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Minutes of Review meeting of PERC (Project Evaluation & Review Committee) held under the Chairmanship of Shri Satendra Singh, Joint Secretary, Ministry of Mines on 21-22 January 2020 at JNARDDC, Nagpur. The list of participants is enclosed in Annexure-A.

1. A total of 35 ongoing projects were considered for review by the PERC. As per the terms of reference of PERC, the concerned members recused themselves, to avoid conflict of interest, from the proceedings from that part of the meeting when project(s) related to their institute(s) was under consideration.

2. The committee of experts present in the review meeting were divided into two panels with corresponding expertise. Panel-A covering the areas of (i) Geosciences and Exploration (ii) Mining and (iii) Mineral Processing & recovery from waste. Panel-B covering the field of (iv) Metal Extraction (Metallurgical processes) and (v) Alloys, specialty materials and product. This enabled more time for the PIs to make the presentations as well as detailed interaction. Both the panels met together at the end and finalized the recommendation. 4 (four) PIs were absent. The details are given in the succeeding paragraphs.

1

<b>F. No.</b>	14/4/2016-Met.IV		
<b>Project Title</b>	<b>Geochemical Studies of the Archaean Greenstone Belts of the Aravall I Craton, Northwestern Indian Shield: Implications for Crustal Evaluation and Economic Potential” for financial assistance</b>		
<b>Institution</b>	Aligarh Muslim University, Aligarh		
<b>Principal Investigator</b>	Shri Md. Erfan Ali Mondal, E-mail:- erfan.mondal@gmail.com		
<b>SSAG Approval</b>	47 <sup>th</sup> SSAG dated 23.08.2016		
<b>Project Cost &amp; Duration</b>	Rs. 22.321 lakh 2 years		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	Rs. 11.716 lakh	19.10.2016
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. PI has studied only mafic rocks.</li> <li>2. Studies not carried out in right direction.</li> <li>3. Timeframe targets not achieved. Objectives not met.</li> <li>4. Considering the current situation PERC recommended to close the project and submit the final report. Unspent balance should be refunded to Govt of India along with UC and statement of expenditure.</li> </ol>			

2

<b>F. No.</b>	14/8/2015-Met.IV		
<b>Project Title</b>	<b>Enhanced recovery of Manganese as electrolytic manganese dioxide (EMD) from Ferro manganese mine tailings through bioleaching</b>		
<b>Institution</b>	Siksha O Anusandhan University, Bhubaneswar		
<b>Principal Investigator</b>	Dr. Sanghamitra Nayak, Email :- <a href="mailto:sanghamitran24@gmail.com">sanghamitran24@gmail.com</a>		
<b>SSAG Approval</b>	46 <sup>th</sup> SSAG dated 02.12.2015		
<b>Project Cost &amp; Duration</b>	Rs. 30 Lakhs 3 Years		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	12.39108 lakh	14.3.2016
	Balance of 1 <sup>st</sup> installment	4.20892 lakh	28.7.2016
	2 <sup>nd</sup> installment	5.10lakh(part)	28.11.2018
<b>REMARKS/SUGGESTION : PI WAS ABSENT.</b>			

3

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<b>F. No.</b>	14/51/2014-Met.IV		
<b>Project Title</b>	<b>Development of Nickel containing steel from chromite over burden</b>		
<b>Institution</b>	Indian Institute of Technology, Kharagpur and Institute of Minerals & Materials Technology, Bhubaneswar (Jointly)		
<b>Principal Investigator</b>	Prof. Siddhartha Das, Email:- sdas@metal.iitkgp.ernet.in Dr. B. Bhoi, E-mail:-bbhoi@immt.res.in		
<b>SSAG Approval</b>	45 <sup>th</sup> SSAG dated 04.12.2014		
<b>Project Cost &amp; Duration</b>	Rs. 107.6214 lakh 3 Years		
<b>Funds Released</b>	<b>IMMT</b>	<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	26.8638 lakh	15.12.2014
	2 <sup>nd</sup> installment	11.7138 lakh	28.9.2017
	<b>IIT Kharagpur</b>	<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	26.901 lakh	15.12.2014
	2 <sup>nd</sup> installment	16.401 lakh	28.9.2017

**REMARKS/SUGGESTION :**

1. PI was asked to perform cost evaluation of technology developed.
2. Project work has been completed and final report to be submitted to Ministry.
3. PERC advised the PI and IMMT to compile all previous works related to Sukinda Nickel and Chromite over burden (COB).
4. Also prepare a vision document/ roadmap as part of Final Report.
5. Balance funds to be released subject to submission of utilization certificate and statement of expenditure.

