Government of India
Ministry of Mines

F. No. 14/67/2014-Met IV

To,

1. Secretary,
   Dept. of Science and Technology,
   Technology Bhawan, New Mehrauli Road, New Delhi-110016

2. Director General,
   Geological Survey of India
   27, Jawanmalal Watu Road,
   Kolkata-700 019

3. The Controller General,
   Indian Bureau of Mines,
   Indira Bhawan, Civil Lines,
   Nagpur-440 001

4. Advisor (Minerals)
   Planning Commission,
   Govt. of India
   New Delhi

5. Prof. D.C. Pandit
   Director,
   IIT, Kharagpur

6. Prof. D.C. Pandit
   Director,
   Indian School of Mines University
   Dhanbad-526004

7. The Director,
   Defence Metallurgical Research Laboratory,
   P.O. Kanchan Bagh,
   Hyderabad

8. The Director,
   Bhabha Atomic Research Centre
   Trombay, Mumbai – 400 085

9. The Chairman & MD,
   National Aluminium Company Limited
   NALCO Bhawan, P-2, Nayapalli, Bhubaneswar
   751 007

10. The Director,
    National Institute of Rock Mechanics,
    Kolar, Karnataka

11. Dr. Pradip
    Group Head,
    Tea Research Development &
    Design Centre, 548 Hadapsar
    Industrial Estate, Pune – 411 013

12. Dr. Anjali Sinha
    Director,
    National Institute of Science &
    Technology
    Bhubaneswar

13. Prof. P.K. Mishra
    Director,
    Institute of Minerals & Materials Technology,
    Bhubaneswar

14. Dr. K. Balasubramanian
    Director,
    Non-Ferrous Materials & Technology
    Development Centre,
    Kanchan Bagh, Hyderabad

Subject: 45th meeting of the Standing Scientific Advisory Group [SAG].

Sir,

I am directed to forward herewith a copy of the Minutes of the 45th meeting of the
Standing Scientific Advisory Group [SAG] held on 04.12.2014 under the Chairmanship of
Secretary, Ministry of Mines for information and necessary action.

Yours faithfully,

[Signature]

Under Secretary to the Govt. of India
Ph. No. 511-2435458
Email: abba.mishra@nic.in
Copy to:

1. Dr. Venkatesan Venkata Krishnan, Non-Ferrous Material Technology Development Centre (NFTDC), P.O. Kanchanbagh, Hyderabad.
2. Mr. V.N.S.U. Vyaswanath Ammu, Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC), Amravati Road, Wadi, Nagpur.
3. Dr. Arvind Kumar Mishra, Indian School of Mines, Dhanbad-826004, Jharkhand.
4. Dr. Rajib Dey, Jadavpur University, Kolkata-700032
5. Dr. M. Muneer, Department of Chemistry, Aligarh Muslim University, Aligarh-202002
6. Dr. Pravin G Bhukte, Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC), Amravati Road, Nagpur.
7. Dr. Amit Kumar Sen, Institute of Technology, Roorkee-247667, Uttarakhand.
10. Dr. Praveen Kumar Rana, Gandhi Institute of Engineering and Technology, Gunupur, Odisha.
11. Dr. Singam Jayanthu, National Institute of Technology, Rourkela-769008, Odisha.
12. Dr. S. Hari Prativa, Non-Ferrous Materials Technology Development Centre, Hyderabad.
13. Dr. Chisoi, Joint Director, Directorate of Geology and Mining, Government of Nagaland, Nagaland-Dimapur.
14. Dr. Manju Kamal Halder, Principal Investigator, Central Glass & Ceramic Research Institute, 196, Rajaj S.C. Mullick Road, Kolkata-700032.
15. Director, Central Glass & Ceramic Research Institute, 196, Rajaj S.C. Mullick Road, Kolkata-700032.
18. Dr. Sarika Mishra, Principal Investigator, Non-Ferrous Materials Technology Development Centre, Hyderabad-500058.
19. Director, Non-Ferrous Materials Technology Development Centre, Hyderabad-500058.
22. Dr. Prashant Shukla, Principal Investigator, Amity Institute for Advanced Research and Studies (Materials & Devices), Amity University (U.P.), Sector-125, Noida-201303.
23. Director, Amity Institute for Advanced Research and Studies (Materials & Devices), Amity University (U.P.), Sector-125, Noida-201303.
24. Dr. Sudhansu S Nandi, National Institute of Miners' Health, JNARDDC Campus, Amaravati Road, P.O. Wadi, Nagpur-440023.
25. Director, National Institute of Miners' Health, JNARDDC Campus, Amaravati Road, P.O. Wadi, Nagpur-440023.

