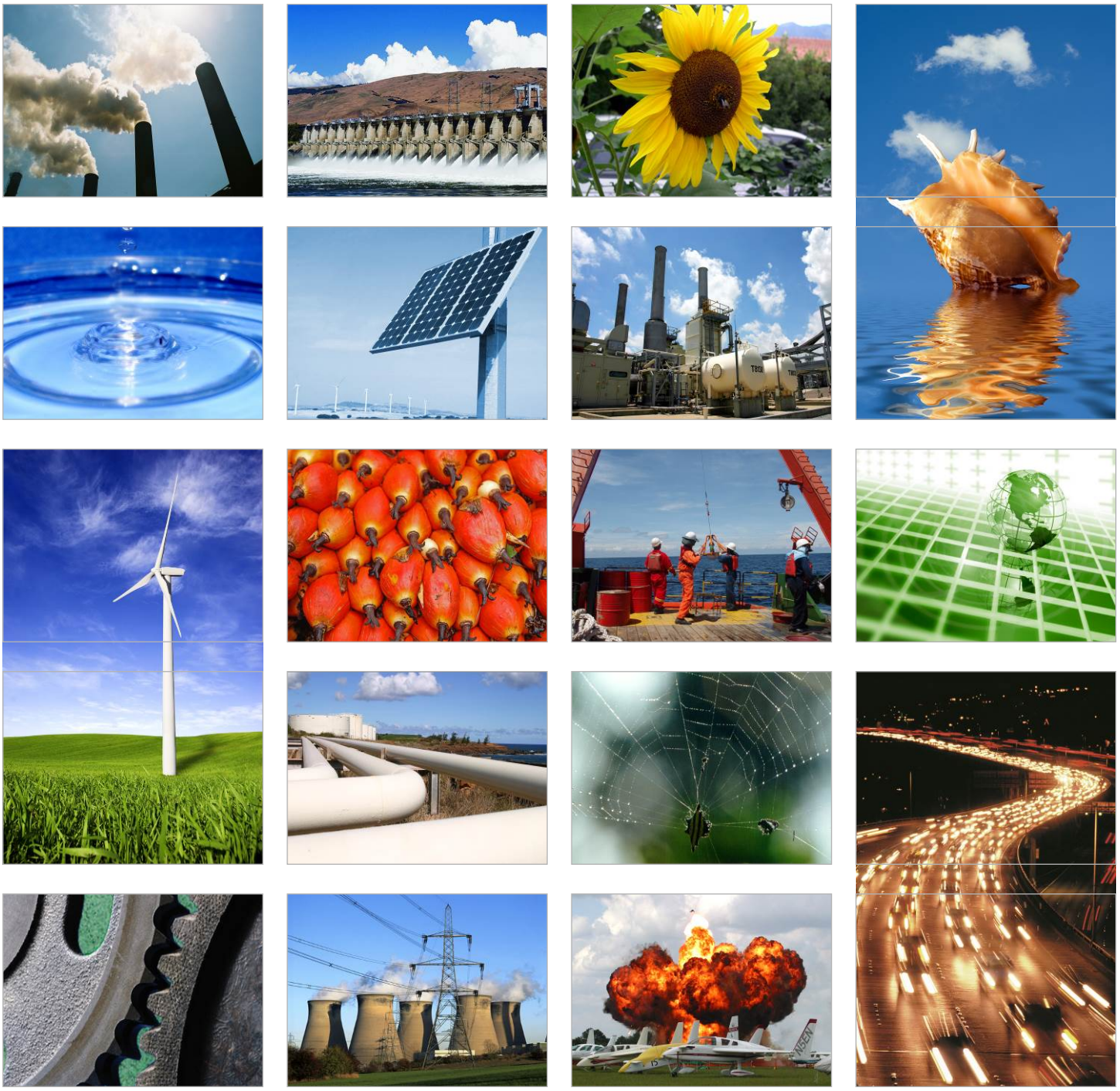

Action Plan Monitoring for Environment and Occupational Health and Safety for a 1400 MW Coal Based Thermal Power Plant: *Kamalanga, Odisha, India*

GMR Kamalanga Energy Limited

Executive Summary

April 2016

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ERM

6th April 2016

Mr.R Raveendranathan Nair,
Director & COO
GMR Kamalanga Energy Limited
Kamalanga
Odisha

Subject: Certification of Compliance: Environmental and Occupational Health and Safety Action Plan Monitoring for a 1400 MW coal fired power plant, at Kamalanga, Dhenkanal district in the state of Odisha, April 2016.