4

<b>F. No.</b>	14/75/2015-Met.IV		
<b>Project Title</b>	<b>Rare earth mineral concentration in the beach sands of uttarakannada coast: their economic viabilities and sustainable mining</b>		
<b>Institution</b>	SDM college of Engineering & Technology, Dhavalagiri, Dharwad		
<b>Principal Investigator</b>	Dr. V. S. Hegde, Email:- <a href="mailto:vshegde2001@gmail.com">vshegde2001@gmail.com</a>		
<b>SSAG Approval</b>	46 <sup>th</sup> SSAG dated 02.12.2015		
<b>Project Cost &amp; Duration</b>	Rs. 29.44 lakh 3 Years		
<b>Funds Released</b>	<b>Amount</b>	<b>Date</b>	
	1 <sup>st</sup> installment	18.20560 lakh	29.12.2015
	2 <sup>nd</sup> installment	2.20 lakh(part)	27.2.2019
<b>REMARKS/SUGGESTION : PI WAS ABSENT.</b>			

5

<b>F. No.</b>	14/22/2015-Met.IV		
<b>Project Title</b>	<b>Simulation of simultaneous rock fractures at multiple scales</b>		
<b>Institution</b>	IIT Delhi (project transferred from Birla Institute of Technology and Science, Pilani)		
<b>Principal Investigator</b>	Shri Gaurav Singh, Email:- <a href="mailto:gsingh@am.iitd.ac.in">gsingh@am.iitd.ac.in</a>		
<b>SSAG Approval</b>	46 <sup>th</sup> SSAG dated 02.12.2015		

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Project Cost & Duration	Rs. 30 Lakh 3 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	13.30 lakh	10.3.2016
	2 <sup>nd</sup> installment	7.79879 lakh (part)	28.9.2017
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. The objectives are achieved and closure requested by PI.</li> <li>2. Final Technical Report circulated.</li> <li>3. PI was advised to submit one page summary including input required, type of rock, isotropic identification etc.</li> <li>4. No further funds have been sought by PI.</li> <li>5. Final report of the project is recommended for acceptance and closure of the project.</li> </ol>			

6

F. No.	Met4-14/12/2017		
Project Title	<b>Critical Mineral (non-fuel) Resources Index of India- for effective policy decisions on mineral and manufacturing sector of India</b>		
Institution	Council of Energy Environment and Water(CEEW), Thapar House, Janpath, New Delhi		
Principal Investigator	Shri Vaibhav Gupta, Email:- <a href="mailto:vaibhav.gupta@ceew.in">vaibhav.gupta@ceew.in</a>		
SSAG Approval	48 <sup>th</sup> SSAG dated 20.11.2017		
Project Cost & Duration	Rs. 36.29115 lakh 3 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	12.10lakh	16.3.2018
<b>REMARKS/SUGGESTION : PI WAS ABSENT.</b>			

7

F. No.	Met4-14/3/2017		
Project Title	<b>Development of a novel underground mining method for exploitation of Chromite deposits from friable orebody and host rocks of Sukinda Valley, Odisha</b>		
Institution	Department of Mining Engineering, IIT, Kharagpur		
Principal Investigator	Shri Abhiram Kumar Verma, E-mail:- <a href="mailto:akverma@mining.iitkgp.ac.in">akverma@mining.iitkgp.ac.in</a> , <a href="mailto:abhiram.verma@gmail.com">abhiram.verma@gmail.com</a>		
SSAG Approval	48 <sup>th</sup> SSAG dated 20.11.2017		
Project Cost & Duration	Rs. 68.46 lakh 3 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	36.15 lakh	24.1.2018
<b>REMARKS/SUGGESTION:</b>			
<ol style="list-style-type: none"> <li>1. Panel suggested to give a presentation of one year work done to steel company and OMC (Odisha Mining Corporation) and reorient the methodology.</li> <li>2. PI should submit minutes of the above meeting to Ministry within 3 months.</li> <li>3. Next instalment to be released subject to submission of utilization certificate and statement of expenditure.</li> </ol>			

8

F. No.	Met4-14/7/2017		
Project Title	<b>Processed Sea sand for construction and other purposes</b>		
Institution	Civil Engineering Department, Saveetha Engineering College, Saveetha Nagar, Thandlam,		

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	Chennai		
Principal Investigator	Shri Sudharson G, E-mail:-sudharson@saveetha.ac.in,		
SSAG Approval	48 <sup>th</sup> SSAG dated 20.11.2017		
Project Cost & Duration	Rs. 40 lakh 2 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	30 lakh	26.3.2018

**REMARKS/SUGGESTION :**

- PI was advised to carry out the following activities -
  - Sand Size distribution study as per CPW standards.
  - Study the chemistry of river, sea sand and fused material.
  - Overall economics of project.
  - Collect different areas (5-6 locations) sea sand and study their size distribution and chemical composition.
  - Bond work Index to be studied.
- Based on the request of PI, PERC recommended for time extension of 3 months.

9

<b>F. No.</b>	Met4-14/5/2017		
Project Title	<b>Urban Li Battery Mining: Physio-Chemical separation of used Li ion Batteries for Recovery of Li, Co, Ni active materials and Cu, Al Metal</b>		
Institution	Nonferrous Materials Technology Development Centre, Hyderabad		
Principal Investigator	Shri D. Lokeswara Rao, E-mail:- <a href="mailto:lokesh@nftdc.res.in">lokesh@nftdc.res.in</a>		
SSAG Approval	48 <sup>th</sup> SSAG dated 20.11.2017		
Project Cost & Duration	Rs. 83.82 lakh 2 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	59.91 lakh	20.2.2018

**REMARKS/SUGGESTION :**

- PERC appreciated the achievements of the project.
- PI advised to submit one page write-up to Ministry highlighting salient features of project achievements.
- PI has submitted the final report.
- Final report of the project is recommended for acceptance and closure of the project.
- Balance funds to be released subject to submission of utilization certificate and statement of expenditure