(Atul Mishra)
Under Secretary to the Govt. of India
Ph. No. 011-24369480
Email: atulabha.mishra@nic.in

Copy also to:

(i) Sr. PPS to Secretary (M) (ii) PPS to Addl. Secretary (M) (iii) PS to E.A (iv) PS to JS&FA (v) Director (FN) (vi) DS(T)
Minutes of the Standing Scientific Advisory Group held on 04.12.2014 under the chairmanship of Dr. Anup K Pujari, Secretary, Ministry of Mines

Secretary, MoM and Chairman, SSAG observed that PERC has gone into the details of projects and the PIs of short listed projects have already made their presentations. In view to save time and money, decision has been reached for not pressing for repeat presentation at SSAG. He further added that SSAG members may give their inputs if funding constraint is coming in the way of meeting the objectives of S&T scheme.

If a case has to be made for obtaining more S&T funds, impact of projects funded so far had to delineated and recalibrated with outcomes for inculcating better focus and efficiency in utilization of funds

1. Ratification of minutes of 44 SSAG meeting.

In absence of any further observations/comments on the minutes of 44th SSAG, the same as circulated were adopted.

2. Status of actions on decisions of 44th SSAG:

2.1 In line with decision of 44th SSAG an action on preparation of database of projects has been initiated. In addition, regular updates with regard to (i) call for proposals, (ii) projects funded and (iii) showcasing of completed projects with good impact is proposed to be hosted on the website of MoM.

2.2.1 Regarding periodic monitoring of projects; SSAG decided that for a meaningful review; three theme based committees shall be constituted in discussion with the PERC members. These committees to have 3-4 members each and PERC can co-opt other members from specialized areas depending on the specific requirement of the study area.

2.2.2 The progress of the projects to be reviewed on six monthly basis. This review will preferably be done through tele-conferencing. However, the decision on any need to visit the concerned institutions will rest with PERC. Adequate provision of budget to facilitate these visits is to be provided.

2.2.3 The thematic areas identified are:

- Mining & minerals: covering exploration to beneficiation;
• Metals and alloys covering extraction of metals, alloy making and products;
• Specialty materials (Rare Earths, high purity materials etc).

Thereafter the SSAG continued with the Agenda for the meeting and following agendas were discussed and decisions taken:

**AGENDA ITEM NO. 1**

To consider for approval recommendation of PERC for research project received under S&T Scheme of Ministry of Mines for the year 2014-15.

SSAG desired to know the budget for S&T in the current financial year. It was informed by EA that we have 6.60 crore budget for S&T for the financial year 2014-15, out of which Rs. 2.18 crore has been released and if approved, the first year commitment for these 11 project approx 3.25 crore can be met in the current financial year. For the one project of NIMH approved in 43rd SSAG part funding can be done in this financial year and the balance can be released in next financial year. The 11 projects recommended by PERC were reviewed by SSAG and following are the decisions

**Title of the Project**: Purification of Commercial Rare Earth Oxides, e.g., Ceria, by molten salt fusion and re-crystallization.

**Name of the Institute**: Non-Ferrous Material Technology Development Centre (NFTDC), P.O. Kanchanbagh, Hyderabad.

**Proposed funding Plan**: Rs. 108.28 lakh.

The change in nomenclature of the project was noted and the project was approved with following sequencing of the funding plan.

<table>
<thead>
<tr>
<th>2014-15</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs. 68.35 lakh</td>
<td>Rs. 39.93 lakh</td>
<td></td>
</tr>
</tbody>
</table>

2. **Title of the Project**: Integrated approach for development of process models and pilot production of aluminium alloy extrudates using porthole dies.

**Name of Institute**: Jawaharlal Nehru Aluminium Research Development & Design Centre (JNARDDC), Amravati Road, Wadi, Nagpur.
Proposed funding Plan: Rs. 288.06 lakh

SSAG noted that the recommendations of PERC with regard to preparation of business plan for operating the facility on a self financing mode subsequent to the project period. The budget rationalization over 3 year period was also done. Project is approved as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>2014-15</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>Rs. 50.52 lakh</td>
<td>Rs. 194.02 lakh</td>
<td>Rs. 53.52 lakh</td>
</tr>
</tbody>
</table>

As it is project with a significant outlay, a project monitoring committee, as suggested in para 2.2.3 above should review it after six months to ensure that timelines are maintained and suggest any intervention if required.

