GOVERNMENT OF INDIA
MINISTRY OF MINES

********

No.14/6/2013 – Metal IV New Delhi, the 28.11.2013

To

1. Dr. Amalendu Sinha,
   Director,
   Central Institute of Mining & Fuel
   Research,
   Dhanbad, Jharkhand.

2. Dr. Pradip,
   Group Head,
   Tata Research Development &
   Design Centre, 54B Hadapsar
   Industrial Estate, Pune – 411 013.

3. Prof. D. Acharya,
   Director,
   IIT, Kharagpur.

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

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

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

Subject: 12th Project Evaluation and Review Committee (PERC) meeting of
Standing Scientific Advisory Group [SSAG].

Sir,

I am directed to forward a copy of the Minutes of the 12th meeting of
the Project Evaluation & Review Committee Standing (PERC) of Standing
Scientific Advisory Group (SSAG) held on 29.10.2013 under the Chairmanship
of Ms Sunanda Sharma, Economic Adviser, Ministry of Mines for information
and necessary action.

Yours faithfully,

(Abha Mishra)

Under Secretary to the Govt. of India
1. Shri Phiroze Dungore, Scientist-III, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023
2. Shri Rajendra J Sharma, Scientist-V, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023.
3. Shri Vimal Kishore Jha, Scientist-II, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023.
4. Shri V.N.S.U.Viswanath Ammu, Scientist-II, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023.
5. Dr. Upendra Singh, Scientist-III, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023.
6. Director, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023.
7. Dr. K.U.M.Rao, Principal Investigator, Professor, Department of Mining Engineering, Indian Institute of Technology, Kharagpur-721302, W.B.
8. Dr. Partha Sarathi Mukherjee, Chief Scientist, Advanced Materials Technology Dept., Institute of Minerals & Materials Technology (CSIR), Bhubaneswar-751013.
9. Shri R.N. Chouhan, Scientist-II, Jawaharlal Nehru Aluminium Research Development and Design Centre, Amravati Road, Wadi, Nagpur-440023 and Shri D.Lokeswara Road, Dy. Project Director, Non-Ferrous Materials Technology Development Centre, P.O. Kanchanbagh, Hyderabad-500 058 (Jointly submitted).
10. Dr. Prahalada, M.C., Christ University Faculty of Engineering Kanimukha, Kumbalagodu, Mysore Road, Bangalore-560060.
11. Dr. B.R.V.Narasimhan, Non-ferrous Materials Technology Development Centre (NFIDC), P.O. Kanchanbagh, Hyderabad-500058.
12. Dr. A.K. Verma, Principal Investigator, Assistant Professor, Department of Mining Engineering, IIT, Kharagpur-721302.
13. Dr. Swapan Kumar Karak, Department of Metallurgical and Materials Engineering, National Institute of Technology, Rourkela, Orissa-769008.
14. Dr. Anupam Singhal, Assistant Professor, Civil Engineering Department, Birla Institute of Technology & Science, Pilani, Rajasthan.
15. Dr. Snehamoy Chatterjee, Department of Mining Engineering, National Institute of Technology, Rourkela, Orissa-769008.
16. Dr. Shabayan Sarkar, Principal Investigator, Department of Mechanical Engineering, Indian School of Mines, Dhanbad.
17. Dr. Tarnoy Maiti, Associate Professor of Electrical Engineering, Mining Machinery Engineering, Indian School of Mines, Dhanbad-826004.
18. Dr. S.Das, Chief Scientist & Head Metallic Composite Group, CSIR-Advanced Materials and Processes Research Institute, Hoshangabad Road, Near Habibganj Naka, Bhopal-462026 (MP).
19. Director, National Institute of Miners’ Health, JNARDDC Campus, Opp. Wadi Police Station, Amravati Road, Wadi, Nagpur-440023.
21. Dr. B.M. Pingua, Scientist, Central Institute of Mining and Fuel Research, Barwa Road, Dhanbad-826015, Jharkhand
22. Director, Central Institute of Mining and Fuel Research, Barwa Road, Dhanbad-826015, Jharkhand.

Copy also to:-

(i) PS to (EA), (ii) Director (IF) (iii) DS (BS) (iv) DS (T)

(Abha Mishra)
Under Secretary to the Govt. of India.
MINUTES OF THE TWELFTH MEETING OF PROJECT EVALUATION AND REVIEW COMMITTEE (PERC) OF STANDING SCIENTIFIC ADVISORY GROUP (SSAG) HELD ON 29.10.2013 AT MINISTRY OF MINES, NEW DELHI.