10

<b>F. No.</b>	Met4-14/11/2017		
Project Title	<b>Development of Metal-Graphene Alloys, Department of Materials Engineering</b>		
Institution	Indian Institute of Science, Bangalore		
Principal Investigator	Dr. Chandan Srivastava, E-mail:- <a href="mailto:csrivastava@materials.iisc.ernet.in">csrivastava@materials.iisc.ernet.in</a> , <a href="mailto:csrivastava@iisc.ac.in">csrivastava@iisc.ac.in</a>		
SSAG Approval	48 <sup>th</sup> SSAG dated 20.11.2017		
Project Cost & Duration	Rs. 20 lakh 2 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	10 lakh	22.3.2018

**REMARKS/SUGGESTION :**

- PI was advised to develop a product for applications from the metal graphene systems developed.

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2. Battery applications were not explored.
3. Comparison of energies required to produce multi-component graphene composites for water oxidation and conventional method used for water oxidation.
4. Is G-ZnO better electrochemical sensor compared to other sensors available in the market?
5. Fe-G, Co-G & Ni-G systems were not investigated.
6. PERC recommends 9 months time extension in collaboration with a strategic partner, NFTDC and IIT Bhubaneswar (DST- MECSP Centres)
7. Next instalment to be released subject to submission of utilization certificate and statement of expenditure.

11

<b>F. No.</b>	Met4-14/9/2017		
<b>Project Title</b>	<b>Value added electrochemical Devices from Zircon obtained from Beach Sands of Odisha</b>		
<b>Institution</b>	Indian Institute of Technology, Bhubaneswar		
<b>Principal Investigator</b>	Dr. Soobhankar Pati, E-mail:-spati@iitbbs.ac.in		
<b>SSAG Approval</b>	48 <sup>th</sup> SSAG dated 20.11.2017		
<b>Project Cost &amp; Duration</b>	Rs. 36.04 lakh 2 Years		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	29.425 lakh	22.3.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. PERC appreciated the progress in the project.</li> <li>2. PI is advised to manufacture around 10 sensors.</li> <li>3. PERC recommends for 6 months time extension (Sept 2020) for optimization without any cost escalation.</li> <li>4. Next instalment to be released subject to submission of utilization certificate and statement of expenditure.</li> </ol>			

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<b>F. No.</b>	Met4-14/18/2018		
<b>Project Title</b>	<b>Investigation of the dynamics &amp; mechanism of flocculation by polymers and biopolymers for separation of solid particles of high rate thickeners in mineral processing industries</b>		
<b>Institution</b>	CSIR- National Institute for Interdisciplinary Science and Technology		
<b>Principal Investigator</b>	Dr. Lakshmi Rakesh Kumar Yasarla, E-mail:-yasarla.rakesh@gmail.com		
<b>SSAG Approval</b>	49 <sup>th</sup> SSAG dated 31.07.2018		
<b>Project Cost &amp; Duration</b>	Rs. 42.61 lakh 2 Years		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	22.433 lakh (part)	28.9.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. PERC noted that PI has developed a process on commercially available polymer sustained at 60°C</li> <li>2. Specific gravity to be checked by the PI</li> <li>3. One page write-up should be submitted by Director, NIIST to Ministry within one month giving details of the process developed for biodegradable polymer to be patented.</li> <li>4. Next instalment to be released subject to submission of utilization certificate and statement of expenditure</li> </ol>			

13

<b>F. No.</b>	Met4-14/8/2018
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Project Title	<b>Use of Overburden Clay as alternate for aggregate</b>		
Institution	Indian Institute of Technology Madras Chennai		
Principal Investigator	Dr. K. Ramamurthy, E-mail:-vivek@iitm.ac.in		
SSAG Approval	49 <sup>th</sup> SSAG dated 31.07.2018		
Project Cost & Duration	Rs. 173 lakh (MoM – 70 + NLCIL-103) 3 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	35 lakh (part)	30.10.2018
	2 <sup>nd</sup> installment	-	-

**REMARKS/SUGGESTION :**

1. PI was advised to submit one page write-up including proportion of sand: clay for different benches, characteristics of sand, if it meets specification in construction, chemical characterisation of clay for different applications.
2. PERC suggested the PI to meet Neyveli personnel and make one page minutes.
3. Next instalment to be released subject to submission of utilization certificate and statement of expenditure.

14

<b>F. No.</b>	Met4-14/14/2018		
Project Title	<b>High performance of rare earth metal as Electrode material for super-capacitor application and fuel cell</b>		
Institution	Velammal Institute of Technology, Panchetti, Chennai		
SSAG Approval	49 <sup>th</sup> SSAG dated 31.07.2018		
Principal Investigator	Dr. V. Sindhu, E-mail:- <a href="mailto:sindhusrini@gmail.com">sindhusrini@gmail.com</a>		
Project Cost & Duration	Rs. 30.96944 lakh 2 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	23.73054 lakh (part)	27.12.2018

**REMARKS/SUGGESTION :**

1. PI was advised to design and fabricate a super-capacitor device, benchmark the device and was asked to compare with other super-capacitor materials.
2. PI was asked to carry out techno-economic assessment of the device for scalability and applications.
3. PI should explore strategies for obtaining solutions for fast-charging followed by slow discharge.
4. Next instalment to be released subject to submission of utilization certificate and statement of expenditure.

