Minutes of the 47th Meeting of Standing Scientific Advisory Group (SSAG) held on 23rd August 2016 at 15.30 Hours in Room No.320, “A” wing, Shastri Bhavan, New Delhi

The 47th Meeting of Standing Scientific Advisory Group (SSAG) was held under the chairmanship of Secretary (Mines) on 23.8.2016 at 3.00 P.M in Room No.320, “A” wing, Shastri Bhavan, New Delhi. The list of participants is annexed.

The Secretary, Ministry of Mines and Chairman, SSAG welcomed the members to the 47th SSAG Meeting. The chairman in his introductory remarks highlighted the purpose of the S&T scheme and mentioned that SSAG plays an important role in fostering directed research projects in Mining, Minerals and Materials sector. He emphasized the urgent need to nurture impactful R & D which will contribute to enhanced economic output in this sector. He stressed on the fact that the projects funded under the Scheme should have national interest along with better focus and bigger perspective in terms of long term value for the country and also have far reaching effects on the economy. He advised JNARDDC and NIRM may take up the projects under the scheme which have national importance. He reiterated the decision of SSAG to fund those projects with a direct application potential in near future.

Shri Subhash Chandra, Joint Secretary briefed the members on the project proposals received and reviewed by Project Evaluation and Monitoring Committee (PERC) in its 15th Meeting held on 15th and 16th July 2016 at NFTDC, Hyderabad. He referred to the Minutes of 15th PERC meeting that is appended to the Agenda of this 47th SSAG Meeting and noted that 108 project proposals were received and in the first stage review, 37 proposals were short listed for further detailed evaluation by experts. PIs of these 37 proposals were also invited to make presentation before expert panels in the 15th PERC meeting held on 15th and 16th July 2016. In line with earlier decisions, PERC divided these 37 project proposals as per thrust areas in to the following five major categories and sub categories viz.,

1. Exploration related such as in Exploration & Prospecting, Evaluation of Samples; Assessments, database for minerals;

2. Mining Related
   2.1 Mine Planning + Rock Mechanics + Mining methods + Mining Equipment Engineering; energy efficient Mining/
   2.2 Mine Safety, Sensors etc
   2.3 Mine waste/ water / soil contamination and reclamation
   2.4 Miners Health Related Projects; Noise, vibration, airborne dust, chemicals etc

3. Beneficiation, Ore Dressing & Mineral Processing
   3.1 Beneficiation & Mineral Processing;
   3.2 Recovery of metal / values from low grade ores, tailings, mine waste

4. Metal Extraction
   Metal Extraction, Process Metallurgy, Separation Methods

5. High Purity Materials, Speciality Materials REs etc
Alloys, Product Developments, High Purity Metals, Minerals, compounds; Speciality Materials; Rare Earths, solar materials etc

SSAG was also briefed on the following criteria which 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.

Based on the detailed review and evaluation, the following TEN Project proposals comprising of (i) two from geosciences and exploration, (ii) three 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.

**Agenda Item No.1 : Projects recommended by 15th PERC**

**Category - I: Exploration and Geosciences**

In the area of exploration and geosciences, the following two projects were recommended by PERC.

**Agenda 1.1**

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

**Project ID:** 47SSAG/I

**Implementing Institution:** Department of Geology, AMU Aligarh

In line with the recommendation of PERC, the project duration was reduced to 2 years with corresponding reduction budget outlay. The project deals with

(i) generation of high quality geochemical data comprising major, trace and rare earth elements of mafic/ultramafic rocks of identified areas i.e. Jawariya-sisna-tasol, and rakhiawal-mavli-jagat areas; (ii) to constrain nature of their mantle sources, conditions of partial melting and subsequent modification of mantle 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; (iv) mapping on 25K scale is also added to objectives.

