GOVERNMENT OF INDIA
MINISTRY OF MINES

No. 14/26/2013 – Metal IV

New Delhi, the 27.12.2013

To,

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

2. Director General,
   Geological Survey of India
   27, Jawaharlal Nehru 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. Acharya,
   Director,
   IIT, Kharagpur.

6. Prof. D.C. Panigrahi
   Director,
   Indian School of Mines University,
   Barwa Road,
   Dhanbad-826004

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

8. The Director (Material Group),
   Bhabha Atomic Research Centre,
   Trombay,
   Mumbai – 450 085.

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

10. The Director,
    Regional Research Laboratory,
    Near Habibganj Naka,
    Bhopal.

11. The Director,
    Central Institute of Mining & Fuel Research,
    Dhanbad, Jharkhand.

12. Dr. Amalendu Sinha,
    Director,
    Central Institute of Mining & Fuel Research.

13. Dr. K. Baisubrahmanian,
    Director,
    Non-Ferrous Material & Technology Development Centre,
    Kanchan Bagh, Hyderabad.

14. Dr. Pradeep,
    Tata Research Development & Design Centre, 54B Hadapsar
    Industrial Estate, Pune – 411 013.

15. Prof. B.K. Mishra,
    Director,
    Institute of Minerals & Materials Technology,
    Bhubaneswar.

Subject: 44th meeting of the Standing Scientific Advisory Group [SSAG].

Sir,

I am directed to forward herewith a copy of the Minutes of the 44th meeting of the Standing Scientific Advisory Group [SSAG] held on 18.12.2013 under the Chairmanship of Secretary (Mines), Ministry of Mines for information and necessary action.

Yours faithfully,

(Vikas Raj)
Section Officer
Copy to:-

1. Shri Rajendra J Sharma, Scientist-V, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023.
2. Shri Vimal Kishore Jha, Scientist-II, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023.
3. Dr. Partha Sarathi Mukherjee, Chief Scientist, Advanced Materials Technology Deptt., Institute of Minerals & Materials Technology (CSIR), Bhubaneswar-751013.
5. Dr. Prahalad, M.C., Christ University Faculty of Engineering Kanminika, Kumbalagodu, Mysore Road, Bangalore-560060.
6. Dr. B.R.V. Narasimhan, Sr. Scientist Non-ferrous Materials Technology Development Centre (NFTDC), P.O. Kanchanbagh, Hyderabad-500058.
7. Dr. Anupam Singhali, Assistant Professor, Civil Engineering Department, Birla Institute of Technology & Science, Pilani, Rajasthan.
8. Dr. Snehamoy Chatterjee, Department of Mining Engineering, National Institute of Technology, Rourkela, Orissa-769008 and Dr. Biswajit Samanta, Department of Mining Engineering, Indian Institute of Technology, Kharagpur, WB-721302.
9. Dr. Shabayem Sarkar, Principal Investigator, Department of Mechanical Engineering, Indian School of Mines, Dhanbad.
10. Director, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023.
11. Director, National Institute of Miners' Health, JNARDDC Campus, Opp. Wadi Police Station, Amravati Road, Wadi, Nagpur-440023.
13. Dr. B.M. Pingua, Scientist, Central Institute of Mining and Fuel Research, Barwa Road, Dhanbad-826015, Jharkhand
14. Director, Central Institute of Mining and Fuel Research, Barwa Road, Dhanbad-826015, Jharkhand.

(Vikas Raj)
Section Officer

Copy also to:-

(i) Sr. PPS to Secretary(M)  (ii) PPS to Addl. Secretary(M)  (iii) PS to (EA)  (iv) PS to JS&FA  (v) DS(T)  (vi) DS(BS)
MINUTES OF THE 44TH STANDING SCIENTIFIC ADVISORY GROUP (SSAG)
MEETING HELD ON 18TH DECEMBER 2013 AT MINISTRY OF MINES, SHASTRI BHAWAN, NEW DELHI.

The meeting of the 44th Standing Scientific Advisory Group (SSAG) was held on 18th December, 2013 under the Chairmanship of Shri R.H. Khwaja, Secretary, Ministry of Mines in his Chamber at Shastri Bhawan, New Delhi. The list of participants is enclosed.