15

<b>F. No.</b>	Met4-14/15/2018		
Project Title	<b>Development of open cell aluminium foams for heat sink and EMI shielding Application</b>		
Institution	Advanced Materials and Processes Research Institute (AMPRI), Bhopal		
Principal Investigator	Dr. D. P. Mondal, E-mail:-mondalp@yahoo.com		
SSAG Approval	49 <sup>th</sup> SSAG dated 31.07.2018		
Project Cost & Duration	Rs. 21 lakh 2 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	4.72 lakh (part)	16.10.2018

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**REMARKS/SUGGESTION :**

1. Application of foams in electronic circuits is not viable
2. PI was advised to design and manufacture a heat transfer element (HTE)
3. PI was advised to set-up a test bed for measuring heat evacuation.
4. PI advised to complete the project by Oct 2020.
5. Next instalment to be released subject to submission of utilization certificate and statement of expenditure.

16

<b>F. No.</b>	Met4-14/23/2018		
Project Title	<b>Assessment of Udaipur rock phosphate, low grade potassium feldspar and lignite mine waste for the development of organo-mineral fertilizer formulations</b>		
Institution	ICAR- Central Arid Zone Research Institute, Near ITI Circle, Jodhpur, Rajasthan		
Principal Investigator	Dr. Praveen Kumar, E-mail:-praveenkumar@icar.gov.in		
SSAG Approval	50 <sup>th</sup> SSAG dated 02.11.2018		
Project Cost & Duration	Rs. 24.9225 lakh 2 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	7.875 lakh (part)	31.12.2018

**REMARKS/SUGGESTION :**

1. PI was advised to discuss with Rajasthan State Mines & Minerals Ltd. (RSMML) about salient features of the proposed fertilizer over conventional fertilizer and submit minutes to Ministry within 3 months.
2. PERC suggested to study pH of Udaipur soil and analyse how micro-organisms are affected. Size fraction study to be done for optimization.
3. Next instalment to be released subject to submission of utilization certificate and statement of expenditure

17

<b>F. No.</b>	Met4-14/27/2018		
Project Title	<b>Integrated Geological, Geochemical and Geophysical studies for the delineation of Chromitite extensions in Nuggihalli Schist Belt and implications for Ni-Cu+-PGE mineralization</b>		
Institution	CSIR- National Geophysical Research Institute and IISc, Bangalore		
Principal Investigator	Dr. P. V. SunderRaju E-mail:-perumala.raju@gmail.com  Dr. Sajeev Krishnan, E-mail:-krishnansajeev@gmail.com		
SSAG Approval	50 <sup>th</sup> SSAG dated 02.11.2018		
Project Cost & Duration	Rs. 60 Lakh 2 Years		
Funds Released	NGRI	Amount	Date
	1 <sup>st</sup> installment	7lakh (part)	31.12.2018
	IISc	Amount	Date
	1 <sup>st</sup> installment	7lakh (part)	31.12.2018

**REMARKS/SUGGESTION :**

1. PI advised to prepare roadmap to link geophysics, geology and geochemistry of mineral deposit.
2. Next instalment to be released subject to submission of utilization certificate and statement of expenditure

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<b>F. No.</b>	Met4-14/28/2018		
<b>Project Title</b>	<b>Development of grapheme based membranes from graphite ore for desalination</b>		
<b>Institution</b>	CSIR- National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram and CSIR-NML, Madras, Chennai		
<b>Principal Investigator</b>	Dr.(Mrs.) Sreeja Kumari S.S., E-mail:-sreejakumar@niist.res.in, sreejakumariss@gmail.com  Mrs. N. Vasumathi E-mail:-tvvk65@yahoo.com		
<b>SSAG Approval</b>	50 <sup>th</sup> SSAG dated 02.11.2018		
<b>Project Cost &amp; Duration</b>	Rs. 60 Lakh 2 Years		
<b>Funds Released</b>	<b>NIIST</b>	<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	22.88 lakh (part)	31.12.2018
	<b>NML</b>	<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	3.85 lakh (part)	31.12.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. Lot of graphite powder available from used graphite crucibles. Project should be versatile to switch the source of input.</li> <li>2. Project is bio friendly, scalable and able to find multiple applications.</li> <li>3. Report average thickness of graphene oxide membrane.</li> <li>4. Explore use of titania for desalination studies and dye removal applications.</li> <li>5. Clearly define bulk generation in terms of numbers/figures</li> <li>6. Functionalize porous graphene membrane with metallic ion.</li> <li>7. Next tranche of funds may be released subject to submission of utilisation certificate and statement of expenditure</li> </ol>			