The 12th PERC meeting was held on 29.10.2013 in Shastri Bhawan, New Delhi under the Chairpersonship of Ms. Sunanda Sharma, Economic Adviser. The list of participants is at Annexure.

2. The Chairperson welcomed the members and thereafter the 12th PERC considered the following projects and gave its recommendations as follows:-

**Agenda Item No. 1 – New Projects:**

1.1 Development of a Spot Test Kit for Aluminium Recycling Scrap: JNARDDC
Total Cost Rs 19.80 lakh and duration: 1 year

Chemical reagent reactions with aluminium alloys followed by colour decoding based techniques are well established for Aluminium scrap identification. Further R & D required in this field is very minimal. The proposal lacks detail with regard to product development as a kit package.
Proposal NOT Recommended.

1.2 Development of Integrated Simulator for Bayer process incorporating Material/Energy balance and Process/Capital Cost Estimation.: JNARDDC
Total Cost Rs 33.576 lakhs and duration: 3 years

Problem definition is based on development of mathematical model and integration with a cost model for prediction. The proposal needs better elaboration and the methodology of database development and validation with real plant data is important. The proposal needs revision in terms of elaboration of methodology, enunciation of models and validation methods. Reduction in financial outlay to be examined. An expert/consultant should be included as techno economic modelling is essential for costing.
Recommendation: Revision and Resubmission to PERC

1.3 Development of Real Time Instrument / System to measure bath ratio, alumina concentration and superheat of the aluminium electrolysis bath, JNARDDC
Total Cost: 38.396 lakhs and duration: 3 years

The project proposal has merit in terms of direct application to pot operation and process optimization for energy reduction in the Aluminium smelter plants. JNARDDC 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 JNARDDC 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 financial outlay can be reduced to Rs 30 lakhs.
Proposal Recommended as above and integration with all other related projects is to be made part of the deliverable.

1.4 Integrated Approach for design and development of process models and production of aluminium alloy extrudates using port hole dies: JNARDDC
Total Cost: 292, 54,560 and duration: 3 years

This project proposal from JNARDDC is part of downstream process/product development endeavour. The proposal envisages study of extrusion, design of porthole dies, establishment of extrusion presses and related accessories. As a policy it was decided earlier in its GB that JNARDDC should identify specific areas of development in the downstream sector and extrusion was chosen as one them. Earlier project funding was for procurement of software and a few apparatus. This proposal is aimed at establishing core competence in aluminium extrusion with extensive process equipments and testing/characterization equipments. The proposal needs further detailed examination in view of its extensive financial outlay. Impact of work and long term self sustainability of this facility which is eminently possible if executed with care are to be detailed. There is prima facie merit in the overall proposal and further review needed.
Recommendation: The proposal may be reviewed especially with reference to requirement of equipments and re-submitted to PERC.

1.5 Conversion of residual aluminium dross into smelter grade alumina: JNARDDC
Total Cost Rs 20,912 lakhs and duration: 2 years.

The problem related to dross formation has been attempted by industry as of now in two directions, namely (i) reduction in the formation of the dross itself and (ii) reaction with salts to "sweat" out the useful part for reversion to melting. In the present practice, the rest of the dross is disposed as waste alumina to scrap dealers. The proposal aims to seek solutions to convert dross into smelter grade alumina. It is better to do a few lab scale preliminary studies for proof of concept as well as establish prima facie feasibility in terms of technical specifications of the product and the financial viability of the process options to convert dross into feed for the electrolysis.
Proposal: NOT Recommended at this stage.

1.6 Technical Assessment & Deporportion of trace elements of bauxite in Bayer cycle: Emphasis on Dissolution chemistry with respect to bauxite of Indian origin: JNARDDC
Total Cost: Rs 41.868 lakhs and duration: 3 years.

This project proposal is only at the conceptualization stage and deals primarily with identification of trace elements and partitioning of those elements during the Bayer leaching process. The initial work of identification of trace elements can be better handled by GSI and other exploration agencies. It is therefore necessary to first establish the concept with a few chemical characterization of potential bauxite bodies for valuable trace elements before embarking on the project.
Proposal: NOT Recommended.

