

**Minutes of 15th PERC meeting held under the chairmanship of Shri Subhash Chandra ,
Joint Secretary M/o Mines on 15-16 July 2016 at NFTDC, Hyderabad**

1. A total of 108 project proposals received for the year 2016-17. A three stage review process was adopted to evaluate the proposal for recommendation to Standing Scientific Advisory Group (SSAG). The first stage comprised of preliminary screening of the proposals done by a small team of experts drawn from PERC. Based on the guidelines as adopted in 14 PERC, the experts conducted pre-screening of the proposals. 37 proposals covering five areas, namely (i) geosciences and exploration, (ii) mining related, (iii) ore dressing and mineral processing, (iv) extraction and (v) specialty materials and rare earths were short listed for further review in the second stage. The soft copies of proposal were sent to at least 2 experts in each of these categories in the detailed review. The Principal Investigators (PIs) of all these 37 proposals were called for presentation and evaluation in the third stage by the experts from PERC on 15th July 2016 at NFTDC, Hyderabad.

2. The following criteria was given to all experts for detailed evaluation both from proposal as well as during presentations by the PIs.

- (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 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.

Overall Rating and final recommendation to SSAG

- (a) Recommended with or without changes to next level SSAG
- (b) To be revised and resubmitted in next PERC
- (c) NOT recommended

3. Based on the detailed review and evaluation, the following **Eleven** Project proposals comprising of (i) two from geosciences and exploration, (ii) four from mining related areas including occupational health related, (iii) four from mineral processing and (iv) one in the area of specialty materials of rare earth extraction and purification are being recommended to SSAG with some revisions.

3.1 One of the important aspects that is emphasized in the revision and made mandatory is to reduce the time duration of the projects in most cases from 3 years to 2 years with attendant reduction in budget outlay. In addition, a few other revisions were suggested which are given specific for each of the recommended projects to be carried out by the PIs/implementing institutions before being considered for SSAG. Out of 11 recommended projects, three are from academia, namely AMU, ISM and IIT Roorkee with emphasis on new techniques and methods with an eye on near future application potential if successful. This is keeping in line with the decision of SSAG to fund those projects with a direct application potential while encouraging a few deserving projects in the academic systems as well in a 80-20 paradigm.

3.2 The rest 8 proposals are from laboratories as in JNARDDC, NIMH, IMMT and NFTDC, wherein the emphasis is on quicker development and direct translation to user agency or commercial exploitation. Here, NFTDC and JNARDDC (in one project) have significant co-funding, proven proof of concept, scale-up activity as the project proposal and direct application and lesser time duration for project execution. In line with emphasis on co-funding, particularly for well established labs, it is recommended that IMMT being a CSIR lab with large resource base available for funding in CSIR system, should get co-funding.

3.3 NIMH is recommended henceforth as a policy to tie-up with appropriate and relevant research institutions in medical field as well as have medical professional in the project team. It is important that NIMH develops working relationships and partnerships with other Medical institutions and Hospitals in the areas of interest to Miners Health, such as TB and respiratory diseases, musculoskeletal (orthopedic) and hearing related/auditory diseases (ENT) and other Institutions working in occupational health related issues. A panel of such research institutions, hospitals as well as physicians and surgeons, particularly in Nagpur and other neighbouring cities area to be identified and NIMH should enter in to MOUs with them. Such institutions can also become Co-PIs in the project proposals. This measure would not only enhance the quality of research potential translation from lab to practice but also will lend higher level of credibility to the proposed research. A Standing Review Committee is constituted for this purpose which is elaborated in Clause 7 in this minutes.

4. The details of recommended projects and specific recommendations are given hereunder.

Category - 1 : Geosciences and Exploration related (2 Projects)

4.1 Project ID: 05 / 15PERC /2016-17

Project Title: Geochemical studies of Archaean greenstone belts of Aravalli craton, Northwestern Indian Shield: Implications for crustal evolution & economic potential

PI: Prof. Md. Erfan Ali Mondal, Phd, **Email :** Erfan.mondal@gmail.com

Implementing Institution: Department of Geology, AMU Aligarh

Project Cost : Rs. **28.10 L**

Duration: **3 years (to be 2 years)**

Objectives :

(i) To generate high quality geochemical data comprising major, trace and rare earth elements of mafic/ultramafic rocks of identified areas ie. Jawariya-siana-tasol, and rakhiawal-mavli-jagat areas; (ii) To constrain nature of their mantel sources, conditions of partial melting and subsequent modification of mantel derived melts during their ascent; (iii). To delineate the tectonic environment prevailing at the time of eruption/emplacement of mafic rocks using geochemical data etc.

Remarks and Recommendation: YES with following mandatory revisions

As the target is PGE metals which is of strategic value, PERC observed that the investigations in the project proposal has merit. (i) reduce project duration to 2 yrs and accordingly reduce budget; (ii) mapping on 25K scale to be added in objectives;

4.2 Project ID: 17/ 15PERC /2016-17

Project Title: Large scale digital database creation of bauxite & laterite deposits of Maharashtra state using geo-informatics technology

PI: Dr. Bhukte, JNARDDC; Co-PI: Dr Deshpande MRSAC)

Implementing Institution: (JNARDDC), Nagpur and Maharashtra Remote sensing application Centre, Nagpur (Jointly)

Project Cost : 43.8234L (JNARDDC) + 38.325 L (MRSAC) = Total + **82.1484 L**

Duration: 2 years

Objectives :

(i) Optimum use of bauxite and laterite resources of Maharashtra requires proper techno-economic data and information. Mere geological, exploration and mining data are not sufficient for this purpose. Evaluation of bauxite and laterite is essential to establish their suitability for metallurgical and other industrial uses. (ii) The present JV activity shall provide the much required solution. Alumina plants which are starving for proper grade of ore and using inferior grade of bauxite can identify possible deposits from the JV activity.

Remarks and Recommendation: YES with following mandatory revisions

(i) **Budget is excessive and to be rationalized;** (ii) Billing to the project of either man-hours or own facility utilization by MRSAC is not permitted as MRSAC is a participating applicant and Co-PI in this project. (iii) Detailing of work component to be made more precise; (iv) Co-PI from GSI (Nagpur) to be added.

Category 2 : Mining Related (4 Projects)

4.3 Project ID: 36/ 15PERC /2016-17

Project Title: Development of environment friendly blasting techniques

PI: Dr. B.S. Choudhary

Email : Bhanwar_ism@hotmail.com

Implementing Institution: ISM, Dhanbad

Project Cost : Rs. 29.04 Lakhs

Duration: 3 years

Objectives :

(i) Development of blasting accessories (blast hole column plugs, spacers, stemming materials; (ii) To investigate the influence of blasting accessories on fly rock, ground vibration, air overpressure, toe generation, boulder generation, boulder generation and damage to the high wall with the help of state of art instruments; (iii) To investigate the influence of blast design changes with respect to the rock characterization (physic-mechanical properties, in-situ block size)

Remarks and Recommendation: YES with following mandatory revision.

(i) This project was submitted in earlier PERC and PI was asked to revise so as to include field validation in actual mines and also obtain permission letters from mines. PI has obtained for 3 mines. PERC observed that for the technique to be proved, it is necessary to add more mines totaling up to 10 and include manganese and bauxite mines as well in field validation.

(ii) in view of validation in more number mines to obtain meaningful data, the project duration will be 3 years.