19

<b>F. No.</b>	Met4-14/31/2018		
<b>Project Title</b>	<b>Recovery of scandium metal from acid leach liquor from titanium mineral industries</b>		
<b>Institution</b>	CSIR-National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram-695019		
<b>Principal Investigator</b>	Dr. M. Sundararajan, E-mail:-rajanmsundar77@yahoo.com		
<b>SSAG Approval</b>	50 <sup>th</sup> SSAG dated 02.11.2018		
<b>Project Cost &amp; Duration</b>	Rs. 32.92 lakh 2 Years		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	8.73 lakh (part)	31.12.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. ICP MS data of leach liquor is incorrect (shows presence of valuable elements viz. V, Ni, Zn in higher concentrations)</li> <li>2. Mass balance of scandium and ICP results are incorrect.</li> <li>3. PI was advised to send leach liquor samples to at least two independent laboratories for composition analysis and report the finding within a month.</li> <li>4. Carry out solvent extraction in more number of stages.</li> <li>5. PI was advised to establish analytical protocol before moving ahead in the project.</li> <li>6. Consideration of continuation of the project and release of further funds will be considered only after presentation of above reports to next PERC.</li> </ol>			



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<b>F. No.</b>	Met4-14/26/2018		
<b>Project Title</b>	<b>Improving fracture resistance of rocks through adhesive bonding for underground mining application</b>		
<b>Institution</b>	IIT, Dhanbad (Indian School of Mines), Jharkhand		
<b>Principal Investigator</b>	Dr. Rashmi Ranjan Das, E-mail:-drrrdas@iitism.ac.in		
<b>SSAG Approval</b>	50 <sup>th</sup> SSAG dated 02.11.2018		
<b>Project Cost &amp; Duration</b>	Rs. 14.73467 lakh 15 months		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	13.9571 lakh (part)	31.12.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. PERC advised the PI to select typical crack size in mining rocks and replicating the objectives of project.</li> <li>2. Rheological properties to be studied.</li> <li>3. Characterization of cracks of rocks to be studied.</li> <li>4. PI was advised to visit mining site.</li> <li>5. Based on the request of PI, PERC recommended a time extension of 3 months.</li> </ol>			

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<b>F. No.</b>	14/34/2014-Met.IV		
<b>Project Title</b>	<b>Novel synthesis routes for high purity kesterites (CZTS:Cu-Zn-Sn-S;Cu-Zn-Sn-Se) and development of cost kesiterite based solar PV cells and modules</b>		
<b>Institution</b>	Non Ferrous Materials Technology Development Centre, Hyderabad		
<b>Principal Investigator</b>	Dr. S. Harinipriya Seshadri, E-mail:-harinipriya@nftdc.res.in		
<b>SSAG Approval</b>	45 <sup>th</sup> SSAG dated 04.12.2014		
<b>Project Cost &amp; Duration</b>	Rs. 81.30 lakh 3 Years		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	42.712 lakh	21.5.2015
	2 <sup>nd</sup> installment	21.704 lakh	29.7.2016
	3 <sup>rd</sup> installment	15.1956 lakh	21.9.2017
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. PI advised to submit one page write up to the Ministry.</li> <li>2. PI has submitted the final report.</li> <li>3. Final report of the project is recommended for acceptance and closure of the project.</li> <li>4. Balance funds to be released subject to submission of utilization certificate and statement of expenditure</li> </ol>			

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<b>F. No.</b>	14/54/2014-Met.IV		
<b>Project Title</b>	<b>Production of geopolymer based construction material from pond ASH: an industrial waste</b>		
<b>Institution</b>	Gandhi Institute of Engineering and Technology, Gunupur, Odisha		
<b>Principal Investigator</b>	Dr. Mukhtikanta Panigrahi E-mail:-mukhtikanta2@gmail.com		
<b>SSAG Approval</b>	45 <sup>th</sup> SSAG dated 04.12.2014		
<b>Project Cost &amp; Duration</b>	Rs. 28.955 lakh 3 Years		

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Funds Released		Amount	Date
	1 <sup>st</sup> installment	13.805 lakh	29.12.2014
	2 <sup>nd</sup> installment	9.30 lakh	17.3.2016
	3 <sup>rd</sup> installment	5.265 lakh	28.9.2017
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. PI submitted the final report.</li> <li>2. Final report of the project is recommended for acceptance and closure of the project.</li> </ol>			

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<b>F. No.</b>	14/74/2015-Met.IV		
<b>Project Title</b>	<b>Recyclability strategy or value-added utilization of iron/manganese ore tailing/ low grade ore: evaluation of energy storage capacities</b>		
<b>Institution</b>	Institute of Minerals and Materials Technology, Bhubaneswar		
<b>Principal Investigator</b>	Dr. Mamata Mahopatra, E-mail:-mamatomahapatara76@gmail.com		
<b>SSAG Approval</b>	46 <sup>th</sup> SSAG dated 02.12.2015		
<b>Project Cost &amp; Duration</b>	Rs. 35 lakh 3years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	25 lakh	29.12.2015
	2 <sup>nd</sup> installment	5 lakh	19.3.2019
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. PI was advised to submit one page write-up summarizing lab scale studies and roadmap to scale-up with appropriate industry where the product can be used.</li> <li>2. PI submitted the final report.</li> <li>3. Final report of the project is recommended for acceptance and closure of the project.</li> <li>4. Balance funds to be released subject to submission of utilization certificate and statement of expenditure</li> </ol>			