2. The Chairman welcomed the participants to the 44th SSAG meeting. He requested the Economic Adviser, M/o Mines to give a brief summary on the important actionable points and present a review of action taken on the decisions of the previous meeting.

Agenda Item No. 1

Review of action taken on decisions of previous meetings:

E.4., M/o Mines informed that apart from the projects approved in the 43rd SSAG it was also decided that M/o Mines would take steps to clearly define the Thrust Areas and also have a relook at the methodology to be followed for inviting S&T proposals. As a follow-up to this, the M/o Mines in May 2013 has brought out Comprehensive Guidelines for support to Mining Research. Under this, Project proposals are invited from Academic Institutions, Universities, national Institutes, C-TEMPO and R&D institutions recognised with the D/o Scientific & Industrial Research, GOI, for up to 3 years duration. Detailed guidelines covering Thrust Areas for Research in Mines, scope and coverage of research grants, procedure for invitation, submission, appraisal, monitoring and review of research proposals have also been laid down. The participants were informed that no comments had been received from any quarter regarding Minutes of the 43rd SSAG held on 18.12.2012. The Chairman noted that the Revised Guidelines have been placed on the website of the M/o Mines. Some of the members who were present in the earlier meetings agreed that the guidelines now brought out were an improvement on the earlier ones. The Chairman stressed that constant improvement should be our endeavour. Since no comments had been received on the Minutes of the last meeting, the Minutes were approved.
3. Chairman, SSAG noted that the focus of the meeting should shift from mere seeking of approval of projects to evaluation of projects. It has to be seen whether objectives of these projects are being fulfilled. He reiterated that practicability of projects should be gone into with clarity about what was being attempted to be achieved. He felt that the outcome of project Studies should be relevant to the industry so that the latter becomes a partner in research and also contributes towards funding of these Projects. He informed the participants that the equipments purchased from SSAG funds are under safe custody and ownership of the Institution concerned who have to make detailed inventories of the same. He also emphasized that a comprehensive database of Projects undertaken in the past utilising SSAG funds of M/o Mines has to be built on an immediate basis. A Technical Sub-Committee out of SSAG/PERC could be constituted to meet on quarterly basis for reviewing the ongoing projects. Alternatively, an e-review of the projects on quarterly basis could also be conducted.

4. Thereafter, the SSAG took up discussions on the ongoing projects for extension of time and release of last instalment due.

**Agenda Item No. 2**

**Review of the ongoing projects for considering release of last instalment and extension of project.**

2. **Production of Ferro-Nickel from Chromite Overburden (COB) and Nickel Laterite Ore by Thermal Plasma Process, IMMT, Bhubaneswar.**

<table>
<thead>
<tr>
<th>Total Project Outlay</th>
<th>Rs. 40.05 lakh</th>
<th>Duration</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension Sought</td>
<td>one year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release Requested</td>
<td>3rd Instalment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Status</td>
<td>Ongoing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

M/o Mines released Rs. 31.95 lakhs by way of first two instalments. Principal Investigator and the institution (IMMT, Bhubaneswar) sought budget neutral extension of one year in order to enable scale-up of the process and release of third instalment of funds. Budget neutral extension granted up to 15th July, 2014.
The project is still underway as per the status report in the extended period. During the extension period, detailed characterization of metal and slag of Fe-Ni alloyed pig iron and large scale experiments for maximum recovery of Ni from COB would be taken up. Release of third and final instalment of Rs. 8.10 lakhs is recommended subject to receipt of U.Cs and detailed progress report.

2.2 Systematic Study of Potential Biomarkers of Occupational Diseases in Miners, NIMH, Nagpur

Total Project Outlay : Rs 21.33 Lakhs  Duration : 3 Years
Extension Sought : Six Months
Release Requested : 3rd and final Instalment
Project Status : Ongoing

M/o Mines has released Rs. 17.27 lakhs by way of first two instalments. Principal Investigator and the institution (NIMH, Nagpur) sought budget neutral extension of 6 months. The delay was due to difficulties in acquiring specialized kits. Budget neutral extension is granted up to 31st March, 2014. Director, NIMH informed that preparation of the final report is in progress and would be submitted to the Ministry by February, 2014. Since the U.C for the second instalment has been submitted, the third instalment of Rs. 4.06 lakhs is recommended for release.