The above project is approved by SSAG and the following budget outlay is sanctioned for this project.
Total Budget: Rs 22.32 Lakh and Duration: 2 years  
First Installment: Rs 11.716 Lakh and Second Installment: Rs 10.605 Lakh

Agenda 1.2

**Project Title:** Large scale digital database creation of bauxite & laterite deposits of Maharashtra state using geo-informatics technology; (Project ID: 47SSAG/2)

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

Members observed that the title of project does not adequately reflect the objectives, in particular the digestion kinetics of bauxite that will be added to the geo-informatics. Members also wanted to know the reasons behind the cost and longer time duration of such a study, which otherwise seems doable in lesser budget. Director, JNARDDC clarified that bauxite digestion studies on experimental samples are to be carried out to obtain the technobasic data on techno-economic feasibility of utilization of bauxite which will be co-mapped with geo-informatics data. Such experimental data conducted by JNARDDC so far are somewhat limited in geographical expanse and it is necessary to complete the entire belt in Maharashtra and therefore a comprehensive approach is taken in this proposal. As the number of samples should be significant in number, the time duration for such experimental back up studies would also call for 2 year duration.

The above project is approved by SSAG and the following budget outlay is sanctioned for this project,

<table>
<thead>
<tr>
<th>Total Budget</th>
<th>Rs 69,5484 Lakh and Duration: 2 years</th>
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<tbody>
<tr>
<td>JNARDDC</td>
<td>Total Cost: Rs 43,8234 Lakh</td>
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<tr>
<td>First Installment: Rs 29,4117 Lakh and Second Installment: Rs 14,4117 Lakh</td>
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<tr>
<td>MRSAC</td>
<td>Rs 25,725 Lakh</td>
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<tr>
<td>First Installment: Rs 12,8625 Lakh and Second Installment: Rs 12,8625 Lakh</td>
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Chairman, SSAG and the members also enquired about the strategy by which the results and the database will be made useful for the bauxite mining sector. It was clarified that the database will be made available at cost to the mining sector and dissemination workshops and conferences will be conducted to bring about the awareness of existence and utility of such a useful technological information that has potential to reduce the mineral processing cost of the bauxite resource.

**Category 2: Mining Related (4 Projects)**

The following four projects in the area of mining and related activities has been recommended by PERC.

**Agenda 1.3**

**Project Title:** Development of environment friendly blasting techniques; (Project ID: 47SSAG/3)
Implementing Institution: ISM, Dhanbad
The project deals with
(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 (physico-mechanical properties, in-situ block size)

Members observed that environment friendly blasting techniques are important and further directed that ISM should endeavour to demonstrate it in more mines and achieve translation to practice. Accordingly as per recommendations of PERC at least 10 mines be considered for validation and demonstration. ISM should also conduct workshop and outreach programmes to push these techniques to the mining industry. Chairman further added that innovation in mining sector has to be visibly seen and it is necessary for ISM to play a lead role in bringing about impactful R & D and expressed hope that projects such as this reach fruition and adoption by industry.

The project is approved and with following financial outlay:

Total Cost: Rs 29.04 Lakhs and duration 3 years.
1st Installment: Rs 14.865 Lakhs; 2nd Installment: 7.34 Lakhs
and 3rd Installment: Rs 6.835 Lakhs

Agenda I.4
Project Title: Design of Eco-friendly thickened tailings slurry pipelines for surface disposal and mine backfilling system
Implementing Institution: IMMT, Bhubaneswar
The objectives stated in this project are 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.)

The members observed that this type of activity is already in practice in industrial scale and what is being attempted in lab scale is very incremental. It was also pointed by experts in SSAG that thickened slurry pumping has achieved the levels of solids content aimed in this project many years ago and therefore there is not much merit in pursuing this project. The project is NOT approved by SSAG.