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<b>F. No.</b>	14/74/2016-Met.IV		
<b>Project Title</b>	<b>Technology Development (TRL-7) for calico-thermic reduction of rare earth metal oxides and establishment of pilot plant for extraction and purification of samarium</b>		
<b>Institution</b>	Non Ferrous Material Technology Development Centre (NFTDC), Hyderabad		
<b>Principal Investigator</b>	Dr. Hareesha Iddya, E-mail:-hareesha@nftdc.res.in		
<b>SSAG Approval</b>	47 <sup>th</sup> SSAG dated 23.08.2016		
<b>Project Cost &amp; Duration</b>	186.50 lakh 2years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	107 lakh	19.10.2016
	2 <sup>nd</sup> installment	71.55 lakh	14.6.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. The project is in its closure state. Final project report to be submitted.</li> <li>2. PERC advised PI to carry out techno-economic study of process. The study should include the write up of "Why adopted technique is better than conventional process"</li> <li>3. Balance funds to be released subject to submission of utilization certificate and statement of expenditure.</li> </ol>			

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<b>F. No.</b>	14/75/2016-Met.IV		
<b>Project Title</b>	<b>Extraction of potash values from silicate rocks</b>		

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Institution	Indian Institute of Technology, Roorkee, Uttarakhand		
Principal Investigator	Dr.Nikhil Dhawan, E-mail:- ndhawan.fmt@iitr.ac.in <a href="mailto:dhawan.nikhil@gmail.com">dhawan.nikhil@gmail.com</a>		
SSAG Approval	47 <sup>th</sup> SSAG dated 23.08.2016		
Project Cost & Duration	Rs. 20 lakh 2years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	17.35 lakh	19.10.2016
	2 <sup>nd</sup> installment	1.15 lakh (part)	4.12.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. PI has submitted the final report.</li> <li>2. Final report of the project is recommended for acceptance and closure of the project.</li> <li>3. PI advised to submit two-page write-up to Ministry including flow sheet of overall process with mass balances, papers published summarizing the project.</li> <li>4. Balance funds to be released subject to submission of utilization certificate and statement of expenditure</li> </ol>			

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<b>F. No.</b>	14/77/2015-Met.IV		
Project Title	<b>Mineralogical and geochemical characterization of Indian glauconites for alternative potassium fertilizers</b>		
Institution	Indian Institute of Technology, Bombay and NGRI, Hyderabad (jointly)		
Principal Investigator	Shri Santanu Banerjee, Email:- santanu@iitb.ac.in  Dr. P. V. Sunder Raju, E-mail:-perumala.raju@gmail.com		
SSAG Approval	46 <sup>th</sup> SSAG dated 02.12.2015		
Project Cost & Duration	Rs. 55 lakh 3 Years		
Funds Released	IIT Bombay	Amount	Date
	1 <sup>st</sup> installment	12.5 lakh	29.2.2016
	2 <sup>nd</sup> installment	7.5 lakh	29.9.2017
	3 <sup>rd</sup> installment	6.75 lakh(part)	28.12.2018
	NGRI	Amount	Date
	1 <sup>st</sup> installment	12.5lakh	29.2.2016
	2 <sup>nd</sup> installment	7.5 lakh	29.9.2017
3 <sup>rd</sup> installment	6.75 lakh(part)	28.12.2018	
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. PI submitted the final report.</li> <li>2. However, PI was advised to submit a summary, map showing Glauconite deposits with resources available in India and a Flow-sheet of the process.</li> <li>3. Final report of the project is recommended for acceptance and closure of the project.</li> <li>4. Balance funds to be released subject to submission of utilization certificate and statement of expenditure</li> </ol>			

27

<b>F. No.</b>	14/39/2015-Met.IV		
Project Title	<b>Assessment and prediction of land surface deformation due to underground metal mining in northern aravali range of hills using microwave remote sensing data sets and ground based Observations</b>		

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Institution	IIT, Dhanbad(Indian School of Mines), Jharkhand		
Principal Investigator	Shri Dheeraj Kumar, Email:- dheeraj@dkumar.org <a href="mailto:dt@ismdhanbad.ac.in">dt@ismdhanbad.ac.in</a>		
SSAG Approval	46 <sup>th</sup> SSAG dated 02.12.2015		
Project Cost & Duration	Rs. 45 lakh 3 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	25.6 lakh	29.12.2015
	2 <sup>nd</sup> installment	9.7 lakh	21.9.2017
	3 <sup>rd</sup> installment	8.73 lakh	28.1.2019
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>All Objectives not fulfilled properly. PERC recommended for closure of project.</li> <li>Un-utilised amount to be returned along with upto date UC.</li> <li>PI advised to submit the Final Report by 15<sup>th</sup> February 2020.</li> </ol>			

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<b>F. No.</b>	14/22/2014-Met.IV		
Project Title	<b>Development of low density emulsion explosives for energy efficient blasting in environmentally sensitive areas</b>		
Institution	IIT, Dhanbad (Indian School of Mines), Jharkhand		
Principal Investigator	Dr. Arvind Kumar Mishra, Email:- <a href="mailto:dravndmishra@gmail.com">dravndmishra@gmail.com</a>		
SSAG Approval	45 <sup>th</sup> SSAG dated 04.12.2014		
Project Cost & Duration	Rs. 29.134 lakh 3 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	18.95 lakh	16.12.2014
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>One page write-up to be submitted to Ministry.</li> <li>PI advised to explore the option of filing patent.</li> <li>PI has submitted the final report.</li> <li>Final report of the project is recommended for acceptance and closure of the project.</li> <li>Balance funds to be released subject to submission of utilization certificate and statement of expenditure</li> </ol>			