ERM India Private Limited ("ERM") has been appointed by GMR Kamalanga Energy Limited (hereafter referred to as "*Company or GKEL*") for undertaking the monitoring of the Environmental and Occupational Health and Safety Action Plan (EOHSAP) for GMR Kamalanga Energy Limited (hereafter referred to as 'GKEL') in the state of Odisha. The EOHSAP was recommended from an ESDD study conducted by ERM in 2014.

ERM has performed an Environmental and Occupational Health and Safety Action plan monitoring study for the Project between 28th March to 4th April 2016 ("Assessment"), in accordance with the scope of work specified under the *ERM Proposal No I11624, dated 22nd March 2016*. The scope of work required providing a detailed monitoring report for each action item in the EOHSAP, and also supporting GMR in completing any pending activities or studies. ERM observed significant progress on overall compliance with the EOHSAP. While a few items were complete, some were in progress. A detailed report of the assessment along with the closure of pending action items will be submitted by 11th April, 2016, along with recommendations. Based on the field verification and review of the documents provided by GKEL towards the completion of the implementation of the EOHSAP, the following status was observed:

- **Environment & Social**
  - 25 action items have been completed by GKEL;
  - 9 action items are partially completed; and
  - 14 action items are in progress for which ERM has been engaged, of which some would be completed in the next 1 month and the documentation pertaining to ISO 26000 will be completed in the next 3-4 months.
- **Social**
  - Baseline Health Study report (Completed)
  - Stakeholder Engagement and Information Disclosure Plan (Plan completed & Implementation started)
  - Grievance Redress Management Plan (Plan completed & Implementation completed)
  - Livelihood Restoration/Improvement Plan (Completed and implementation also started)
- **OHS**
  - 19 action items completed; and
  - 7 actions partially completed.

The information presented in this document is subject to the scope, dependencies, qualifications and limitations, as would be stated within the Draft Monitoring report. If, after reviewing the above, you have any questions, please call the undersigned at +91 124 4170 311.

Very truly yours,

ERM India Private Limited

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1 INTRODUCTION

ERM India Pvt. Ltd. (ERM) had undertaken an Environmental, Occupational Health and Safety, and Social Compliance Audit in April 2014 for GMR Kamalanga Energy Limited (GKEL). This Audit was undertaken on behest of the investors (IIF and IDFC) to identify gaps in the environment, occupational health safety and social systems/practices of GKEL with reference to national/state regulatory requirements and India Infrastructure Funds (IIF's) Environment and Social Performance Standards. ERM prepared an Environment, Occupational Health and Safety, and Social Action Plan (EOHSAP) for GKEL in order to achieve compliance.

In Apr 2016, ERM was engaged by GKEL to undertake monitoring of the EOHSAP and provide onsite advisory support to their EHS team to help complete documentation and actions to comply with EOHSAP requirements, and define action plans for those that are either pending or ongoing. This monitoring report provides a statement of completions of the EOHSAP actions where they have been, and define the action plans for those that are partially compliant and those that are under progress.

1.1 PURPOSE & OBJECTIVE OF THE STUDY

The purpose of the monitoring is to provide IDFC/GKEL an objective feedback on the progress of the ESAP implementation till date and identify gaps, as well as actions that need completion. The key objective is to be able to check and review actions and documentations that have been completed; review actions and studies that in progress and identify mid-course corrections where necessary; and complete pending activities and documentation with GKEL support. The scope of work specifically included the following:

- To review the progress of the Corrective Action Plan implementation as recommended in the ES & OHS audit conducted during 2014 and supporting project documentation of the Compliance Department of GKEL;
- To identify pending actions and documentation;
- To provide onsite advisory support to the GKEL EHS team to help complete documentation and actions to comply to the ESAP requirements, and define action plans for those that are either pending or ongoing;
- To undertake the site assessment of the plant for physical verification of the EOHSAP implementation;
- To initiate and possibly complete any studies yet to be initiated (where not possible to complete, provide an action plan for completion); and
- To provide a monitoring report and a statement that confirms the completions of the EOHSAP actions where they have been, and define the action plans for those that are partially compliant and those that are under progress.