4.4 Project ID: 01 / 15PERC /2016-17

Project Title: Design of Eco-friendly thickened tailings slurry pipelines for surface disposal and mine backfilling system

PI: Dr. P.K. Senapati, Email Id: Pksenapati@immt.res.in

Implementing Institution: IMMT , Bhubaneswar

Project Cost: Rs. 50.9L

Duration: 3 years (to be 2 years)

Objectives:

In order to design the thickened tailings slurry disposal pipelines for surface as well mine backfill system, studies will be conducted with the following objectives: (i) Complete characterization of tailings samples including particle size distribution, chemical composition, pH geotechnical and geo-mechanical characteristics. (ii) Preparation of thickened tailings slurry (60-70% by weight and above) using appropriate techniques. (iii) Rheological studies of tailings samples using precision rotational Rheometer (Model: Rehostress 1 and slump tests etc.)

Remarks and Recommendation: YES with following mandatory revisions

(i) Budget provision is excessive and requires significant revision.

(ii) Project duration to be revised to two years only.

(iii) The present objectives are very limited in scale to laboratory levels and rheological studies and sump level tests as an end point; Establishment of pilot plant and field level validation at a mine site to be made of objectives

(v) Co-funding from CSIR (at least 50%) to be obtained and **MoM contribution to a maximum of Rs 20 lakhs over two year period.**

4.5 Project ID: 09 / 15PERC /2016-17

Project Title: High prevalence of pulmonary tuberculosis among Sahariya tribe of MP - Inquest into role of occupational silica exposure.

PI: Dr. Sarang Dhatrak, Phd Email Id: directornimh@gmail.com,

Implementing Institution: NIMH, Nagpur

Project Cost: Rs 28.7 L

Duration: 3 years

Objectives:

(i) To access the role of occupational exposure of silica in predisposition of tuberculosis in Sahariya tribe; (ii) To estimate burden of silicosis and silico-tuberculosis in known/suspected cases of tuberculosis in Sahariya tribe; (iii) To suggest suitable preventive modalities to control TB secondary to silica exposure; (iv) Rheological studies of tailings samples using precision rotational Rheometer (Model: Rehostress 1 and slump tests etc.

Remarks and Recommendation: YES with following mandatory revisions

Medical professionals to be involved as Co-PIs and proposal to be resubmitted to PERC
TB Institute at Chennai can be officially contacted by NIMH

4.6 Project ID: 13 / 15PERC /2016-17

Project Title: Postural risk analysis of mining equipment operators and its relation to musculoskeletal disorders.

PI: Dr. Bibhuti Bhusan Mandal, Phd

Email Id: bbmandal@gmail.com

Implementing Institution: NIMH, Nagpur

Project Cost: Rs 37.66 L

Duration: 2 years

Objectives:

- (i) To determine prevalence and type of MSDs among operators of selected mining equipment;
- (ii) Postural analysis and identification of risk factors in operation of mining machinery with higher prevalence of MSD; (iii) To establish relationship between ergonomic risk factors and occurrence of MSD etc.

Remarks and Recommendation: YES with following mandatory revisions

Medical professionals to be involved as Co-PI. Orthopedic Surgeons in established institutions to be made part of study.

CATEGORY : 3 Ore Dressing and Mineral Processing (4 Projects)

4.7 Project ID: 18/ 15PERC /2016-17

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

PI: Dr.(Mrs.) Suchita Rai,

Email: Suchitarai1968@gmail.com

Implementing Institution: JNARDDC, Nagpur

Project Cost : Rs 49.646 L

Duration: 2 years

Objectives :

- (i) To explore the possibility of using seed aluminium hydroxide with changes surface properties to enhance the liquor productivity in precipitation process. This involves alteration/modification/change in the surface properties of the seed alumina hydrate by thermal activation; (ii) Optimization of precipitation parameters by using seed aluminium hydroxide with modified surface properties and to study the kinetics of the process.

Remarks and Recommendation: YES with following mandatory revisions

- (i) add effect of Gibbistic seeds on precipitation kinetics;
- (ii) Budget outlay is on the higher side, given that JNARDDC has significant facility in bauxite leaching lab;
- (iii) reduce to 2 years with corresponding reduction in budget to below Rs 40 Lakhs over 2 years.
- (iv) explore co-funding from Aluminium companies.

4.8 Project ID: 23/ 15PERC /2016-17

Project Title: Development of ecofriendly bio-based reagents for mineral floatation

PI: Dr (Mrs.) Nilotpala Pradhan, Phd,

Email: npradhan@immt.res.in

Implementing Institution: IMMT, Bhubaneswar.

Project Cost : Rs 30.82400 L

Duration: 3 years (to be 2 years)

Objectives :

(i) Identification, evaluation and characterization (biochemical and molecular aspects) of potential surface active bio-molecules produced from biomasses of plant, algal, fungal and other prospective species; (ii) Studying efficacy of such molecules for their possible application in selective mineral floatation and dewatering of concentrates/tailings.

Remarks and Recommendation: YES with following mandatory revisions

(i) instead of algae or fungal go in only for reagents based on plant extracts;
(ii) End point of this project cannot just be lab scale studies, but should include scale up and validation in pilot plant which is available in IMMT itself. Scale up should be part of deliverables;

(iii) Co-funding by CSIR up to 50% to be obtained and MoM contribution to be maximum of Rs 12 lakhs over two year project duration.

4.9 Project ID: 31/ 15PERC /2016-17

Project Title: Extraction of potash values from silicate rocks

PI: Dr. Nikhil Dhawan, **Email:** Nehawan.fmt@iitr.ac.in

Implementing Institution: IIT, Roorkee.

Project Cost : Rs. 26.04 L

Duration: 3 years (to be 2 years)

Objectives :

The prime objective of the present research proposal is to develop a process route for effective utilization of silicate rocks to extract potash values. This will certainly reduce our potash import demands and many agricultural/ mine sites can benefit from the project findings. (i) Characterization of different silicate rocks for their use in crops; (ii) Conventional beneficiation of silicate rocks such as feldspar, mica, glauconitic sandstone, nepheline syenite utilizing gravity and flotation techniques etc.

Remarks and Recommendation:

(i) Project deliverable to aim for scale up to at least one kg scale output in process flow development;

(ii) emphasis to be on glauconitic sandstone; Nepheline Syenite;

(iii) Project duration to be reduced to 2 years with corresponding reduction in Budget with a maximum outlay being Rs 20 lakhs for 2 year period.

4.10 Project ID: 16/ 15PERC/ 2016-17

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, PhD **Email Id:** Mukeshchaddha1@yahoo.com (JNARDDC)

Co PI: Prof. (Dr) Biswabandita Kar, PhD **Email Id:** drbbkar@gmail.com (KIIT)

Implementing Institution: JNARDDC Nagpur, KIIT Univ, Bhubaneswar and NALCO, Bhubaneswar (Jointly)

Project Cost: JNARDC =44.225L + KIIT = 45.536L; Total = Rs 89.761 L

Duration: - 3 Years

Objectives:

(i) The objective is to develop a commercial process for the use of red mud as a raw material for the manufacture of minimum die blocks of 1 ftx1ftx1ft for application in controlling sea bed erosion; (ii) The process includes three major aspects (a) laboratory scale product optimization

(fine tuning etc) (b) utilization of the products at the coastal area like that of kendraparha coast and (c) monitoring its suitability.

Remarks and Recommendation: YES with following mandatory actions.

(i) Involve an Ocean Research and Development Institute for testing;

(ii) Budget outlay to be rationalized down to Rs 72 Lakhs - given that a lot of preliminary work is already done.