3. Title of the Project: Development of low density emulsion explosives for energy efficient blasting in environmentally sensitive areas.

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

Proposed funding Plan: Rs. 29.134 lakh.

The project was approved with following sequencing of the funding plan.

<table>
<thead>
<tr>
<th>Year</th>
<th>2014-15</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>Rs. 18.95 lakh</td>
<td>Rs. 5.724 lakh</td>
<td>Rs. 4.46 lakh</td>
</tr>
</tbody>
</table>

4. Title of the Project: Physico-chemical processing of low grade chromite ore for beneficiation and agglomeration of fines for recovery of metal values.

Name of institute: Jadavpur University, Kolkata-700032

Proposed funding Plan: Rs. 47.00 lakh

The project was approved with following sequencing of the funding plan.

<table>
<thead>
<tr>
<th>Year</th>
<th>2014-15</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>Rs. 25.37 lakh</td>
<td>Rs. 10.82 lakh</td>
<td>Rs. 10.81 lakh</td>
</tr>
</tbody>
</table>

Members felt that this project on Chromium ore burden and Ni recovery related R&D have been done by IMMT. In view of this it is decided that inputs from IMMT...
regarding previous similar work done be taken to get a clarity on the overlap in objectives and outcomes.

6. Title of the Project: Synthesis, characterization and photocatalytic performance of metal doped semiconductor nano-materials

Name of Institute: Aligarh Muslim University, Aligarh-202002

Proposed funding Plan: Rs. 28.5375 lakh.

The project was approved with following sequencing of the funding plan:

<table>
<thead>
<tr>
<th>Year</th>
<th>Funding Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-15</td>
<td>Rs. 19.5285 lakh</td>
</tr>
<tr>
<td>2015-16</td>
<td>Rs. 4.3785 lakh</td>
</tr>
<tr>
<td>2016-17</td>
<td>Rs. 4.6305 lakh</td>
</tr>
</tbody>
</table>

6. Title of the Project: Development of hard and high temperature refractory material/aggregate from saprolite

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

Proposed funding Plan: Rs. 40.91200 lakh.

The project was approved with following sequencing of the funding plan:

<table>
<thead>
<tr>
<th>Year</th>
<th>Funding Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-15</td>
<td>Rs. 26.88607 lakh</td>
</tr>
<tr>
<td>2015-16</td>
<td>Rs. 8.19420 lakh</td>
</tr>
<tr>
<td>2016-17</td>
<td>Rs. 5.83173 lakh</td>
</tr>
</tbody>
</table>

7. Title of the Project: Study of alkaline-carbonatite complexes as potential resource for REE, NB-TA and U-TH

Name of Institute: Institute of Technology, Roorkee- 247667, Uttarakhand

Proposed funding Plan: Rs. 38.575 lakh.

The project was approved with following sequencing of the funding plan:

<table>
<thead>
<tr>
<th>Year</th>
<th>Funding Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-15</td>
<td>Rs. 25.591 lakh</td>
</tr>
<tr>
<td>2015-16</td>
<td>Rs. 6.47850 lakh</td>
</tr>
<tr>
<td>2016-17</td>
<td>Rs. 6.20550 lakh</td>
</tr>
</tbody>
</table>

8. Title of the Project: Development of Nickel containing steel from chromite over burden

Name of Institute: Indian Institute of Technology, Kharagpur and Institute of Minerals & Materials Technology

Proposed funding Plan: Rs. 107.6214 lakh, IMMT. Rs. 50.8164 lakh & IIT, Kharagpur- Rs. 56.605 lakh
The project was approved with following sequencing of the funding plan:

<table>
<thead>
<tr>
<th>2014-15</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMMT Rs. 26.86 lakh</td>
<td>Rs. 11.71 lakh</td>
<td>Rs. 12.23 lakh</td>
</tr>
<tr>
<td>IIT Rs. 26.90 lakh</td>
<td>Rs. 16.40 lakh</td>
<td>Rs. 13.50 lakh</td>
</tr>
</tbody>
</table>