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<b>F. No.</b>	14/41/2015-Met.IV		
Project Title	<b>Study the feasibility of treatment of seepage water from chromite mine quarries of Odisha</b>		
Institution	National Institute of Technology, Rourkela		
Principal Investigator	Dr. (Mrs) Susmita Mishra, Email:- <a href="mailto:smishra@nitrkl.ac.in">smishra@nitrkl.ac.in</a> <a href="mailto:Smishra1234@gmail.com">Smishra1234@gmail.com</a>		
SSAG Approval	46 <sup>th</sup> SSAG dated 02.12.2015		
Project Cost & Duration	Rs. 32 Lakh 3 Years		
Funds Released		Amount	Date
	1 <sup>st</sup> installment	16lakh	29.1.2016
	2 <sup>nd</sup> installment	8 lakh	21.9.2017
	3 <sup>rd</sup> installment	7.2 lakh	19.12.2018
<b>REMARKS/SUGGESTION : PI WAS ABSENT.</b>			

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<b>F. No.</b>	Met.4-14/6/2018		
<b>Project Title</b>	<b>Development of a Low-cost Portable Optical Reflectance Spectrometer for Mining and Mineralogy</b>		
<b>Institution</b>	Indian Institute of Technology, Madras		
<b>Principal Investigator</b>	Dr. Sivarama Krishanan, E-mail:-srikrishnan@iitm.ac.in		
<b>SSAG Approval</b>	49 <sup>th</sup> SSAG dated 31.07.2018		
<b>Project Cost &amp; Duration</b>	Rs. 10.0 lakh 1 Year		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	6.1 lakh (part)	28.9.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li><b>1. Lacks applicability to minerals to have proof of concept</b></li> <li><b>2. PI was advised to validate /proof of concept of the device with a few real minerals.</b></li> <li><b>3. PI advised to submit the final report.</b></li> <li><b>4. PERC recommends closure of the project with submission of utilization certificate and release of any residual dues within the sanction project cost.</b></li> </ol>			

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<b>F. No.</b>	Met.4-14/7/2018		
<b>Project Title</b>	<b>Novel Approach to Recover Individual Valuable Heavy Minerals from Pyriboleferrous Beach and Dune Sand Deposits</b>		
<b>Institution</b>	CSIR-Institute of Minerals & Materials Technology, Bhubaneswar		
<b>Principal Investigator</b>	Dr. C Eswariah, E-mail:-eswar@immt.res.in		
<b>SSAG Approval</b>	49 <sup>th</sup> SSAG dated 31.07.2018		
<b>Project Cost &amp; Duration</b>	Rs. 15.0 lakh 1 Year		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	6.775 lakh (part)	28.9.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li><b>1. Screen separation is better replacement of air separator.</b></li> <li><b>2. Project objective is achieved</b></li> <li><b>3. PI advised to submit the final report.</b></li> <li><b>4. PERC recommended for extension of the project duration till 31<sup>st</sup> March, 2020.</b></li> <li><b>5. Balance funds / residual dues within the sanctioned project budget may be released subject to submission of utilisation certificate and statement of expenditure.</b></li> </ol>			

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<b>F. No.</b>	Met.4-14/29/2018		
<b>Project Title</b>	<b>Development of capacitive deionization technology for the extraction of germanium and selenium: Two elements of strategic relevance</b>		
<b>Institution</b>	IIT, Madras, Chennai		
<b>Principal Investigator</b>	Professor T.Pradeep E-mail:-pradeep@iitm.ac.in		
<b>SSAG Approval</b>	50 <sup>th</sup> SSAG dated 02.11.2018		
<b>Project Cost &amp; Duration</b>	Rs. 29.61 lakh 1 Year		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>

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	1 <sup>st</sup> installment	13.10 lakh (part)	31.12.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. Establishing CDI at a place and use it for selective extraction of precious elements from mine water</li> <li>2. Phase I is successful in looking at real industrial mine water and found that germanium (Ge) and selenium (Se) were very low for extraction and strontium (Sr) levels are attractive.</li> <li>3. Aqueous solutions from JNARDDC (red mud RE leachate project) and leachate from copper tailings (HCL) will be provided.</li> <li>4. Phase-I of the project is recommended for extension by one year as the work is very relevant and useful for extraction of valuables from waste solutions.</li> <li>5. Balance funds may be released subject to submission of utilisation certificate and statement of expenditure.</li> </ol>			