Agenda Item I.5
Project Title: Postural risk analysis of mining equipment operators and its relation to musculoskeletal disorders. (Project ID: 47SSAG/4)

SSAG was informed that as per recommendations of PERC, NIMH is tying up with Orthopaedic, TB research institutes and ENT researchers they shall be taken in as consultants and partners as per the project requirements in all future projects.
Chairman, SSAG urged NIMH to play a more pro active role with the mining industry by taking up their routine health check - up which would pay way understanding the health problems faced by the mine worker population thereby enabling specific projects to be chosen. Members appreciated the need for scientific studies in particular on dust, noise, vibration and chemicals related to the mining sector.

The project is approved with the following budget outlay is sanctioned.
Total Cost: Rs 37.66 Lakhs and Duration : 2 Years
1st Installment: Rs 24.85 Lakhs; 2nd Installment: 12.81 Lakhs

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

**Agenda 1.6:**
**Project Title:** Effect of modified seed properties in precipitation of aluminium hydroxide from Bayer liquor; (Project ID : 47SSAG/5)
**Implementing Institution:** JNARDDC, Nagpur

The Objectives are (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.

The members observed that JNARDDC has done significant work in bauxite digestion and alumina precipitation and it is important that scale up and higher level TKL work is done in collaboration with Aluminium companies to achieve the necessary impact of this study. JNARDDC shall therefore at least a pilot plant level work in this project rather than limiting to lab scale work and the institute shall take co-funding from aluminium companies to augment the budget to meet the required expenditure of such an exercise. JNARDDC from the start of the project should work towards design and development of a pilot/demonstration plant or tie - up with Aluminium companies for adoption before the end of the project.

The project is approved with the following budget sanction:

Total Cost: Rs 44.99 Lakhs and Duration : 2 Years
1st Installment: Rs 24.80 Lakhs; 2nd Installment: 20.19 Lakhs

**Agenda 1.7**
**Project Title:** Development of ecofriendly bio-based reagents for mineral floatation
**Implementing Institution:** IMMT, Bhubaneswar.(Project ID : 47SSAG/6)

The Objectives of this project are (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.

The project is approved in line with the following recommendations of PERC, viz (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) Total duration of project to be reduced to two years with corresponding reduction of budget to Rs 24 lakhs and 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.

Total Contribution by MoM : Rs 12 Lakhs and CSIR Co-Funding : Rest and the MoM funds be released in two equal installments of Rs 6 lakhs subject to co-funding by CSIR. If co-funding is not forthcoming, the project stands not approved.

Agenda 1.8

Project Title: Extraction of potash values from silicate rocks; (Project ID : 47SSAG/7)
Implementing Institution: IIT, Roorkee.
The prime objective of the proposed 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.

The project is approved with the following directions as recommended by PERC
(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; NephelineSyenite;
(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.

Total Cost: Rs 20.0Lakhs and Duration : 2 Years
1st Installment : Rs 17.35 Lakhs; 2nd Installment: 2.65 Lakhs

Agenda 1.9

Project Title: Estimation of morphodynamicity and its remedial action using red-mud based concrete at coastal zone of eastern odisha
Implementing Institution: JNARDDC Nagpur, KIIT Univ, Bhubaneswar and NALCO, Bhubaneswar (Jointly)
(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 ftx1fx1ft 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.
Director, JNARDDC informed SSAG that the proposal is being reworked as per the recommendations of the PERC and it is likely to take more time and it shall be resubmitted with relevant partners in Ocean development and Aluminium industry with demonstration in actual coastal belt.
The project is deferred to next SSAG subsequent to resubmission and recommendations from PERC.

CATEGORY : 5 Specialty Materials, Rare Earths

Agenda 1.10
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 (Project ID: 478SSAG/8)

Implementing Institution: NFTDC, Hyderabad

Project Cost: 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.