2.3 Characterization and Optimum Utilization of Manganese Ore Resources of Orissa, IMMT, Bhubaneswar

Total Project Outlay : Rs 27 Lakhs  Duration : 3 Years
Extension Sought : Six Months
Release Requested : 3rd and final Instalment
Project Status : Ongoing

This project was originally sanctioned in the 38th SSAG meeting on 18th December 2008 and there was delay in the disbursement of the first instalment of funds. The first and second instalments of Rs. 9 lakhs each, totalling Rs. 18 lakhs, were released on 8.3.2010 and 24.10.2011 respectively. Taking the date of first
instalment release as the start date of the project, the 3 year duration stands completed by March 2013. The Principal Investigator has asked for only Rs 1 lakh out of the third instalment of Rs. 9 lakhs as the project stands completed. The last and final instalment of Rs. 1 lakh shall be released based on submission of U.C.s and progress reports. Principal Investigator and the Institutions have sought extension of 6 months which is granted upto 31.3.2014.

2.4 Development of water resistant ANFO for blasting in watery holes, CIMFR, Dhanbad.

Total Project Outlay : Rs 21.90 Lakhs  
Duration : 3 Years
Extension Sought : one year
Release Requested : 3rd and final instalment.
Project Status : Ongoing

This project was originally sanctioned in the 38th SSAG meeting held on 18.12.2008. The first instalment of funds of Rs. 12.15 lakhs was released on 13.12.2009 and the second instalment of Rs. 6.71 lakhs was released on 13.7.2011. Taking the first instalment release date as the start date, 3 year duration stands completed by December 2012. The Institute has requested for release of third instalment of Rs. 3.04 lakhs. The Institute has also requested for appropriate reallocation in different heads for successful completion of the project. The re-appropriation requirements be submitted and the justification for delay be examined by PERC. Budget neutral extension is granted upto 31.03.2014. Third instalment is recommended subject to receipt of U.C.s and submission of detailed progress reports.

2.5 Feasibility and Application of bio-fuel as well as low cost and diluted ANFO for cost effective and safe blasting practices in open cast metalliferrous mines in India, CIMFR, Dhanbad.

Total Project Outlay : Rs 88.02 Lakhs  
Duration : 3 Years
(M/o Mines = Rs. 45 lakhs, CIMFR = Rs. 43.02 lakhs)
Extension Sought : one year
Release Requested : 3rd and final instalment.
Project Status : Ongoing
Rs. 38.5 lakhs have been released by M/o Mines by way of first two instalments. Principal Investigator and the institution (CIMFR, Dhanbad) sought budget neutral extension of one year, in order to complete remaining work that is pending. The PI and Institution have requested for re-appropriation/reallocation in different heads for successful completion of the projects. The re-appropriation requirements be submitted and the justification for delay examined by PERC. Budget neutral extension is granted up to 31st March, 2014. Request for release of third instalment of Rs. 6.5 lakhs was recommended subject to submission of The PI should also submit detailed progress reports and Utilization Certificates.

**Agenda item No. 3**

Review of ongoing projects

The SSAG noted that full details of physical and financial progress as per milestones set had not been received for all the ongoing S&T projects. The same were required to be obtained before a meaningful review could be undertaken. The information is to be obtained and the detailed review conducted by the PERC as part of its quarterly evaluation.

**Agenda item No. 4**

To consider the Projects recommended for approval in the 12th PERC Meeting.