1.7 Shear Characteristics of Reinforced Rock Joints, IIT Kharagpur.
Total Cost: 39,852 lakhs and duration: 3 years

The project proposal deals with establishment of an experimental facility (modification of compression/tensile by augmentation of hydraulic shear force) at IIT Kharagpur to study the
shear characteristics of rock bodies. The experts observed that the project lacks relationship with actual situations as obtained in mines and it is necessary to reproduce those conditions in the test methodology in order for the results to be useful.
Proposal: NOT Recommended.

1.8 Development of Process for making value added materials from Ilemenite Minerals, IMMT, Bhubaneswar

Total Cost: Rs 48.224 lakhs and duration: 3 years.

The proposal is essentially based on an earlier successful project executed by IMMT for IREL for upgrading the titanium bearing slag from Ilemenite. 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 should 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 project can be reduced in financial outlay to Rs 25 lakhs with emphasis only on advanced engineering ceramics of TiC and TiN from Ti bearing slags.
Proposal Recommended with above modifications and reduced outlay of Rs 25 lakhs in view of reduced deliverables.

1.9 Development of Super Thermal Aluminiun (STAL) conductor for Indian Power Sector: Joint Proposal from JNARDDC and NFTDC

Total Cost: Rs 625.4 lakhs (JNARDDC Rs 294 and NFTDC Rs 331.4 lakhs and duration: 3 years)

In line with the directions given to JNARDDC by its GB, a few critical areas were to be identified by the centre in downstream sector with a clear emphasis on industry impact. Accordingly, two major proposals were submitted in the earlier PERC meetings, namely on (i) extrusion and (ii) next generation aluminium conductor materials. The first project proposal on extrusion was funded over the last three years to a limited extent. This specific project was first proposed by JNARDDC in the 11th PERC held on 02 November 2012. The original proposal envisaged establishment of extensive process facilities starting from melting to casting and properzii Rod mill followed by wire drawing for an overall outlay of over Rs 600 lakhs. PERC at that juncture observed that such industry scale facilities cannot be handled by a laboratory. Furthermore, the original proposal was more on material development of Al-Zr materials suitable for STAL conductor while it is more appropriate to target the final product and process developments and modifications to processes thereof to enable adoption by the industry. It was suggested by PERC that NFTDC should collaborate with JNARDDC in this proposal and rework the entire proposal.

In line with the earlier decision of PERC, Director, NFTDC convened a review meeting in NFTDC, Hyderabad to investigate and examine the needs of the power sector in the near future in terms of (i) next generation conductors, (ii) how to enable existing cable manufacturers to graduate to the emerging conductor technologies, (iii) role of JNARDDC and NFTDC to develop the process and product without embarking on large scale facilities in the respective laboratories, and particularly (iv) emphasis on product validation through functional testing. Accordingly, the entire proposal was asked to be modified to make
product development and process - product integration and optimization as the main emphasis rather than mere lab scale material development. Only gap equipments are to be identified for development of the process and testing and characterization.

Subsequent to the review at NFTDC, the project proposal as submitted in this PERC 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.

Project Recommended : Overall financial outlay to be reduced to be under Rs 500 lakhs over 3 years as per guidelines given above.

1.10 Value Addition in Mine Waste Tailing Materials through Geo polymer formation; Christ University, Faculty of Engineering, Kumbalgodu, Bangalore.
Total Cost: Rs 15.24 lakhs and duration : 3 years.

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 financial outlay can be reduced to Rs 12 lakhs.
Proposal Recommended with reduced financial outlay of Rs 12 lakhs.

1.11 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 379.52 lakhs and duration 2 years

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. In Phase I establishing the technical feasibility at an appropriate scale within a financial outlay of Rs 100 lakhs in 18 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.
Recommended for execution as Phase I (pilot scale) & II and Phase I recommended with an outlay of Rs 100 lakhs.

1.12 Development of a novel underground mining method for exploitation of Chromite deposits IIT KGP (Rs 47.15 lakhs & 3 year);

This project proposal aims at exploring methods for extracting fragile ore body and host rock between 100 m RL to 250 M RL. The constraints of space for overburden disposal within the existing mining leases (15 companies have been given license by Govt of Odisha) and soft wall rocks have resulted in intermediate region of 100 m RL to 250 m RL not being extracted. The project also aims to develop mobile support systems as model prototypes. The project outcomes will be useful if solutions for support as well as mine planning for the intermediate regions are found and implemented as a demonstration in one or two mines. The expenditures are mostly towards establishment of testing facilities, software and prototype support system fabrication. The financial outlay for the project can be reduced judiciously.
Proposal: To be resubmitted to PERC with Industry partner.