(iii) As NALCO is an industry partner in this project and as this project envisages large scale utilization and off take of red mud, NALCO to co-fund at least 30%.(Rs 24 lakhs out of 72 Lakhs)

(iv) Involve user agency such as PWD and Disaster Management Authority;

(v) Project deliverable should include pilot plant/pilot production and validation in actual coastal belt which is heavily prone to cyclones and has significant habitation nearby.

(vi) Explore concurrent technology transfer to local SMEs or start - ups and utilize the programmes initiated for them.

CATEGORY : 5 Specialty Materials, Rare Earths

4.11 Project ID: 30/ 15PERC /2016-17

Project Title: Technology Development (TRL-7) for calico-thermic reduction of rare earth metal oxides and establishment of pilot plant for extraction and purification of samarium

PI: Dr. Hareesha Iddya,

Email: hareesha@nftdc.res.in

Implementing Institution: NFTDC, Hyderabad

Project Cost : Rs 336.5 > MoM: 186.5 Lakhs and NFTDC: 150 Lakhs; **Duration:** 2 years

Objectives :

(i) Scaling up of technical know-how for Calcio-thermic reduction of samarium oxide from lab scale TRL-3 to a technology demonstration pilot plant at TRL-7 level; (ii)Design, development and rendering of vacuum reactor for reduction of rare oxides by liquid calcium followed by in-situ liquid tin wash at a scale of 30 kg of samarium metal equivalent per batch; (iii)Design and development of vacuum distillation of samarium-tin liquid melt to obtain high purity samarium and recycling of tin etc.

Remarks and Recommendation: YES

(i) RE metals are not being extracted as of now in India even in pilot scale and the requirements are met by imports. (ii) Subsequent to National Level Review by NITI Ayog and Office of PSA it was observed that Technology Centers like NFTDC should take up this activity leading to Pilot scale on priority; (iii) NFTDC did the lab scale work in the last 18 months starting with IREL based RE oxides and the scale up of feasible process flow sheet being taken up. (iv) A fully engineered pilot plant with design and manufacturing will be available as deliverable which will enable technology transfer. Co-funding from NFTDC resources is very significant in this project. PERC observed that potential for tech transfer and scalability very high. PERC observed that this project to be done on priority and completed within 24 months.

5.0 Projects NOT recommended.

The following 26 project proposals have not been recommended. In these 26 proposals, one or more of the following have been observed: (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. In the case of health care related projects it is now necessary to make it mandatory have medical research institutions and professionals in the project team.

5.1 Project ID: 04 / 15PERC /2016-17

Project Title: Correlation of Stress magnitude estimated using acoustic emission technique any hydro fracture method

PI: Dr. D.S. Subrahmanyam ; **Implementing Institution:** NIRM Karnataka.

Project Cost: Rs. 113.86 L

Duration: 3 years

Objectives:

(i) The main objective of the project is to evaluate possible correlation between stress measurements made from hydro-fracturing method and from acoustic emission techniques; (ii) To fulfill the objectives, it is proposed to conduct the hydro fracture tests inside NX size boreholes at various places (inside underground tunnel, underground mine etc.) and estimate the stress magnitude at various zones and depths. Cores will be collected from these sites, the stress magnitude will be estimated in the laboratory by using acoustic emission technique (Kaiser effect). Based on these studies, a suitable trend and correlation of stress will be devised between estimates made from the two methods.

Remarks and Recommendation: NOT Recommended

The proposal was presented in 13 PERC. NIRM routinely gets client service based work for hydro fracture tests for obtaining real data. As samples are available, this study aims to conduct acoustic emission studies to see if there is any correlation. The budget outlay for consumables is high and it only subsidizes the clients of NIRM. This study is mostly of academic interest and it can be done at much lower budget and its efficacy for substituting the hydro-fracture test is limited. PI's knowledge on fundamentals and scientific principles of acoustic emission methods and interaction of sonic waves with multi - phase materials is lacking.

5.2 Project ID: 29/ 15PERC /2016-17

Project Title: Accurate detection of mineral deposits using UAV based hyper spectral sensor

PI: Dr. S.Vasuki, Phd

Email: sv@vcet.ac.in

Implementing Institution: Velammal College of Engineering and Technology, Madurai

Project Cost : Rs. 43.89 L

Duration: --

Objectives :

(i) To develop a low cost, long range and long endurance UAV specifically for mineral exploration; (ii) To generate highly accurate low altitude hyper spectral data cubes using low cost and light weight hyper spectral camera.; (iii) To develop a fast and accurate algorithm for

detection of mineral deposits by selection of particular spectral bands; (iv) to validate results from UAV based hyper spectral mineral exploration with traditional data; (v) To demonstrate to government mining and exploration agencies on the benefits and its applicability of the final outcome of the project.

Remarks and Recommendation: NOT Recommended

(i) PI strength is in UAV and image processing; (ii) Domain strength in mineralogy, magnetic anomaly analysis are not available. PI is advised to interact with domain experts and conduct preliminary investigations particularly in combining UAV mode and magnetic anomaly at higher resolution in an interdisciplinary mode.

5.3 Project ID: 03/ 15PERC /2016-17

Project Title: Rare earth magnetic nano composites for high energy product permanent magnets

PI: Dr. Manoj Rama Verma, Phd

Email : manojrammavarma@yahoo.co.uk

Implementing Institution: National Inst for interdisciplinary Sc & Tech, Tvm

Project Cost : Rs. 200.352 L

Duration: 3 years

Objectives :

(i) To develop rare earth based intermetallics hard magnetic compositions based on the basic compositions neodymium-iron ($\text{Nd}_2\text{Fe}_{14}\text{B}$), samarium- cobalt (SmCo_5 , $\text{Sm}_2\text{Fe}_{17}\text{Nx}$), doped with following transition metal: divalent metals Cu, Zn, No Trivalent metals Cr, Co tetravalent Ti, Zr and pentavalent metal W and rare earth metals to increase magnetization and magnetocrystalline anisotropy; (ii) To develop soft magnetic phases viz, high purity iron (Armco iron), Ni_3Fe , NiMnSb , Ni_2MnSb , MnSb , MnAlGe , and Mn_2Sn etc.

Remarks and Recommendation: NOT Recommended

Significant work is already done in PM based routes to RE magnets in India by BARC, DMRL, NIFTDC, and other leading laboratories. This study is of more basic nature aimed at investigating dopants to increase the magnetic properties. There are large number of studies done all over the world in this area. Experimental investigations on such magnetic property improvements in RE magnets by PM routes require very expensive processing and characterization facilities. PI is advised to approach their CSIR itself for funding for basic research.

5.4 Project ID: 28/ 15PERC /2016-17

Project Title: Production of energy materials from Ni & V bearing spent catalysts

PI: Dr. Barsha Dash,

Implementing Institution: IMMT Bhubaneswar

Project Cost : Rs. 22.8482 L

Duration: 3 years

Objectives :

(i) To synthesize battery grade nickel hydroxide and vanadium pentoxide from spent Ni and V bearing catalysts.

Remarks and Recommendation: NOT Recommended

The proposed research is preliminary laboratory scale work which can be done within the facilities already available.

5.5 Project ID: 07 /15PERC /2016-17

Project Title: Development of image processing based system for automatic ore sorting in mining industry

PI: Dr. Debi Prasad Tripathy, Phd

Email Id: dptripathy@nitrkl.ac.in

Implementing Institution: Dept of Mining Engg, NIT, Rourkela

Project Cost: Rs 25.20 L

Duration: 3 years

Objectives :

(i)To capture image for study color, textural features of different ores limestone and iron ores) and gangue materials ; (ii)To develop feature extraction algorithm to extract features from each object in the images captured (iii)To develop software for automatic ore sorting using MATLAB

Remarks and Recommendation: NOT Recommended

This is a not a thrust area of research and furthermore, the objectives are very sketchy.