4.1 Development of Real Time Instrument/System to measure bath ratio, alumina concentration and superheat of the aluminium electrolysis bath, JNARDCD

Total Cost : Rs. 30 lakhs duration 3 years

PI - V.K. Jha, Scientist II

Co PI - R.J. Sharma, Scientist IV

Co I - Upendra Singh, Scientist III

The SSAG noted that the project proposal has merit in terms of direct application to pot operation and process optimization for energy reduction in the Aluminium smelter plants. JNARDCD has already done or has been funded for related projects earlier for various measurements in bath as well as for developments of fuzzy logic programs. Development of a rugged system together with reliability and validity of the measurement and computation of process parameters to be ensured with plant site trials. It is also important that all the projects dealing with electrolysis funded in the recent past to JNARDCD be integrated along with this
project to obtain an integrated measurement and analysis (database + model + software) system and the work to be appropriately protected by design registration or patents. The project was approved by SSAG and integration with all other related projects was made part of the deliverables. Detailed year-wise budget is as follows:

<table>
<thead>
<tr>
<th>Head</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital</td>
<td>5.500</td>
<td>4.500</td>
<td>-</td>
<td>10.000</td>
</tr>
</tbody>
</table>

4.2 Development of Process for making value added materials from Ilmenite Minerals, IMMT, Bhubaneswar.

Total Cost: Rs 25 lakhs duration: 3 years.

PI - Dr. P. S. Mukherjee
PI - Mr. K. Jayasankar
Ct PI - Dr. S. K. Singh

The proposal is essentially based on an earlier successful project executed by IMMT for IREL for upgrading the titanium bearing slag from Ilmenite. The aim in this project is to convert the Ti in the slag to value added advanced ceramics such as Titanium carbide and composites. The composites such as Fe+TiC as proposed do not have much impact in terms of applications. Therefore, emphasis on advanced high purity ceramics such as TiC and TiN and composites based on these ceramics is to be explored. The project should have specific product development with a pilot/batch size as the target for demonstration as the goal and not mere exploration of possibilities. The techno economics and particularly energy economics should also be kept in mind in process-product development exercises. The SSAG recommended the project at a total cost of Rs. 25 lakhs with emphasis only on advanced engineering ceramics of TiC and TiN from Ti bearing slags. The year-wise break up is as follows:

<table>
<thead>
<tr>
<th>Head</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital</td>
<td>2.00</td>
<td>1.0</td>
<td>-</td>
<td>3.0</td>
</tr>
<tr>
<td>Recurring</td>
<td>5.8</td>
<td>8.8</td>
<td>7.3</td>
<td>21.9</td>
</tr>
</tbody>
</table>
4.3 Development of Super Thermal Aluminium (STAL) conductor for Indian Power Sector: Joint Proposal from JNARDDC and NFTDC

Total Cost: Rs 500 lakhs

duration: 3 years

JNARDDC

PI - Mr. R.N. Chouhan, Scientist III
Pr. Co-I - Mr. F Mahendiran, Scientist II
Project Team - Mr. V.N.S.U. Viswanath Ammu, Scientist II
Mr. Anupam Agnihotri, Scientist –V & HOD

NFTDC

PI Mr. D. Lokeswara Rao, Dy Project Director
Pr. Co-I Mr. Manoj Kumar, Sr. Engineer
Project Team Mr. M. Govind Raju, Project Engineer
Mr. Nitin Kanoongo, Project Engineer

The project proposal envisages (i) reproduction of process conditions in small scale equipments (and not actual industrial equipments) as obtained in cable manufacturing units in melting and casting in lab/pilot scale and the modification thereof, (ii) augmentation of existing hot rolling / and cold deformation facilities in the lab to reproduce process conditions of Properzii and industrial wire drawing (iii) develop final product as reinforced stranded wire and (iv) do functional testing of the product. The project also envisages development of in-line fast annealing systems which is a critical equipment gap in SMEs involved in the cable manufacturing.