1.13 Optimization of composition and processing parameters for development and nano – oxide dispersed zirconium alloys, NIT Rourkela.
Total Cost: Rs 45,98,400 and duration : 3 years

The problem definition is more of an exploratory nature pertaining to Zr alloy composites. Zr alloys are used primarily in nuclear fuel production and the choice of materials and additives are severely restricted in those applications. Furthermore, the proposal does not fall in the thrust areas of research of SSAG. It is advised that the proposal may be submitted by the PI to Board of Research for Nuclear Studies (BRNS) for better appraisal.
Proposal NOT Recommended.

1.14 Development of Copper Bio Leaching methodology/technique from low grade ore at HCL, Khetri; BITS, Pilani.
Total Cost Rs 46.60 lakhs and duration 3 years

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. It is therefore recommended that proposal be revised and resubmitted at the earliest within a financial outlay of Rs 30 lakhs and also take IMMT as a partner institution for rapid knowledge capture and HCL for effective implementation.
Proposal Recommended with above revisions.

1.15 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 and duration 3 years
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. Proposal Recommended.

1.16 Evaluation of spatially distributed underground mine dewatering piping network, ISM
Total Project Cost: Rs 33 lakhs and duration 3 years.

As in many other fields, many expert systems have evolved over the years in the area of underground mining. One such advancement is in pumping networks and sophisticated software such as WATERCAD and WATERGEMS have come into actual use. 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. Proposal Recommended.

1.17 Development of Real Time IP based leaky coax WIFI telephony, video surveillance and Environmental Monitoring in underground mines ISM
Total Cost: Rs 95.45 lakhs and 3 years.

The principal aim of this project is to implement real time mine monitoring system and surveillance with a view to improve safety in mine operations. The experts observed that it is a well thought and a doable project. A suggestion made by the expert member is that it is best tried out in a uranium mine quickly rather than a coal mine. The PI was asked to contact the appropriate authorities in DAE and uranium mining in Jadduguda for effective partnership and implementation. Co-funding from DAE can also be explored. ProposalRecommended with revision to implement first in a uranium mine and resubmission to PERC with co-funding options from DAE.

1.18 Synthesis and Analysis of Cast Magnesium Alloys for Casing Application, AMPRI (CSIR) Bhopal
Total cost Rs 89.28 lakhs and 2 year duration.

This project proposal is aimed at development of Mg based alloys for automotive applications comprising of optimization of the process and development of specific alloys and gravity casting of casing components. The experts in PERC observed that automotive sector has already adopted Mg based components based on actual demonstration of weight reduction of up to 20 - 25% and substitution of high performance Aluminium forging components. The auto sector is a very conservative industry, particularly at the component level and these performance metrics are very important for eventual use by the auto sector.
The automotive parts manufacturers have adopted Mg alloy pressure die casting of components with coating for prevention of corrosion and the adoption is already in place. Starting from scratch in this project and using only gravity die casting will not help in technology adoption by the industry. Proposal NOT Recommended.

**Agenda Item No. 2 – On-going Projects: To review the on-going projects for considering release of last instalment and extension of the project duration.**

### 2.1 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: 3 Years</th>
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<tbody>
<tr>
<td>Extension Sought</td>
<td>one year</td>
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<tr>
<td>Release Requested</td>
<td>3rd Instalment</td>
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<td>Project Status</td>
<td>Ongoing</td>
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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. Since the latest U/C has been submitted, the third tranche of release of funds is recommended.

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

<table>
<thead>
<tr>
<th>Total Project Outlay</th>
<th>Rs 21.33 Lakhs</th>
<th>Duration: 3 Years</th>
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<tbody>
<tr>
<td>Extension Sought</td>
<td>Six Months</td>
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<tr>
<td>Release Requested</td>
<td>3rd and final Instalment</td>
<td></td>
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<tr>
<td>Project Status</td>
<td>Ongoing</td>
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</table>

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. Since the latest U/C has been submitted, the third and final tranche of fund release is recommended.

