Rs. 7.79879 dt 28.9.2017

Recommendations/ Remarks of PERC:

1.PI has moved from BITS Pilani to IIT Delhi and requested to transfer the project to IIT Delhi, which was recommended.

2. PI to validate the software developed by trials in mines of NALCO.

3. Software to be installed in NALCO, HCL and NIRM.

21. Name of the project: Enhanced recovery of Manganese as electrolytic manganese dioxide (EMD) from ferro manganese mine tailings through bioleaching

Duration 3 year F.No. 14/8/2015-Metal IV

Name of implementing institute: Siksha O Anusandhan University, Khandagiri, Bhubaneswar

Date of SSAG approval: 46th SSAG dt 2.12.2015

Total cost: Rs. 30 lakh

1st installment: Rs. 12.39108 lakh dt 14.3.2016, Rs. 4.20892 lakh dt 29.7.2016 (balance of 1st instt)

Recommendations/ Remarks of PERC:

PI was absent.

22. Name of the project: Geochemical studies of the archasean greestone belts of the aravallicration, Northwestern Indian shield" Implication for crustal evolution and economic potential

Duration:2 years F.No. 14/4/2016-Metal IV

Name of implementing institute: Aligarh Muslim University, Aligarh

Date of SSAG approval: 47th SSAG dt.23.8.2016

Total cost: Rs. 22.321 lakh

1st installment: Rs. 11.716 lakh dt19.10.2016

Recommendations/ Remarks of PERC:

PI was absent.

23. Name of the project: Postural risk analysis of mining equipment operators and its relation to musculoskeletal disorders

Duration: 2 years F.No. 14/29/2016-Metal IV

Name of implementing institute: National Institute of Miners' Health, Nagpur

Date of SSAG approval: 47th SSAG dt. 23.8.2016

Total cost: Rs. 37.66 lakh

1st installment: Rs. 24.85 lakh dt 19.10.2016

Recommendations/ Remarks of PERC:

1. Poor progress made despite lapse of about two years.

2. Recommended for foreclosure.

3. All unspent balance and interest earned to be refunded to Ministry of Mines. Audited accounts to be submitted.

24. Name of the project: Effect of modified seed properties in precipitation of aluminium hydroxide from bayer liquor

Duration: 2 years F.No.14/41/2016-Metal IV

Name of implementing institute: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur

Date of SSAG approval: 47th SSAG dt. 23.8.2016

Total cost: Rs. 44.99 lakh

1st installment: Rs. 24.80 lakh dt 19.10.2016

Recommendations/ Remarks of PERC:

1. Project is expected to be completed by Oct 2018 and progress is found to be satisfactory

2. PI was advised to focus on commercial utility of research in consultation with NALCO.

3. Recommended to release the 2nd year installment on submission of utilization certificate and statement of expenditure.

25. Name of the project: Extraction of potash values from silicate rocks.

Duration:2 years F.No.14/75/2016-Metal IV

Name of implementing institute: Indian Institute of Technology, Roorkee, Uttarkhand

Date of SSAG approval: 47th SSAG dt. 23.8.2016

Total cost: Rs. 20 lakh

1st installment: Rs. 17.35 lakh dt 19.10.2016

Recommendations/ Remarks of PERC:

1. PI should diagrammatically represent the result in the final report.

2. Project is expected to be completed by Oct 2018 and progress is found to be satisfactory.

3. Before preparation of the final report, the PI is advised to invite mining and fertilizer experts and discuss the final outcomes with them for its commercial applications. The proceedings of meeting should be presented to the next review committee (PERC)

4. Recommended to release the 2nd year project component subject to submission of utilization certificate and statement of expenditure.

26. Name of the project: Technology Development (TRL-7) for calico- thermic reduction of rate earth metal oxides and establishment of pilot plant for extraction and purification of samarium

Duration:2 years F.No.14/74/2014-Metal IV

Name of implementing institute: Non-ferrous technology development centre, Hyderabad

Date of SSAG approval: 47th SSAG dt. 23.8.2016

Total cost: Rs. 186.50 lakh

1st installment: Rs. 107 lakh dt 19.10.2016

2nd installment: Rs.71.55 lakh dt.15.6.18

Recommendations/ Remarks of PERC:

1. PI was advised to verify the purity of samarium recovered in the project at reputed institute/ lab.

2. The PI requested for extension of time.

3. Recommended for extension of project duration upto 31st March 2019 without cost escalation.

27. Name of the project: Large scale digital database creation of Bauxite & Laterite deposits of Maharashtra State Using geo-informatics technology

Duration : 2 years F.No.14/40/2016-Metal IV

Name of implementing institute: Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC, Nagpur & Maharashtra Remote Sensing Application Centre, Nagpur (Jointly)

Date of SSAG approval: 47th SSAG dt. 23.8.2016

Total cost: Rs. 69.5484 lakh [Rs. 43.8234 lakh (JNARDDC), Rs. 25.725 lakh (MRSAC)]

1st installment: Rs. 29.4117 lakh (JNARDDC), Rs. 12.8625 lakh (MRSAC) Dt 25.10.2016

Recommendations/ Remarks of PERC:

1. PI was advised to include a map of Maharashtra depicting chemical analysis of high and low grade bauxite with geo-informatics technology.

2. Progress of the project is found to be satisfactory.

3. PI should also compare the data being prepared with the similar operating mines to validate the data generated.

4. Recommended to release the 2nd year installment on submission of utilization certificate and statement of expenditure.

28. Name of the project: Development of environment friendly blasting techniques.

Duration:3 years F.No. 14/15/2015-Metal IV

Name of implementing institute: Indian School of Mines, Dhanbad.

Date of SSAG approval: 47th SSAG dt. 23.8.2016

Total cost: Rs. 29.04 lakh

1st installment: Rs. 14.865 lakh dt 25.7.2017

Recommendations/ Remarks of PERC:

1. PI was advised to arrange the trial blast at mines of Nalco & Hindustan Copper Ltd.

2. Progress of the project is found to be satisfactory.

3. Recommended to release the 2nd year component on submission of utilization certificate and statement of expenditure.

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

LIST OF PARTICIPANTS OF 17TH PERC MEETING HELD AT JNARDDC, NAGPUR

On 19 – 20 July 2018

	SN	Shri Alok Chandra Economic Adviser, Ministr of Mines	Chairman
1.		Dr. Amit Saran Director, Ministry of Mines	Member
2.		Dr. K. Balasubramanian Director, NFTDC Hyderabad	Member
3.		Prof. T.C. Rao Ex. Director, RRL Bhopal	Member
4.		Dr. A. Agnihotri Director, JNARDDC & NIMH (I/c)	Member
5.		Dr. H.S. Venkatesh Director, NIRM	Member
6.		Shri Rajendra Singh Chief Scientist & Head, CIMFR, Dhanbad	Representative Member
7.		Dr M. K. Ghosh, Head, Hydro and Electrometallurgy Dept, CSIR-IMMT	Representative Member
8.		Shri Subrata Kar GM (R&D),NALCO,Bhubaneswar	Representative Member
9.		Shri C.K Thoolkar, GM (GS) MECL, Nagpur	Representative Member

Leave of absence granted to Director (Tech.), Deputy Secretary (Integrated Finance), Ministry of Mines: Director, IIT-Kharagpur: Director, ISM, Dhanbad: Adviser (STAC-DST): CMD-HCL, Kolkata and Prof. SP Mehrotra, IIT-Gandhinagar