2. **Title of the Project:** Production of geopolymer based construction material from pond ASH: an industrial waste

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

**Proposed funding Plan:** Rs. 28,95600 lakh

The project was approved with following sequencing of the funding plan:

<table>
<thead>
<tr>
<th>2014-15</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs. 33.80 lakh</td>
<td>Rs. 9.30 lakh</td>
<td>Rs. 5.85 lakh</td>
</tr>
</tbody>
</table>

10. **Title of the Project:** Development of TDR based wireless system for slope stability monitoring in opencast mines

**Name of Institute:** National Institute of Technology, Rourkela - 769008, Odisha

**Proposed funding Plan:** Rs. 22,588 lakh

The project was approved with following sequencing of the funding plan:

<table>
<thead>
<tr>
<th>2014-15</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs. 15.12 lakh</td>
<td>Rs. 6.72 lakh + 0.74 lakh = Rs. 7.46 lakh</td>
<td></td>
</tr>
</tbody>
</table>

1. **Title of the Project:** Prospecting/Exploration of Platinum group of metals within Nega Hills ophiolite at Thengatu Ridge-Moke area, Phok District, Nagaland.

**Name of Institute:** Directorate of Geology and mining, Government of Nagaland, Nagaland-Dimapur.

**Proposed funding Plan:** Rs. 49.50 lakh

The project was approved with following sequencing of the funding plan:

<table>
<thead>
<tr>
<th>2014-15</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs. 7.42 lakh</td>
<td>Rs. 39.50 lakh</td>
<td>Rs. 2.17 lakh</td>
</tr>
</tbody>
</table>
12. Title of the Project: Novel synthesis routes for high purity kesterites (CZTS:Cu-Zn-Sn-S; Cu-Zn-Sn-Se) and development of cost kesterite based solar PV cells and modules

Name of Institute: Nonferrous Materials Technology Development Centre, Hyderabad

Proposed funding Plan: Rs. 101 lakh, MOM-Rs. 81.30 lakh

The project was approved with following sequencing of the funding plan:

<table>
<thead>
<tr>
<th>2015-16</th>
<th>2016-17</th>
<th>2017-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOM Rs. 42.712 lakh</td>
<td>Rs. 21.704 lakh</td>
<td>Rs. 16.884 lakh</td>
</tr>
</tbody>
</table>

Directions of SSAG on monitoring issue: While approving the above projects SSAG suggested that close monitoring of these projects should be done by monitoring Committees. For projects above 1 crore need special dispensation including field visit, if the need be, by the Monitoring Committee to ensure timely competition of the project and deliverables as envisaged in the project.

AGENDA ITEM NO. 2:

To consider extension of the duration of the on-going project for funding under the scheme as per the guidelines of the scheme issued in May 2013

SSAG consider the following projects and approved the extension as per the recommendation of PERC.

1. Title of the Project: Characterisation of Indian lean grade magnesite ore and improvement of its high temperature refractory properties with or without beneficiation.

Name of Institute: Central Glass & Ceramic Research Institute, Kolkata.

Extension granted up to 31 March 2016.

2. Title of the Project: Mineral systematic and pre-concentration of PGE values from low-grade chrome ores of Boulia mines, Orissa.

Name of Institute: Institute of Minerals and Materials Technology, Bhubaneswar.

The PI and concerned institution requested for 1.5 yrs extension up to 31 December 2015 and also for additional funds to the tune of Rs. 20 lakhs. In view of importance
of PGE metal related R & D exploration, members felt that it is necessary that projects in these areas get completed to fruition. It was decided that a technical review committee comprising of members from (i) IBM ore dressing, (ii) ISM and (iv) NALCO shall visit IMMT and review the status and recommend next steps for successful completion of the project. The committee shall submit its report before 31 Dec 2014 and thereafter Chairman SSAG shall take final decision on request for extension and additional funding subject to availability of utilization for certificates for earlier released funds.

3. **Title of the Project:** Development of Multilayered materials for melting, liquid metal handling and casting under high pressure and loads.

**Name of Institute:** Non-Ferrous Materials Technology Development Centre (NFTDC), Hyderabad.

*Extension granted up to 31 March 2015.*

4. **Title of the Project:** Development of State-of-art facilities for in-situ stress measurement by hydrofracture in porous and fractured rocks.