This project is expected to have a significant impact in the power sector if well executed and technology transferred to a large number of cable manufacturing units. Association of a selected industry partner at this stage would not allow for eventual non-exclusive transfer. The project outlay is to be reduced to be under Rs 500 lakhs (both institutions put together) spread over 3 year period. The expenditure be restricted to those directly relevant to project deliverables and job working be explored for certain operations rather than procuring equipments which will not be useful after the project or are available in accessible organisations. Other equipments or augmentation of testing equipments at JNARDDC fall under the purview of overall lab infrastructure development of JNARDDC and SSAG shall take a policy view on this matter, which has implication on the financial outlay. The SSAG recommended the project with a budget of under Rs. 500 lakhs for duration of 3 years. Year-wise budget is as follows:-
### 4.4 Value Addition in Mine Waste Tailing Materials through Geo-polymer formation; Christ University, Faculty of Engineering, Kumbalagodu, Bangalore.

**Total Cost:** Rs 12 lakhs  
**Duration:** 3 years.

**PI:** Dr. Prahallada, Asstt. Professor

The proposal from the above academic institution pertains to exploration of fixation waste tailings through geo polymerization methods which is now being considered as a viable and potential technique. The project outlay is modest and is mostly (Rs 9 lakhs) on project associate related HR expenditure. The SSAG recommended the proposal with a financial outlay of Rs 12 lakhs. The budget break up is as follows:

<table>
<thead>
<tr>
<th>Head</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital</td>
<td>1.0</td>
<td>-</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>Recurring</td>
<td>4.0</td>
<td>3.50</td>
<td>3.50</td>
<td>11.00</td>
</tr>
</tbody>
</table>

### 4.5 Recovery of Copper from Copper Smelter dust and novel fixation of Arsenic in geo polymer matrix derived from converter slag - Scientific and Techno feasibility Studies, NFTDC, Hyderabad

**Total cost:** Rs 40 lakhs  
**Duration:** 1 year

**PI:** Dr. BRV Narasimhan, Sr. Scientist

The proposal has good problem identification emanating directly from the Cu smelter. An innovative solution of simultaneous recovery of Copper as well as fixation of As using other waste as obtained in the smelter slag makes good economics with a green solution. An end to end solution is presented in the proposal. The project implementation should be broken down to Phase I and II. Phase I is to be done within 1 year for proving concept with emphasis on lab scale experiments on Cu separation from flue dust and TCLP studies for Arsenic fixation within a financial outlay of Rs 40 lakhs in 12 months is to be taken as objectives.
and IP filing should be done at the earliest. Phase II is also important as it is necessary for technology transfer to industry not only in India but across the world. The financial outlay for Phase II can be decided on successful completion of Phase I. SSAG recommended Phase I to be completed within 1 year. Budget break-up is as follows:

(Rs lakhs)

<table>
<thead>
<tr>
<th>Head</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital</td>
<td>18.00</td>
<td>-</td>
<td>-</td>
<td>18.00</td>
</tr>
<tr>
<td>Recurring</td>
<td>22.00</td>
<td>7.38</td>
<td>6.62</td>
<td>20.38</td>
</tr>
<tr>
<td>Total</td>
<td>40.00</td>
<td>7.38</td>
<td>6.62</td>
<td>54.00</td>
</tr>
</tbody>
</table>

As the project [Phase I] is to be completed in 12 months, a first release of Rs. 20 lakhs be done in FY 2013-14 and the remaining amount of first instalment i.e. Rs. 20 lakhs be released in the first quarter of FY 2014-15.

4.6 Development of Copper Bio Leaching methodology/technique from low grade ore at HCL, Khetri; BITS, Pilani.

Total Cost Rs 30 lakhs duration 3 years

PI - Dr Anupam Singhal

The project as originally envisaged is based on identification of bio organisms, lab scale study and optimization of process and fabrication of pilot plant. The project was directed more towards ore bodies. It is worth noting that IMMT has done fairly extensive work on bio leaching of Cu ore bodies. It is better to redirect the objectives of the project specifically to tailings that have collected in HCL Khetri and develop methodologies for these tailings only. It is also observed that BITS Pilani being in close proximity to Khetri is well suited to carry out the site based work and this team should interact and take the expertise already established by IMMT. HCL shall also be roped in for better implementation. IMMT would be a partner institution for rapid knowledge capture and HCL for effective implementation. The project objectives are (i) isolation/selection and identification of target micro-organisms (ii) lab scale study and optimization process parameters for tailing bioleaching (iii) fabrication of pilot plant and process optimization. The SSAG recommended the project for a total cost of Rs. 30 lakhs. The year-wise budget is as follows:

(Rs lakhs)

<table>
<thead>
<tr>
<th>Head</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital</td>
<td>10.00</td>
<td>-</td>
<td>-</td>
<td>10.00</td>
</tr>
<tr>
<td>Recurring</td>
<td>6.38</td>
<td>7.38</td>
<td>6.62</td>
<td>20.38</td>
</tr>
</tbody>
</table>
4.7 Recoverable reserve estimation using non-gaussian copula based ore body simulation along with open pit and stope optimization NIT Rourkela & IIT Kharagpur

Total Cost: Rs 27.55 lakhs duration 3 years

PI - Snehamoy Chatterjee (NIT Rourkela)
PI - Biswajit Samanta (IIT Kharagpur)

This project essentially deals with spatial modelling of ore bodies for better prediction of reserve estimates and effective utilization of mine statistics as a planning tool. Dissemination of data analysis via new model and algorithms envisaged to be developed should be made part of the objectives and deliverables. The impact of such developments has to be measured in terms of metrics in the future such as effective recovery and minimization of experimental methods for estimation. The three agencies given in the proposal, namely HCL, NALCO and NMDC be given the model and algorithm for their use in order to encourage validation and utility of the project. This is to be mandated as a tangible deliverable of the proposed project. The SSAG recommended the project. The year-wise budget is as follows:

(Rs lakhs)

<table>
<thead>
<tr>
<th>Head</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NIT</td>
<td>IIT</td>
<td>NIT</td>
</tr>
<tr>
<td>Capital</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Recurring</td>
<td>3.53</td>
<td>3.53</td>
<td>3.53</td>
</tr>
</tbody>
</table>

4.8 Evaluation of spatially distributed underground mine dewatering piping network, ISM

Total Project Cost: Rs 33 lakhs duration 3 years.

This project proposal envisages combining modelling of water networks and implementation in an actual coal mine in Jharia with GPS systems. Different pumping schemes and their efficacy is being attempted in this study with an aim to improve efficiency in high water pumping, predicting failure probability and vulnerable zones. The methodology is well laid out and its implementation will be of great value in preventing flooding and accidents. After discussions the Board directed that the study be re-examined specifically with regard to its applicability to other mines and resubmitted to PERC.

5. Director, NFTDC informed the SSAG that every project should have a co-Principal Investigator to enable continuity in completion of the project in case of
any eventuality. Projects should also be well planned with sufficient pre project activities to avoid excessive time over runs. Regarding project reviews, he observed that progress reports be sent to the PERC members in e-copy mode every quarter so that timely intervention and guidance can be imparted to the Project Investigators. He also informed that the guidelines for expenditure heads have been given for all project proposals. In this regard, the institution overhead is not explicitly mentioned but it is to be incorporated under the given heading "any other expenditure". The following norm of 1% on capital expenditure plus a maximum of 5% on recurring expenditure will be followed for projects for outlay less than Rs 100 lakhs. For projects with larger outlay and more than one institution, a fixed amount of Rs 2 lakhs per year per institution will be used as a norm.

6. The Additional Secretary, Ministry of Mines noted that requests were being received from Institutions for extension of time long after expiry of project deadlines. He directed that Institutions consistently delaying in meeting the deadlines should be put on notice and new projects from such Institutions cannot be considered sympathetically unless the situation is rectified by the Institution. Institutions applying for new projects should point out the ongoing projects already with them. He stressed that comprehensive evaluation of projects – ongoing evaluation as well as post completion evaluation, was required. A quarterly review should be conducted. Project proposals and ongoing projects should be submitted with the details of the various tasks/sub-tasks into which they are to be taken up, showing clearly both the responsibilities for each task/sub-task and the timeline. Reviews should be with reference to this evaluation framework. The PERC should be more active in reviewing the projects in detail in a systematic manner and on a regular basis. He thanked the members for attending the 44th SSAG Meeting and for their valuable suggestions.

7. The Meeting ended with a vote of thanks to the Chair.