The members noted that this project is well conceived and meets all the requirements in the thrust area of RE metals. The members wanted to know the source of raw material. SSAG was apprised of the scale - up of operations by IREL in Orissa in 2015-16 and RE oxides of Sm, Nd and Gd will now be available as input raw materials to the project for extraction of RE metals. Director, NFTDC also briefed the members on the indigenous capability and capacity building in particular on the pilot plant equipments as well as the value addition of 2.5X from RE oxide to RE metal envisaged in this project. Successful and timely execution of this project will remove the imports for both strategic as well as other sectors. The members also noted that NFTDC is also briefing in co-funding resources to a significant extent along with its expertise in execution of pilot plant in many projects. It is worth noting that this pilot plant itself is rightly sized for technology transfer to potential companies and the entire production will result in FE savings. Further scale up can be done modularly as per need and requirement as each pilot plant has to be dedicated for specific RE metal.

The project is approved and the following budget (MoM part) is sanctioned as follows:
Total Cost: Rs 186.50 Lakhs and Duration: 2 Years
1st Installation: Rs 107.00 Lakhs; 2nd Installation: 79.50 Lakhs

Agenda Item No.2: To review On-Going Projects for release of balance 10%, extension of project periods and recommendations of final technical report.

2.1 Development of TDR based wireless system for slope stability monitoring in opencast mines, NIT Rourkela;
Project extension by six months and additional grant of Rs 2.88 lakhs requested approved.

2.2 Up-gradation and Utilization of Laterite in East and West Coast Deposits, JNARDDC Nagpur;
Prof SP Melvira had reviewed the final report and given his observations in PERC meeting; Project is successfully done and met the objectives set out in the proposal; Release of balance 10% approved.

2.3 Study of Toxic fumes and Development of Carbon Nanotubes based sensing device (Jointly by CIMFR, Dhanbad and AMITY Univ, Noida)
SSAG in its previous meetings had formed a two member committee to visit Amity University in view of significant delays and lack of coordination between two
institutions. Accordingly the two member committee conducted visit and also gave specific recommendations to both the institutions. The project was also reviewed recently by PERC when the final report was submitted to it and it was noted that Amity University has given many sensors to CIMFR and no feedback is given by CIMFR to Amity University after trials. It was reported that sensors are working and the results are encouraging.

It is noted by SSAG that the project is delayed far beyond normal parameters and given the lack of proper interaction between the two partners and in particular, the delays by CIMFR in conduction trials it is decided that this project be closed at this juncture. No further extension or funds can be released. It is also decided that MoM shall write to Director, CIMFR on the various concerns.

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

2.5 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.

2.6 Development of Mathematical Modeling using fuzzy logic to control superheat of aluminium electrolysis bath; (JNARDDC)
The project stands completed. Release of balance 10% approved.

2.7 Development of portable analytical kit for field analysis of bauxite: Emphasis on in-situ micro-analysis of mineral entities for mineral prospecting ; (JNARDDC)
The project stands completed. Release of balance 10% approved.

2.8 Process Development for production of low sodz (Na₂O) hydrate in Bayer Circuit
(JNARDDC)
The project stands completed. Release of balance 10% approved.

Agenda Item No. 3. Recommendations of 15th PERC on various issues of S & T programme

Shri Subhash Chandra, Joint Secretary and Chairman, PERC, briefed the members on the decisions of SSAG in its 42nd Meeting regarding the need for directed research at higher TRL in order to address the critical gaps in R & D in mining and minerals sector which will contribute directly to economic development of the country. He mentioned that PERC in its 14th and 15th meetings addressed and discussed in detail various issues ranging from directed research, co-funding, review methodology and project office support requirements. He further added that Parliament Standing Committee for R & D in mining sector recently
has also voiced their concern and the need for directed applied research at higher Technology Readiness Levels which will accelerate economic growth in a transformational mode rather than incremental work. These recommendations are compiled as Clause 8.1 to 8.10 in the minutes of the 15th PERC meeting. He further added that in the last two PERC meetings, a three stage review process has been evolved and put into practice which has helped to handle significant number of project proposals covering five major domains.