5.6 Project ID: 10 / 15PERC /2016-17

Project Title: Development of blasting methodology for improvement in productivity & reduction in CO2 emission from reduced explosive & energy consumption in opencast mines.

PI: Dr. Gyanindra Kumar Pradhan,

Email Id: gkpradhan@aksuniversity.ac.in

Implementing Institution: Department of Mining Engg, AKS Univeristy, Sherganj, Satna, M.P.

Project Cost: Rs 37.82400 L

Duration: 2 years

Objectives:

(i)To study the blasting methodology and optimization in opencast mines of NALCO (Panchpatmali Bauxite Mine), HCL (Malanjkhanda copper project), and Utkal alumina international (Baphlimali Bauxite mine); (ii)Development of a methodology to reduce explosive energy and optimizing the energy factor in blasting along with possible reduction in CO2 emission in blasting-loading-transportation and crushing in opencast mines for day-to-day monitoring.

Remarks and Recommendation: NOT Recommended

To study the present blasting methodology of NALCO and HCL, the PI should interact and work with those companies directly and the companies can directly fund such studies in their R & D budget if there is merit.

5.7 Project ID: 19 / 15PERC /2016-17

Project Title: Assessing the environmental impact of chromite mining on the microbial ecology: A case study of Sukinda, Odisha

PI: Dr. Kiran Kondabagil, Phd

Email Id: kirankondabagil@iitb.ac.in

Implementing Institution: IIT, Bombay

Project Cost: Rs. 77.29861 L

Duration: 3 years

Objectives:

(i) Enumerating microbial fingerprint of soil samples from 3 chromite-mining sites.

This objective involves basis physicochemical characterization of the samples, determination of total viable count, isolation of total environmental DNA, construction of metagenomics library, amplification and shotgun sequencing of the total DNA along with the control dataset. Both 16S

and metagenomic sequencing will be performed to understand the true microbial biodiversity of the selected locations etc.

Remarks and Recommendation: NOT Recommended

The study is more of basic nature and only soil samples are from a mining area. PI may approach Dept of Biotechnology for support of this kind of investigation.

5.8 Project ID: 22 / 15PERC /2016-17

Project Title: Studies on Environmental impact of gold mining in Karnataka in relation to arsenic contamination; development of sensors and novel, green remediation processes

PI: Prof. Praveen C. Ramamurthy, Phd

Email

Id:

Praveen@materials.iisc.ernet.in

Implementing Institution: IISc Bangalore

Project Cost: Rs 89.0800 L

Duration: 3 years

Objectives:

(i) Based on scientific studies, establishment of the role of gold mining and processed waste disposal in arsenic dissolution, mobility and speciation in surface and ground waters; (ii) Development of sensors for arsenic for contaminated water monitoring; (iii) Novel, green technologies based on bioflocculants and sea shells as super biosorbents for arsenic.

Remarks and Recommendation: NOT Recommended

This study is of basic research and Dept of Biotechnology is the appropriate forum.

5.9 Project ID: 24 / 15PERC /2016-17

Project Title: Hybrid presrix process for simultaneous remediation of acid mine drainage and recovery of individual metal sulfides

PI: Dr. Sudipta Sarkar, Phd

Email Id: srkarfee@iitr.ac.in

Implementing Institution: Department of civil engineering, IIT Roorkee

Project Cost: Rs 45.36 L

Duration: 3 years

Objectives:

(i) It will neutralize the acidity in the polluted water by generating enough alkalinity; (ii) It will remove the heavy metals and total dissolved solids content of the AMD; (iii) It will remove the heavy metal ions in their sulfide form that shall sequentially get precipitated out from the AMD so that almost pure metal sulfides can be obtained as end product. Pure metal sulfides have commercial values etc.

Remarks and Recommendation: NOT Recommended

Preliminary work and proof of concept to be done. PI should interact with specific mines and work directly with them to translate any useful results.

5.10 Project ID: 11 / 15PERC /2016-17

Project Title: Assessment of occupational exposure of miners to airborne respirable dust in highly mechanized metalliferous surface mines and development of guidelines for its minimization

PI: Dr. D.P.Mishra,

EmailID : dt@ismdhanbad.ac.in

Implementing Institution: ISM Dhanbad

Project Cost: Rs 31.36 lakh

Duration: 3 years

Objectives:

- (i) Assessment of occupational exposure of miners to airborne respirable dust generated from different mining operations in highly mechanized metalliferous surface mines;
- (ii) Characterization of airborne respirable dust in terms free silica and other trace elements such as zinc, lead, manganese, copper, etc. in the dust etc.

Remarks and Recommendation: NOT Recommended

(i) collection of samples and characterization is a much simpler work which involves no significant R & D; (ii) Similar work done by NIMH. Two institutions may interact and find complementary core strengths; (iii) Research centres in TB and respiratory diseases along with Medical professional should be in these kind of project proposals. Project proposal lacks depth and methodology is limited in scope and efficacy.

5.11 Project ID: 12 / 15PERC /2016-17

Project Title: Identification of signature biomarkers for early diagnosis of silicosis in miners

PI: Dr. Shubhangi K Pingle,

Email Id: shubhangi@gmail.com

Implementing Institution: NIMH, Nagpur

Project Cost: Rs 40.94

Duration: 3 years

Objectives:

(i) Screening, identification and characterization of biomarkers for silicosis using proteomic and immunological approaches; (ii) Evaluation of biomarkers according to progression and stage specific samples of silicosis by using proteomic and immunological approaches.

Remarks and Recommendation: NOT Recommended

- (i) similar projects have been sanctioned to PI and NIMH in the recent past;
- (ii) Identification of biomarkers can be still done as a scientific activity by the PI and NIMH within NIMH organizational reach and lab and HR capabilities;
- (iii) NIMH should enter in to working MOUs with other research centres such as TB centre and hospitals and conduct the studies with medical professionals from such specialist R & D centres and hospitals as part of project team;

5.12 Project ID: 06/ 15PERC /2016-17

Project Title: Development of a new type high-efficient hydrocyclone for iron ore slimes beneficiation

PI: Dr. Satyabrata Mohanta, PhD,

Implementing Institution: Indira Gandhi Institute of Technology, Sarang (Parjang), Dhenkanal, Orissa

Project Cost : Rs 26.70 L

Duration: 3 years

Objectives :

(i) The main objective of this study is to develop a new-type of hydrocyclone, through simple structural modification to the conventional hydrocyclone, that can generate strong centrifugal force inside the hydrocyclone and reduce the influence of short-circuiting flows. Moreover, the structure of the cyclone will remain simple so that it can be easily adopted by the industries.

Remarks and Recommendation: NOT Recommended

No research content and objectives sketchy. Furthermore, a large of number of studies on modifications of hydrocyclones are already available in the literature and available. the existing ones in industries will get over to next generation versions on completion of their service life. If PI has something can be easily adopted by industries as claimed in objectives, the institute should interact directly with industry and offer technical consultancy services to them.

5.13 Project ID: 32/ 15PERC /2016-17

Project Title: A four quadrant nano-grinding technology in energy saving mining industry

PI: Dr. C.Rajesh Kumar,

Implementing Institution: Jeppiaar Institute of Technology, Chennai

Project Cost : Rs 17.45 L

Duration: 3 years

Objectives :

(i)To provide a multi-quadrant operation for the grinding machine; (ii)To consume less power for grinding mechanism.