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<b>F. No.</b>	Met.4-14/30/2018		
<b>Project Title</b>	<b>Treatment of Acid Mine Drainage for Heavy Metal Removal</b>		
<b>Institution</b>	IIT, Mandi, Kamand Campus, VPO Kamand		
<b>Principal Investigator</b>	Dr. Sumit Sinha Ray, E-mail:-sumitsinha@iitmandi.ac.in		
<b>SSAG Approval</b>	50 <sup>th</sup> SSAG dated 02.11.2018		
<b>Project Cost &amp; Duration</b>	Rs. 19.8397 lakh 1 Year		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	16.02 lakh (part)	31.12.2018
<b>REMARKS/SUGGESTION :</b>			
<ol style="list-style-type: none"> <li>1. So far only copper is tested using synthetic solution and to be extended for other metals (Co, Ni, etc.).</li> <li>2. Samples from HCL will be provided for testing real time industrial solutions with higher concentrations in large volumes</li> <li>3. Tuning for particular ions at different concentrations is required</li> <li>4. Biological membrane worked for one metal (Cu)</li> <li>5. Summarize the manufacture and scalability of bio polymer membranes.</li> <li>6. Higher concentrations, multi-metal and flow.</li> <li>7. Cost effective and scalable biopolymer membrane proved to work for copper metal in synthetic solution.</li> <li>8. Test industrial solutions and test for other elements in higher concentrations</li> <li>9. Extension of project (6 months) is recommended by PERC without cost escalation.</li> <li>10. One page summary consisting objective and future plan is to be submitted.</li> <li>11. Next tranche of funds may be released subject to submission of utilisation certificate and statement of expenditure.</li> </ol>			

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<b>F. No.</b>	Met4-14/24/2018		
<b>Project Title</b>	<b>Bench scale study on extraction of pure Silica and smelter grade Aluminium Fluoride from Coal Fly Ash (CFA)</b>		
<b>Institution</b>	JNARDDC, Nagpur		
<b>Principal Investigator</b>	Shri Manoj T. Nimje E-mail:- mantukni@gmail.com		
<b>SSAG Approval</b>	50 <sup>th</sup> SSAG dated 02.11.2018		
<b>Project Cost &amp; Duration</b>	Rs. 63.026 lakh 1½ Year		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	38.205 lakh (part)	27.03.2019

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**REMARKS/SUGGESTION :**

1. PI was advised to carryout tentative cost estimation (OPEX & CAPEX) of pure silica and aluminium fluoride produced through the project (cost comparison w.r.t market price).
2. Refer other methods for finding free silica content in CFA.
3. Titanium slag (2% Ti) is valuable.
4. Teflon coated glassware should be used for scalability.
5. Evacuate HF quickly to avoid backward reaction. Implement ways to remove HF quickly. Use closed loop circuit design and introduce make-up feed for HF.
6. Use silica as a nucleation agent for depositing silica during vapour deposition. Also try meshes or glass filters.
7. Use silica beds in series, process and reactor engineering is to be implemented for preventing backward reaction forming  $H_2SiF_6$  (step 2).
8. Product should end with reactor design for bench scale production (1kg) and should be techno-economically feasible.
9. Next tranche of funds may be released subject to submission of utilisation certificate and statement of expenditure

**Agenda No 2**

<b>F. No.</b>	Met4-14/19/2018		
<b>Project Title</b>	<b>Techno-economic survey of Al-scrap recycling in India</b>		
<b>Institution</b>	JNARDDC, Nagpur		
<b>Principal Investigator</b>	Shri R N Chouhan E-mail- rnchouhan@gmail.com		
<b>SSAG Approval</b>	49 <sup>th</sup> SSAG dated 31.07.2018		
<b>Project Cost &amp; Duration</b>	Rs. 53.55 lakhs 1 Year		
<b>Funds Released</b>		<b>Amount</b>	<b>Date</b>
	1 <sup>st</sup> installment	20.50 lakh (part)	27.09.2018

**REMARKS/SUGGESTION :**

1. PI was asked to pool the data of existing organized and report all the raw data collected so far.
2. Collect licensed recyclers data from pollution control boards, Director of industries and other official sources. Visit and collect data from licensed recyclers first.
3. PI was advised to include an activity plan during extension period.
4. PERC recommended for extension of the project by one year without any cost escalation.
5. Balance funds may be released subject to submission of utilisation certificate and statement of expenditure

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**LIST OF PARTICIPANTS OF REVIEW MEETING OF PERC HELD AT JNARDDC, NAGPUR ON 21-22 JANUARY 2020**

<b>Sr no</b>	<b>Name</b>	<b>Portfolio</b>
1.	Shri Satendra Singh Joint Secretary (Mines), Delhi	Chairman
2.	Shri H. K. Mallick Deputy Secretary (Mines)	Member
3.	Dr. K. Balasubramanian Director, NFTDC Hyderabad	Member
4.	Prof. T.C. Rao Ex. Director, RRL Bhopal	Member
5.	Prof. S.P. Mehrotra IIT, Gandhinagar	Member
6.	Shri Arun Kumar Shukla CMD, HCL, Kolkata	Member
7.	Dr. A. Agnihotri Director, JNARDDC, Nagpur	Member
8.	Dr. H. S. Venkatesh Director, NIRM, Bangalore	Member
9.	Shri S. K. Roy Director (P&T), NALCO, Bhubaneswar	Representative Member
10.	Dr Bibhuranjan Nayak, Sr. Principal Scientist, CSIR-IMMT	Representative Member
11.	Dr. S. Kamalakaram DGM (Exploration) , MECL, Nagpur	Representative Member
12.	Dr. C. N. Ghosh Chief Scientist & Head, CIMFR, Dhanbad	Representative Member
13.	Dr. Shravan Kumar Dep of Fuel & Mineral Engg. IIT (ISM), Dhanbad	Representative Member
14.	Dr B. B. Mondal Asst. Professor, IIT, Kharagpur	Representative Member

Leave of absence granted to other members.