The members appreciated the elaborate analysis of both S & T administrative issues as well as contemporary R & D requirements and approved the following recommendations of PERC.

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

In line with decisions of 44th SSAG and the emphasis shall be on directed R & D at TRL 6/7 levels leading to (i) translational R & D in process development, product and value addition, energy reduction etc with industry participation, (ii) projects going up to technology demonstration/pilot facilities, (iii) engineered prototypes with field testing and validation; One or two specific areas of directed research in each major domain shall be decided by PERC on annual basis and call for proposals shall be at TRL 6/7 levels. Likewise in order to explore innovation, applied R & D at TRL 3/4 levels will be encouraged in specific topics. The five identified major domains, viz (i) Geosciences and Exploration; (ii) mining, (iii) ore dressing and mineral processing; (iv) metal extraction and (v) specialty materials shall now be frozen and PERC shall conduct workshops and brainstorming meetings to arrive at least one specific topic in each major domain. 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 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.

3.2 Funding and Co-Funding of Projects

3.2.1 As the budget outlay will be significant in directed research leading to TRL6/7 will be very high in some cases, the funding will be shared between industry, participating organizations and SSAG scheme. Co-funding improves both capability and capacity in the research programmes as well as the ownership of the research programme.

3.2.2 Project proposals emanating from CSIR labs will require co-funding either from CSIR and/or from industry partners.

3.2.3 In view of limited overall budget available in the SSAG scheme, co-funding from DST will be made for some projects based on fund requirements, merit of the projects and on case by case basis.

3.3 Major Categories

As identified by PERC in its last two reviews the following
(i) Geosciences and Exploration; (ii) mining, (iii) ore dressing and mineral processing; (iv) metal extraction and (v) specialty materials shall now be taken for reference in all projects. This categorization also enables collation of projects as well as targeted R & D.

3.4 Three Stage Review Process:

The three stage review process from call to recommendation to SSAG which has evolved over the last two to three years has served well and it is institutionalized. The process shall be reviewed once in three years for any course correction and fine tuning.

3.5 Creation of Data base of projects already sanctioned and rejected

SSAG in its earlier meetings has also emphasized this point and it is informed that a start has been made. Starting with the SSAG and PERC minutes, a compilation of projects sanctioned as well as rejected will be made at the earliest to enable effective review of future project proposals. In addition, this data be put out in the official website of MoM. Review of important fields and thrust areas can also be made by experts so as to guide future PIs on the work already done elsewhere and where the gaps are to filled. SS (MoM) also noted that post completion review and status of application of results in the field are not receiving adequate attention so far and it is needs to be augmented for measuring the efficacy of the SSAG scheme. Members agreed that PERC also consider methods for monitoring usefulness of each completed project to not only obtain evolutionary lessons but also avoid funding non-impactful projects in the future.

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

At least one mid-term review for each project shall be mandatory and such reviews can be done in groups of projects either as per macro domain or region and this post sanction mid-term review is institutionalized. PERC chairman shall nominate experts and venues to conduct the mid-term reviews. Based on the progress, PERC will decide to continue the funding or foreclosure the project.

3.7 IT enabling of all S & T Processes

PERC discussed this issue in its 14th and 15th meetings. It was brought to the notice of this SSAG that NFTDC has over the years developed many micro ERP systems for all its office and project management systems in a cost effective manner. NFTDC shall come up with a proposal for developing the portal and the server and mini ERP system before the next SSAG meeting after getting vetted by PERC.

3.8 S&T Process Implementing Organization:

PERC has 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 one of the four 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.

Shri Subhash Chandra, Joint Secretary and Chairman PERC, briefed that NFTDC has the established techno-managerial experience in handling the S & T processes as identified from call to post completion review and the last two PERC meetings has been hosted by NFTDC successfully. It was proposed that for the first three years NFTDC may be appointed as PIO.