Remarks and Recommendation: NOT recommended

The objectives of this project proposal is better served as consultancy service to industries directly. It is a herculean task to start bottoms - up and go all the way to useful translation to mining / ore dressing machinery.

5.14 Project ID: 02/ 15PERC/ 2016-17

Project Title: Development studies and industrial trial of fly ash based insulator and dielectrics

PI: Prof. Sibananda Mishra, PhD

Implementing Institution: Gandhi Institute for Technology, Bhubaneswar

Project Cost: Budget 43.5 Lakhs

Duration: -

Objectives:

(i)To replace porcelain based insulator by industrial and mines waste; (ii) To study the resistivity of electronic materials to establish cost effective and quality technology; (iii)To study the dielectric behavior, loss tangent and break-down voltage of the fly ash/red mud based electronic materials after processing with different compositions;(iv) To study mechanical performance (compressive strength, hardness, and wear resistance), thermal properties (thermal shock and thermal expansion) and resistance behavior (acid resistance, solvent resistance and resistance to oxidation); (v) To scale-up the fly ash/ red mud based electronic materials and insulators for electric pool; (vi) To conduct all high voltage electrical tests; (vii) To conduct wear and tear test; (viii)To conduct radio interference test; (ix) To conduct temperature cycle test

Remarks and Recommendation: NOT Recommended.

(i) A large number of projects have been already funded in the past under FLY ASH mission. Off take of fly ash by this route is miniscule. (ii) Project can be done directly by the Institute with industry that has shown interest;

5.15 Project ID: 08/ 15PERC/ 2016-17

Project Title: Development of value added Geo-polymer aggregates using mine tailings- a sustainable solution

PI: Dr. Bibhuti Bhusan Das

Implementing Institution: NIT Surathkal, Karnataka

Project Cost: Rs 23 L

Duration: 3 Years

Objectives:

(i)Physical, chemical and mineralogical characterization of mine tailings collected from different sources; (ii) To develop artificial geo-polymer aggregates using mine tailings, industrial by-products and with a combination of both; (iii)To investigate the effects and suitability of

different dosages of geo-polymer and type of curing regime on the properties of geo-polymer aggregates; (iv) To analyse the performance of geo-polymer aggregates in concrete

Remarks and Recommendation: NOT Recommended

Objectives very general and sketchy. Many studies in this area have already been done in the past. Such investigations can be done with limited facilities and directly interacting with mines.

5.16 Project ID: 14/ 15PERC/ 2016-17

Project Title: Design and formulation of submerged arc welding flux and shielded metal arc welding flux coatings using Indian red mud for joining of pipeline steels

PI: Dr. Rahul Chhibber

Email Id: director@iitj.ac.in

Implementing Institution: IIT, Jodhpur

Project Cost: Rs 44.64 L

Duration: 3 Years

Objectives:

The even increasing demand for low cost welding consumable and the need to utilize waste stimulated the interest towards utilization of red mud that contains major compounds i.e. Al_2O_3 , Fe_2O_3 , TiO_2 and Na_2O as welding flux ingredient for formulation of welding fluxes and flux coatings. The aim is to use waste material red mud for welding flux formulation and to provide desired weld properties at lower cost

Remarks and Recommendation: NOT Recommended

The welding electrode flux component is a very small quantity and objective to substitute if successful just 10% substitution of that small quantum is hardly a scratch on the surface of the problem. It can be more of a basic research to find various thermophysical and thermochemical parameters that affect flux performance which is not the thrust area of research in this scheme.

5.17 Project ID: 15/ 15PERC/ 2016-17

Project Title: Bioleaching of Al from Red Mud by isolated halophilic archaea consortia from bauxite mine of Rann of Kutch, and conversion of bioleached residue with vegetable wastes to compost

PI: Dr. Abha Kumari

Email Id: akumari@amity.edu

Implementing Institution: Amity Institute of Biotechnology, Amity University, Noida

Project Cost: -

Duration: -

Objectives:

The major objective of the proposed project is bioleaching of aluminium from bauxite by isolated halophilic archaea from bauxite mine of Rann of Kutch, Gujarat and conversion of bioleached residue with agricultural waste to compost. To achieve the major objective the following steps have to be followed:

(i) Isolation, screening, identification and preparation of halophilic archaea consortia from Rann of Kutch, Gujarat; (ii) Maintenance and growth of halophilic archaea consortia etc

Remarks and Recommendation: NOT Recommended

Isolation of bacteria and microbial organisms and relating them to aluminium extraction from red mud is purported long shot objective of this project. The proposal is very sketchy there is no proof of concept. PI and institution can do this work within their facilities and later on approach DBT along with industry for funding if they find quantifiable proof of concept.

5.18 Project ID: 20/ 15PERC/ 2016-17

Project Title: Processing of fly-ash to value added ceramics

PI: Dr. R.Subramanian

Email Id: contact@psncet.ac.in

Implementing Institution: Department of Chemistry, PSN College of Engineering and Technology, Melathediyoor, Tirunelveli

Project Cost: Rs. 70.08 L

Duration: 3 years

Objectives:

(i) To develop SiC-based ceramic material from fly ash; (ii) To synthesis nitride based ceramic material from fly ash; (iii) To develop newer types of ceramic products which were so far not been developed by anybody; (iv) To explore the new areas of utilization of fly ash for the greater benefit of the country and the mankind; (v) To characterize the ceramic material by SEM, TEM, XRD and thermal analysis.

Remarks and Recommendation: NOT Recommended

The project has conjoined fly-ash and engineering ceramics in a simple continuum. Advanced ceramics are made from fairly pure starting materials of oxides and other intermediate compounds. Converting fly ash to such intermediate compounds itself is a costly and energy intensive exercise. The project objectives are farfetched, sketchy and methodology does not have any merit.

5.19 Project ID: 21/ 15PERC/ 2016-17

Project Title: Development of mining tailing reinforced epoxy matrix composites for structural applications: Value Added products from the Mining Waste (Tailings)

PI: Dr. Ghanshyam Pal, PhD

Email Id: Gpal1@amity.edu

Implementing Institution: Department of Civil Engineering, Amity University, Noida

Project Cost: Rs. 35.06392 L

Duration: 3 years

Objectives:

(i) Design and development of epoxy matrix composite reinforced with mining tailings to replace the conventional clay-epoxy matrix composites in an attempt to develop less expensive composite materials; (ii) Selection of mining tailings suitable for use as reinforcement in epoxy matrix composites based upon their inherent physical properties and chemical structure; (iii) Improving the mutual interaction between mining tailings and the epoxy matrix through chemical grafting and physical processes etc.

Remarks and Recommendation: NOT Recommended

Project proposal very sketchy and general. PI can obtain the minerals and mine tailings from anywhere and do the lab studies within their facilities. It does not require a major project proposal to effect a small substitution in a second phase additives to epoxy.

5.20 Project ID: 25/ 15PERC/ 2016-17

Project Title: Development of onsite tile manufacturing process using chrome slag (ferrochrome industry tailing)

PI: Prof (Dr.) Payodhar Padhi, PhD

Email Id: payadharpadhi@gmail.com

Implementing Institution: Department Konark Institute of Science and Technology (KIST), Bhubaneswar

Project Cost: Rs. 49.40100 L

Duration: 3 years

Objectives:

(i) To cast the vitrified tile on the site of the ferrochrome industries; (ii) To develop online process at factory itself for tile production using molten chrome slag; (iii) To study the process parameter

required for design using CFD; (iv) To utilize the chrome slag (chrome industry tailing) as an ingredient of the tiles; (v) To utilize fly ash (which is also one of the waste of captive thermal plant of chrome industries) as an ingredient of the tiles; (vi) To develop a suitable process incorporating the above objectives.