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

<table>
<thead>
<tr>
<th>Total Project Outlay</th>
<th>Rs 27 Lakhs</th>
<th>Duration: 3 Years</th>
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<tr>
<td>Extension Sought</td>
<td>Six Months</td>
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<td>Project Status</td>
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Principal Investigator and the institution (IMMT, Bhubaneswar) sought budget neutral extension of six months in order to complete remaining 20% of the work that was pending. Budget neutral extension is granted up to 31st March, 2014. Since the last two U/Cs have been submitted, the third tranche of release is recommended, as per amounts approved for proposal.
2.4 Development of water resistant ANFO for blasting in watery holes, CIMFR, Dhanbad.

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

Principal Investigator and the institution (CIMFR, Dhanbad) sought budget neutral extension of **one year**, in order to complete remaining work that is pending. The institute is also requesting for appropriate reallocation in different heads for successful completion of the project. Budget neutral extension is granted up to 31 March 2014. The re-appropriation requirements be submitted. The PI should also submit detailed progress reports and Utilization Certificates for consideration of release of next instalment due.

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 Lakh
Extension Sought : one year
Release Requested : 3rd and final instalment.
Project Status : Ongoing

Principal Investigator and the institution (CIMFR, Dhanbad) sought budget neutral extension of **one year**, in order to complete remaining work that is pending. Budget neutral extension is granted up to 31st March, 2014. The PI should also submit detailed progress reports and Utilization Certificates for consideration of release of next instalment due.

3. The Meeting ended with a vote of thanks to the Chair.
# LIST OF PARTICIPANTS OF 12TH PERC MEETING HELD ON 29.10.2013

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<tr>
<th>Sl. No</th>
<th>Name S/Shri</th>
<th>Designation</th>
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<tr>
<td>1.</td>
<td>Ms Sunanda Sharma</td>
<td>Economic Adviser, M/o Mines (Chairperson)</td>
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<td>2.</td>
<td>Dr. K. Balasubramanian</td>
<td>Director, NFTDC</td>
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<td>3.</td>
<td>Amalendu Sinha</td>
<td>Director, CIMFR, Dhanbad</td>
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<td>D. Lokeswarra Rao</td>
<td>Dy. Project Director, NFTDC</td>
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<td>V.N.S.U. Viswanth Ammu</td>
<td>Scientist II, JNARDDC</td>
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<td>Dr. Shubhangi Pingle</td>
<td>S.R.O. NIMH</td>
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<td>R.J. Sharma</td>
<td>S IV JNARDDC</td>
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<td>8.</td>
<td>Dr. Swapam Kumar Karak</td>
<td>Asstt. Professor NIT, Rourkela</td>
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<td>Dr. U. Singh</td>
<td>Scientist JNARDDC</td>
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<td>12.</td>
<td>Dr. B.R.V. Narasimhan</td>
<td>Sr. Scientist</td>
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<td>13.</td>
<td>Dr. Prahallada</td>
<td>Professor</td>
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<td>14.</td>
<td>Dr. P. Das</td>
<td>Professor</td>
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<td>15.</td>
<td>Dr. A.K. Soni, CIMFR, Nagpur</td>
<td>Sr. Principal Scientist</td>
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<td>17.</td>
<td>Dr. S. Das</td>
<td>Chief Scientist</td>
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<td>18.</td>
<td>Dr. Tanmoy Maity</td>
<td>Assistant Professor</td>
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<td>19.</td>
<td>Dr. Shibayan Sarkar</td>
<td>Assistant Professor, Mech. Enng., ISM Dhanbad</td>
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<td>Scientist, CSIR, IMMT</td>
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<td>22.</td>
<td>B.K. Mohapatra</td>
<td>Scientist, IMMT, BBSR</td>
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<td>23.</td>
<td>Dr. S.K. Verma</td>
<td>BITS Pilani Dean</td>
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<td>BITS Pilani Assistant Professor</td>
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<td>P. Dungue</td>
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<td>P.S. Mukherjee</td>
<td>Chief Scientist, CSIR, IMMT</td>
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<td>Dr. J. Bagchi</td>
<td>Deputy Secretary (Technical), M/o Mines</td>
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<td>Bijender Singh</td>
<td>Deputy Secretary, M/o Mines</td>
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<td>Under Secretary M/o Mines</td>
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<td>Rajender Sidhu</td>
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<td>Shri Vikas Raj</td>
<td>S.O (Met.IV) M/o Mines</td>
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