Regarding honorarium of experts it is decided that prevailing norms in DST be followed. Regarding travel related issues, the existing procedures are adequate for handling all exigencies and specific requirements of experts who are retired from service and it can be followed.

SSAG approves NFTDC to be the PIO for three years and the institute shall interact with JS and S & T cell in MoM. An MOU shall be entered with NFTDC for carrying out the identified tasks in S& T process implementation support to MoM. JS and chairman PERC shall take necessary actions in this regard.

3.9 Reconstitution of PERC

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.

SSAG observed that given specializations that are very narrow, it would be difficult to find many experts and they are drawn from a few academic, laboratory and nonferrous companies, IBM and GSI. Members appreciated the rigour and care taken by PERC with limited availability of experts. Chairman, PERC shall suggest more members who are retired or have time to give for reviews and Chairman SSAG shall reconstitute PERC thereafter at an appropriate time.

In order to institutionalize the existing practice, an explicit declaration of conflict of interest if any between the membership and any project proposal be recorded in the minutes of PERC and in such cases, the member(s) will recuse themselves from review of those proposals and other experts will evaluate and PERC as a whole will make appropriate recommendations.

3.10 Brainstorming Meetings and Workshops

One or two brainstorming meetings and workshops be conducted every year to identify problems that are of interest to industry. A drop box of problems in the IT portal will also enable higher degree of participation of industry.
<table>
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<tr>
<th>ID</th>
<th>Title</th>
<th>Institution</th>
<th>Approved/Not Approved &amp; Financial Outlay &amp; Duration</th>
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<tr>
<td>47SSAG/01</td>
<td>Geochemical studies of Archaean greenstone belts of Aravalli craton, NW Indian Shield: Implications for crustal evolution &amp; economic potential;</td>
<td>AMU, Aligarh</td>
<td>Approved Total Budget: Rs 22,321 Lakhs Duration: 2 years 1st Tranche: Rs 11,716 Lakhs 2nd Tranche: Rs 10,605 Lakhs</td>
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<td>Large scale digital database creation of bauxite &amp; laterite deposits of Maharashtra state using geo-informatics technology;</td>
<td>JNARDDC &amp; MRSTC, Nagpur</td>
<td>Approved Total Budget: Rs 69,548.4 Lakhs Duration: 2 years JNARDDC: Rs 43,823.4 Lakhs 1st Tranche: Rs 29,411.7 Lakhs 2nd Tranche: Rs 14,411.7 Lakhs MRSA: Rs 25,725 Lakhs 1st Tranche: Rs 12,862.5 2nd Tranche: Rs 12,862.5 Lakhs</td>
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<td>NOT Approved</td>
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<td>47SSAG/07</td>
<td>Dev of ecofriendly bio-based reagents for mineral floatation</td>
<td>IMMT Bhubaneswar</td>
<td>Approved Total Budget: Rs 24 Lakhs Duration: 2 years MoM: Rs 12 Lakhs CSIR Co-Funding: Rs 12 lakhs MoM funds to be released in two equal installments of Rs 6 lakhs subject to proof of co-funding by CSIR (IMMT).</td>
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<td>Project Code</td>
<td>Description</td>
<td>Institution(s)</td>
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<tr>
<td>47SSAG/08</td>
<td>Extraction of potash values from silicate rocks</td>
<td>IIT Roorkee</td>
<td>Approved</td>
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<tr>
<td>47SSAG/09</td>
<td>Estimation of morpho dynamicity and its remedial action using red-nud based</td>
<td>JNARDDC</td>
<td>Deferred</td>
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<td>concrete at coastal zone of eastern Ouisha</td>
<td>KIIT</td>
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<td>47SSAG/10</td>
<td>Technology Development (TRL-7) for calico-thermic reduction of RE metal</td>
<td>NFTDC Hyderabad</td>
<td>Approved</td>
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<td>oxides &amp; establishment of pilot plant for extraction and purification of</td>
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