Remarks and Recommendation: NOT Recommended;

Project objectives are general and sketchy. There is no process flow sheet developed by PI and to develop on site factory of ferrochrome industry, it is appropriate that those companies are directly contacted and such project proposals are to be submitted to them on consultancy mode.

5.21 Project ID: 26/ 15PERC/ 2016-17

Project Title: Synergetic effect of chemical reagents on leaching of iron from partially laterised khondalite rocks-A bauxite mining waste for preparation of high valued filler materials

PI: Dr. Ranjita Swain, PhD

Email Id: Ranjitaswain79@gmail.com

Implementing Institution: C.V. Raman College of Engineering, Bhubaneswar

Project Cost: Rs. 25.66 L

Duration: 3 years

Objectives:

(i) To reduce the size of PLK rocks-first process is physical beneficiation i.e. comminution study which is followed by chemical process i.e. leaching of iron from PLK rocks; (ii) To recover filler grade material from partially laterised khondalite (PLK) rocks-a bauxite mining waste by using selective removal of iron; (iii) To optimize the leaching reaction by using various acids. (iv) To characterize and evaluation of the product obtained; (v) To develop a process flow for recovery of valuable material from bauxite mining waste; (vi) Simulation and modeling of the leaching process by applying advanced software for sustainable industry, by projecting the technique.

Remarks and Recommendation: NOT Recommended

Project objectives general and iron extraction from low grade bauxite or even red mud or low grade iron ore is not techno economically feasible. Leaching of iron by acid leaching methods is an environmentally disastrous.

5.22 Project ID: 27/ 15PERC/ 2016-17

Project Title: Geopolymerisation of waste low grade bauxite ore

PI: Dr. Beulakh.M, PhD

Email Id: m.beulah@christuniversity.in

Implementing Institution: Civil Engineering Department, Christ University, Bangalore

Project Cost: Rs. 17.47 L

Duration: 3 years

Objectives:

(i) Study at macro-scale the physical and mechanical properties, durability and environmental performance of mine tailings-and/or other aluminosilicate based geopolymers by conducting mechanical experiments and leaching analysis to investigate the effect of different factors; (ii) Investigate the micro/nano-scale structure and elemental and phase compositions of mine tailings and waste fly ash based geopolymers at different conditions to better understand mechanism through which geopolymer is formed from mine tailings.

Remarks and Recommendation: NOT Recommended.

Low grade bauxite is not a construction material and it is not considered as a waste material either. It is a future potential for Al source. The proposal has randomly taken a mine material and trying to mix fly ash etc to get bricks. This is rather outlandish. Furthermore, this institute

has already been funded in an on-going project by SSAG for waste materials utilization and geopolymerization.

5.23 Project ID: 33/ 15PERC/ 2016-17

Project Title: Manufacturing of eco-friendly construction bricks from magnesite mine tailings

PI: Dr. S.Balaji, PhD

Email Id: Er.shbalaji@gmail.com

Implementing Institution: Dept. of Civil Engineering, Kongu Engg College, Tamilnadu

Project Cost: Rs. 11.30 L

Duration: 3 years

Objectives:

(i)To convert magnesite mine tailings to a potentially useful eco-friendly construction material;
(ii)To identify a source for bulk disposal of mine tailings; (iii)To develop a light weight and low cost construction material using mine tailings; (iv)To identify the magnesite mine tailings as an alternate construction green material.

Remarks and Recommendation: NOT recommended

Project proposal very sketchy and general.

5.24 Project ID: 34/ 15PERC/ 2016-17

Project Title: Characterization and beneficiation of low grade iron ore to meet the demand of the Indian industries

PI: Dr. B.K.Pal

Implementing Institution: NIT, Rourkela

Project Cost: Rs. 75.524 L

Duration: 3 years

Objectives:

(i)Study of Indian iron ore deposits; (ii) Classification, characterization and beneficiation of iron ore deposits on the basis of its utility i.e. low, medium and high;(iii)New technique for the beneficiation of sub-grade iron ore; (iv)Correlation and cost analysis of data for utilization of iron ores and wastes.

Remarks and Recommendation: NOT Recommended

Study on low grade iron ore beneficiation is not the thrust area of research under this programme. Furthermore, it may be of relevance to companies such as NMDC and other iron ore and steel companies and PI should directly approach them. The physical and High field magnetic separation techniques are already in their domain, particularly in NMDC research centre and PI is better placed to work with them, where there is relevance and funding potential directly by the companies under their R & D schemes.

5.25 Project ID: 35/ 15PERC/ 2016-17

Project Title: Development of geopolymer next generation green construction material from industrial waste

PI: Dr. Rashmi chansarkar,

Implementing Institution: Sharda University, Greater Noida

Project Cost: Rs. 47.67 L

Duration: 3 years

Objectives:

(i)To replace cement by industrial waste such as fly ash based geopolymer as a novel construction material; (ii) To study the effect of alkali on geopolymer (GP) for high compressive

strength to establish cost effective and quality technology; (iii) To study the corrosion behavior of the fly ash based geo-polymer.

Remarks and Recommendation: NOT Recommended

Project proposal of this nature, namely industrial waste such as fly ash and geo polymerization has been beaten to death in many studies and in Fly Ash Mission.

5.26 Project ID: 37/ 15PERC/ 2016-17

Project Title: Partial replacement of slate waste as coarse aggregate in concrete

PI: Dr. G.Manjula

Email Id: principal@svsce.edu.in

Implementing Institution: SVS college of Engineering, Tamilnadu

Project Cost: Rs 9.261 L

Duration: 2 years

Objectives:

(i) To determine the properties of slate mining waste and comparing the results with the conventional coarse aggregate; (ii) Partial replacement of slate mining waste with the coarse aggregate; (iii) Determining the strength properties of concrete for 3, 7, 21, 28, 56 and 90 days.

Remarks and Recommendation: NOT Recommended

There are many such partial substitutes for coarse aggregates already studied for concrete. It is better to work directly with slate/dimensional stone quarry or manufacturer and develop solutions on technical consultancy mode. Source of slate waste which is site specific (while granite is well distributed) and point of concrete manufacture will play a big role in techno economics.

6 Review of On-Going Projects: (a) Extensions, (b) Release of Last Installment; (c) Additional Grant Request

The following FOUR projects stand completed, draft reports or final reports submitted and the last installment can be released.

- 6.1 Development of TDR based wireless system for slope stability monitoring in opencast mines, NIT Rourkela; (The project extension is granted for six months only, the last instalment be released. Additional Grant of Rs.2.88 Lakhs is approved for HR cost head for the extended six months.)
- 6.2 Development of Standard Framework and Guidelines for noise mapping in mines and surrounding community, NIMH, Nagpur; (Director - Tech to forward to an external expert)
- 6.3 Up-gradation and Utilization of Laterite in East and West Coast Deposits, JNARDDC Nagpur, (Prof SP Mehrotra had reviewed the report as RAC chairman and given his observations in this meeting; Project is successfully done and met the objectives set out in the proposal)
- 6.4 Development of Water Resistant ANFO for blasting watery holes, CIMFR, Dhanbad (Director - Tech, MoM to review)
- 6.5 Evaluation of Biomarkers for early detection of Noise Hearing Loss in Miner Workers NIMH, Nagpur;
Regarding the review of this project, please see below Clause 7.
The Standing Review Committee as given in Clause 7 shall take up this project for its review and evaluation.
- 6.6 Study of Toxic fumes and Development of Carbon Nanotubes based sensing device (Jointly by CIMFR, Dhanbad and AMITY Univ, Noida)

This project has been under review for the last 3 years and project extensions have been given twice. A two member committee from PERC also visited AMITY Univ as per the directions of SSAG on 20 April 2015 and observed that sensors have been developed by AMITY Univ, but testing of them have not been completed by CIMFR. Specific recommendations for joint testing and evaluation were given to CIMFR and AMITY Univ and project duration was extended up to December 2015.