**Name of Institute:** National Institute of Rock Mechanics, Karnataka.

*Extension granted up to 31 March 2015.*

5. **Title of the Project:** Study of toxic fumes and development of Carbon nanotubes based sensing device.

**Name of Institute:** Central Institute of Mining & Fuel Research, Dhanbad and AMITY University, Noida (Jointly).

The projects approved in earlier SSAG meeting on Carbon Nano tubes for sensor development jointly to CIMFR Dhanbad and AMITY University has not been completed and the PI from Amity University has been away for more than year on sabbatical leave from the University. During the progress review presentation on 25 Aug 2014, CIMFR scientists presented their portion of work while the representative from Amity university requested for extension as a Co-PI has to be appointed to continue the work. Accordingly PERC recommended extension of project period up to 31st March 2015. SSAG deliberated the matter and suggested that CIMFR
interact with Amity university research group to explore ways to complete the project. Concurrently a two member expert team shall be constituted by MoM to visit Amity University and submit their report on the status on ground and feasibility of completion of the project. Chairman SSAG shall take the final decision on receiving the report from the expert committee as well as from CIMFR.

**AGENDA ITEM NO. 3:**

**Considering the recommendation of PERC to give emphasis on guided research under S&T Scheme.**

The members discussed the importance of R & D projects funded by MoM. Members after in-depth discussion opined that subject to availability of larger funds, the scope of guided research needs to be expanded. In order for the R & D projects to have an impact it was felt that it is necessary to emphasize (a) guided / directed research in well identified thrust areas and also graduate from just basic research to (b) translational R & D leading up to a pilot production stage.

After detailed discussion on the subject, following decisions were taken by the SSAG:

(a) Identification of thrust areas in each of the three thematic areas (refer to para 2.2.3) by PERC with co opted experts shall be completed before the next call for proposals; An approach paper be prepared and brainstorming meetings shall also be conducted with all stakeholders.

(b) Future call for proposals will be on two modes, namely TRL (Technology Readiness levels 1 - 3 which shall continue to be done by academia or laboratory on basic research while and TRL 4 - 7 leading to prototypes and pilot production by consortium of academia/lab and industry. Industry partnership with necessary IP management models shall be followed. Experience of other S & T programmes can be studied for implementing consortium mode project implementation.

(c) In view of funding needs going up in projects that go up pilot production, which is necessary for techno economic feasibility for eventual commercialization for obtaining impact factor, it was also felt that MoM shall take appropriate steps to obtain higher outlay for S & T programme in the coming years and particularly for 13 Plan period. Furthermore, industry co-funding options will also be suitably
incorporate based on pre-competitive R & D in the consortium mode for TRL 4-7 projects and the governance mechanisms for such projects shall also be decided in due course. It is envisaged that such projects will be typically in the range of Rs 2 to 10 Cr over a 3 year period depending up on the sector, complexity of the project and the consortium.

(c) MoM shall also enter into partnership with other S & T ministries for facilitating R & D projects under Joint funding mechanisms. It was noted that MoM and DST can come together for frontier R & D needs in certain thrust areas. Similar mechanisms shall also be explored between MoM and DBT for project funding on biotechnology as applied to mining and minerals sector and MoM and Dept of Electronics and Information Technology for directed R & D on high purity materials.

AGENDA ITEM NO. 4:

Multi Centric Study of dust related Disorders in stone Miens and Development of Sustainable Preventive Programme, National Institute of Miners Health (NIMH), Nagpur- reconsideration.

It was brought to the attention members that project proposal from NIMH was approved in 43rd SSAG meeting with direction to obtain co funding from Ministry of Labour. Co Funding from Min of Labour has been acquired by NIMH and therefore this project is now sanctioned to the extent of outlay of MoM i.e Rs. 2.60 crore.

Any other item:

Reconstitute of PERC

In view of the need for PERC membership to cover all the thematic areas it is necessary for it to be reconstituted. Current members who are unable to attend shall be substituted by other experts and one or two more experts be added. MoM shall reconstitute next PERC. SSAG suggested names of Prof. T.C Rao, former Director R.R.L (Bhopal) and Prof. S P Mehrotra formerly Prof IIT Kanpur presently Prof IIT Gandhinagar and representative of Ministry of Science and Technology may be considered for inclusion.

Meeting ended with vote of thanks to the Chair.