The PI from CIMFR made the presentation in this PERC and it was given to understand that there has been successful demonstration in lab and in actual mine areas before and after blasting. AMITY Univ has so far given 50 sensors and it was also realized by PERC that there has been no proper feedback to AMITY Univ to further improve

It is unfortunate that the project that has been over delayed due to testing of sensors in CIMFR and there is lack of technical feedback to AMITY University in a professional

manner. It is recommended that this project be closed and Director, CIMFR be given the official communication from MoM on the serious lacunae in the project execution.

6.7 Development of viable technique for assessment of reclaimed land safety of structures under settling environment, NIRM, Karnataka

6.8 Estimation of Seismic Hazard in and around mines out areas of Kolar Gold Fields NIRM

The above two projects of NIRM were reviewed in mid term review meeting of on - going projects held on 30 April 2016 at NFTDC, Hyderabad. As there was hardly any progress in the project execution together with minimal expenditure in the project, it was decided in that review meeting that Director, NIRM and the PIs come with an action plan to complete the project. NIRM has given the action plan and requested for two year extension as the project is getting underway. The above two projects are given final extension of two years to do the needful in the project and bring it to successful conclusion.

6.9 Production of geopolymers based construction material from Pond Ash: An industrial Waste, Gandhi Inst of Engg& Tech, Gunupur, Odisha

This project was reviewed in the mid term review held on 17 May 2016 in HCL, Kolkata. PI was given many inputs and pointers to enhance the quality of work. The PI made the presentation on the work done in this PERC as well and a request was made for additional grant.

The members observed that the work content is very limited in this project and already nearly Rs 21 lakhs have been released. It was also pointed out to the PI that similar projects based on waste materials were sanctioned to other institutions which are doing it in a lower budget. Regarding the output, PI was advised to investigate more variables particularly other additives as suggested in the mid term review.

No additional grant request be given as the quantum of work is not very high and need to add more project assistant is NOT tenable particularly given the fact that the project is to assist MTech and PhD students in the institute to do more research. No further release of funds be done in this project as there is adequate resource available to do the work and the PI and institution have already obtained a significant capital equipments and consumables required are simple chemicals.

6.10 Director, JNARDDC, brought to the attention of PERC that erstwhile projects that were completed, reviewed in PERC and are yet to receive the final 10% funds as given below:

6.10.1 Development of Mathematical Modeling using fuzzy logic to control superheat of aluminium electrolysis bath (2011-12); Project sanction: Rs 32 lakhs and 10% i.e Rs 3.20 lakhs remaining to be released.

6.10.2 Development of portable analytical kit for field analysis of bauxite: Emphasis on in-situ micro-analysis of mineral entities for mineral prospecting (2012-13); Project sanction: Rs 21.93 Lakhs and 10% Rs 2.19 to be released

6.10.3 Process Development for production of low soda (Na_2O) hydrate in Bayer Circuit (2012-13); Project Sanction: Rs 31.80 Lakhs, 10% Rs 3.18 Lakhs to be released.

6.10.4 Up-gradation and Utilization of Laterite in East and West Coast Deposits (2012-13)
Project Sanction: Rs 47.00; Amount left over to be released is Rs 0.79 Lakhs
(see also 6.3 above)

The last 10% of 6.10.1, 6.10.2. and 6.10.3 be released and Rs 0.79 lakhs outstanding in 6.10.4. (same as 6.3) shall also be released for closure.

6.11 Request for additional grant in STAL Project (sanctioned in 44th SSAG, 18 Dec 2013)
Development of Super Thermal Aluminium (STAL) conductor for Indian Power Sector jointly between JNARDDC and NFTDC

Director, JNARDDC made a request for additional grant for procurement of Optical Emission Spectrometer in the mid term review of project held on 30 April 2016 at NFTDC, Hyderabad. The overall outlay in the project is Rs 495.40 Lakhs apportioned as Rs 226 lakhs for JNARDDC and Rs 269.40 lakhs for NFTDC.

The next tranche of release is due as the mid term review, progress reports and U/C s were completed. PERC observed that JNARDDC obtain details of expenditure to be incurred for this additional characterization apparatus and a two member committee of Prof SP Mehrotra (RAC Chairman, JNARDDC) and Director-Tech (MoM) shall consider the merits of the request and make recommendations to the chairman PERC in the next two weeks. Chairman PERC shall decide on the issue based on the recommendations and fund availability.

7. An external expert committee (hereinafter called Standing Review Committee) comprising of members drawn from medical research institutions and specialists in biomedical research is constituted for project reviews and monitoring of Projects of NIMH.

Chair/Co-Chair

- (a) Dr W Selvamurthy, (formerly, DG (Life Sciences), DRDO, N Delhi) Chair
- (b) Dr G Bhuvaneshwar, (formerly Head Bio Technology Wing, Sree Chitra Trunal Institute of Medical Sciences and Technology (SCTIMST), Thiruvananthapuram, (Co-Chair)

Members:

- (c) Specialist (ENT)
- (d) Specialist (TB and respiratory Diseases) TB Research Centre
- (e) Specialist (Orthopedics)
- (f) Expert in Biochemistry, Member
- (g) Dr Sishodia, Formerly Director, NIMH, Nagpur
- (h) Director, NIMH to serve as member secretary

The Chair/Co-Chair can co-opt any other expert as special invitee.

The committee shall

- (a) shall review and evaluate the methodology of the study and its validity and efficacy and recommend steps to improve;
- (b) shall look in to the IP asset potential in the results of projects and suggest measures to protect them at the earliest;
- (c) recommend next steps in the projects in terms of expansion of the study for larger sample and or multi centric study;
- (d) visit NIMH and suggest appropriate partner institutions in medical research and medical specialists;
- (e) recommend actions to be taken by Director and scientists of the institute

NIMH shall meet the expenses of travel and honorarium and any other related expenditure from the remaining project funds.

8. Various issues pertaining to S & T Programme

8.1 Directed R & D (Technology Development) at TRL 6/7 and Applied R & D at TRL - 3

Members of PERC viewed with concern the level of projects being received under S&T Scheme. Most of them are of basic research. It was discussed that SSAG in its 44th Meeting decided that future projects should be based more on directed research with emphasis on reaching higher level of maturity and translation potential going up to TRL 6 and 7 which is done as a consortia of lab and industry. In order to enhance the effectiveness of this S & T scheme in terms of impact, it will be operated on two modes, (i) Mode I : **directed research leading up to TRL 6 and 7 levels** (pilot plant and demo plant in industry, industry adoption of process in their plant as the target) on the one hand and (ii) Mode II call for projects **in specific areas** by individual research group up to TRL - 3 level. The former will be directed towards well established laboratories with established core competence to come up with industry partnerships while the latter will address more of TRL -3 level research by individual research groups in laboratories and academia. In the future, MoM will facilitate bringing together of lab, academia and industry in specific directed research programs; It is envisaged that Mode I and II projects will be 60:40 in terms of overall funding from SSAG. This may vary from year to year and nature of projects. It has been noted that after 44th SSAG meeting there was no progress on directed research. It was thus proposed that a workshop with members of PERC, reputed technical institutes capable of taking research at TRL 6-7 level and PSUs be organized in August to be sponsored by either NALCO or HCL where the areas and future course of action to be discussed and proposed. The same will then be placed before next SSAG for approval. Ministry of Mines to take immediate action on the same.

8.2 Funding and Co-Funding of Projects

- (i) As the budget outlay will be significant in Mode I and will be very high in some cases, the funding will be shared between industry and S & T scheme.
- (ii) In addition, depending on the participating labs, co- funding from CSIR and DST will be made as a requirement in view of limited overall budget available in the SSAG scheme. Co-funding improves both capability and capacity in the research programmes.
- (iii) As a policy, all project proposals, in both mode I & II emanating from CSIR labs will require co-funding from CSIR as that system has order of magnitude higher funding capacity for R & D.

8.3 Major Categories and Sub Domains

The five major categories already in practice since 44th SSAG decision, namely (i) Geosciences and Exploration; (ii) Mining related; (iii) Ore dressing & Mineral Processing; (iv) Metal Extraction and separation processes; (v) specialty materials (Rare Earths etc) will serve as macro domains and specific targeted areas in each of them will be identified each year for identifying Mode I and Mode II.

8.4 Three Stage Review Process:

The three stage review process that has been adopted in 14 and 15 PERC has been found to be effective. (see also clause 2 in this minutes) This process can now be institutionalized. The three stages are

(i) Stage I : Pre screening of proposals

Pre screening of proposals will be done to verify if they fit the directed research area, mandatory lab - industry consortia, co-funding in Mode I ; fitment in to specific call area for each year and co-funding as per Clause 8.2; All other general conditions such as requirement of Co-PI and affidavit of Institution to take overall responsibility for execution of the sanctioned projects, adherence to budget formats will also be seen and to be cleared for the next stage; Failure to comply to the norms will result in return of proposals at this stage itself; From the past experience, many of the issues that result in not fitting the call can be outlined in the website itself at the time of call. It is important to emphasize in the call as well as at all times in the website that only applied R&D with scale - up or and those with tie-ups with industry and co-funding will be given preference. Reproducing the typical reasons given in clause 5 for ready reference, the following are useful to highlight.

(a) objectives are very sketchy and methodology not clear or doable; (b) proposals not directly in the thrust areas, (c) outcomes are not relevant or impactful, (d) there is no visible translational potential; (e) similar projects have already been funded, (f) it could be directly done as a consultancy project with the industry; (vii) preliminary proof of concept is not done; (h) proposed work can be done by PI within the facilities available with them and it does not really need a project proposal;(i) in a few cases PI has not adequate domain knowledge in mining or minerals or lacking a partner with domain knowledge, (j) casual approach to problem definition and a loose connection made between mining, minerals and waste. (k) In the case of health care related projects it is now necessary to make it mandatory have medical research institutions and professionals in the project team.

Those proposals that do not fall in to the specific areas but are covered in S & T schemes of other departments such as DST, DBT, BRNS, Min of Steel, Min of Coal etc will be identified and separated and these proposals will be returned with advise to submit to other relevant agencies.

Only one hard copy is to be submitted and all review processes will be handled only in e-copy and digital mode.

(ii) Stage II Review by experts:

A panel of experts in the five major domains will be identified and those proposals that have cleared Stage will be sent to at least 2 experts. The evaluation criteria as decided by PERC will be followed. The following criteria have been used by PERC;

(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 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.

(iii) Stage III : presentation by PI and evaluation by expert panel

Depending on the results of Stage II Review, call for presentation and further evaluation will be done by the expert panel in each of the macro domain category. The final recommendation will be as follows:

Overall Rating and final recommendation to SSAG

- (a) Recommended with or without changes to next level SSAG
- (b) To be revised and resubmitted in next PERC
- (c) NOT recommended

8.5 Creation of Data base of projects already sanctioned and rejected

In order to avoid repetition of project proposals both sanctioned earlier as well as rejected it is important to create, periodically update the data on them at the earliest. This data base is needed for pre screening exercise (see above clause 8.4 (i) e); Similar projects done in other S & T schemes in other ministries can be added.

8.6 Periodic Progress Reports & Mid Term Review of On-Going Projects

At least one mid-term review for each project is mandatory and such reviews can be done in groups of projects either as per macro domain or region. In 2016-17, PERC conducted midterm reviews in two regions and in three phases to cover nearly 30 plus on - going projects. This process can now be institutionalized. PERC chairman shall nominate experts and venues to conduct the mid term reviews. It is also necessary to make sure that fairly detailed milestones are identified while sanctioning the projects. Based on the progress, PERC will decide to continue the funding or foreclosure the project.

8.7 IT enabling of all S & T Processes

It has been seen necessary to IT enable all the processes from call stage to post completion review. It will enable faster and more efficient processing of project proposals as well conduct reviews with soft copies and digital presentations.

PERC discussed this issue in its 14th and 15th meetings. NFTDC has over the years developed many micro ERP systems for all its office and project management systems in a cost effective manner. NFTDC is recommended to come up with a proposal for developing the portal and the server and mini ERP system.

8.8 MoM S&T Process Implementing Organization:

It has been observed from the experience of the last few years, the number of project proposals to be handled are an order of magnitude higher and together with the need to manage processes from call to post completion review, it is necessary to utilize the services of an R & D institution. Taken together with IT enabling of the processes, it would better serve not only the (i) R & D objectives, but also (ii) project execution guidance, (iii) mid-term reviews, (iv) maintenance of data bases; (v) conduct of PERC meeting etc. Annual expenditure for PIO shall be met from the administrative costs head in the S & T scheme. PIO shall manage all the travel, stay, honorarium of experts, meeting related expenses, maintenance of IT resources and institution O/H from this annual charges and submit U/C as per decisions taken. It is preferable to consider R & D institutions under the aegis of MoM as a PIO. PERC will guide, recommend and review PIO on all issues that relate to the management of above said processes.

The identified R & D institution should have established techno-managerial experience in handling the S & T processes as identified from call to post completion review; IT enabling and digital network establishment between MoM and PIO should be made; PIO should digitally connect to all institution and research groups to enable seamless connectivity; one of the R&D Institute under Ministry of Mines may be appointed as PIO. It was proposed that for the first three years NFTDC may be appointed as PIO.

8.9 Reconstitution of PERC

PERC is to be reconstituted periodically every three years. It has been observed that many members (ex - officio by designation) have not been participating in PERC meetings. As PERC has a crucial role to play, it is necessary that members of PERC be chosen to represent the five macro domains as well have academia - lab - industry combinations. It is also necessary to explicitly state the conflict of interest if any between the membership and any project proposal that gets submitted. **In such cases, the member(s) will recuse themselves from review of those proposals and other experts will evaluate and PERC will make appropriate recommendations.**

8.10 Brainstorming Meetings and Workshops

It is recommended that one or two brainstorming meetings and workshops be conducted every year to identify problems that are of interest to industry. From these discussion meetings, directed research areas for Mode I and specific research areas for Mode II can be identified, apart from direct consultancy projects that can be executed by labs and academia. A drop box of problems in the IT portal will also enable higher degree of participation of industry.

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