1.2 METHODOLOGY FOR THE STUDY

The approach for the E&OHSAP monitoring study was informed by the requirements enlisted in the Corrective Action Plan shared for this assignment and ERM's previous experience of working in similar assignments and with GKEL. The approach for this assignment primarily concentrated on the following:

- The compliance approach, has been used to undertake the documentary review assess the compliance level of these vis-à-vis the national and international requirements, IFC PS against the status of each of the action items; and
- Thereafter, a participatory approach has been adopted to assess the implementation of the various corrective measures recommended as well as associated requirements (such as completion of some of the associated studies and plans). This approach enabled the identification of not only implementation gaps (if any) but also helped in understanding the additional issues, if any.

1.3 STATUS OF ACTION PLAN IMPLEMENTATION

Status of different action items in

Table 1.1 provides the status towards all the completed action items by GKEL pertaining to environment aspects.

Table 1.2 provides the status towards all the partially completed action items by GKEL pertaining to environment aspects.

Table 1.3 provides the status towards all the action items in progress by GKEL pertaining to environment aspects.

Table 1.4 provides the status towards all the action items in progress by GKEL pertaining to socials aspects.

Table 1.1 Environment Action Items- Completed by GKEL

SN.	Corrective Actions	Status in Apr 2016
1.	Obtain Consent to Operate from Orissa State Pollution Control Board for the 30-bedded Vivekananda Hospital.	The hospital had obtained BMW authorization that was valid until 31.03.2016. However, based on the discussions with OSPCB, it is understood that CTO is not applicable for hospitals having less than 100 bed capacity. Moreover, ERM has requested OSPCB to share the respective gazette notification for the same. OSPCB however, has a guideline for application to CTO for hospitals with 100 and more than 100 beds, but this does not state the

SN.	Corrective Actions	Status in Apr 2016
		non-applicability of hospitals with less than 100 beds. Application for renewal of BMW authorization has already been submitted as the license expired on 31.03.2016.
2.	Water spraying arrangements at coal stock piles	Coal Handling Plant along with coal yard was observed to be provided with adequate number of water sprinklers. Water spraying arrangements involved activities like water fogging, spraying through trucks and water spraying for the Rapid Bottom Discharge (Pneumatic) Hopper Wagons (BOBR).
3.	Tree plantation near the dust prone areas within the project area.	Completed. A specific plan for green belt development around the Ash silo as well as the Coal Handling Plant has been prepared. Also, the green belt development around these areas was found to be significantly growing during the monitoring visit.
4.	Data logger supported with multi-port connectivity output preferably 4-20mA for transmission of online data of stack monitoring and AAQ monitoring stations through Y cable and GPRS network to the server of OSPCB should be installed and prior consent should be taken from OSPCB.	Completed. Images of the Online network AAQ & stack monitoring results has been attached as ***Annexure B.***
5.	GKEL should ensure that the vehicles used for transportation of materials are checked for valid "Pollution Under Control" certificate.	All transportation vehicles are checked for PUC at the security gate and a register is maintained. The PUC copies are also maintained. The contract agreement also has a clause to provide the PUC of the trucks and the other vehicles for raw material transportation.
6.	Mercury emissions from stacks attached to the Boiler Units should be monitored.	Mercury Emission Monitoring is being conducted by SS Environics India Private Limited. The last monitoring was carried out in February 2015. The results were observed to be within the prescribed limits.
7.	GKEL should carryout surface run off study of the whole plant through expert institution/organization/ third party agency. Surface Water Quality Monitoring shall be carried out by GKEL in the area and records should be maintained and the same should be submitted to OSPCB regularly.	Surface Run-Off study has been carried out by GKEL and has been conducted and prepared by SGS India Private Limited for the period of July to September 2015. Review of the study states that: • The report provides a quantitative and qualitative analysis to understand the watershed of the project area within 5 km and also the water quality ; • It also mentions that availability of water if obstructed out flow from the project site (considering 25% obstruction), the runoff water can be made available 21363 m3/day (1709030/20 days=85452m3/day x 25%) as additional which can be handled in the existing rainwater harvesting structure with pumping arrangement by additional 2 hrs pumping; and • It also mentions about the fluoride

SN.	Corrective Actions	Status in Apr 2016
		content and the BOD levels to be in the water samples around the ash pond area. However, the study does not provide an assessment of potential impacts on the nearby community and the water sources. Also, there are no specific mitigation measures or recommendations provided in the report.
8.	Toe Drain Monitoring should be carried out near the ash dyke area as per the consent conditions.	Toe Drain Monitoring also has been conducted by SS Environics over the period 2015-2016.
9.	Fly ash should not be stored in open and should be provided with a belt conveying system from storage silos to transfer to the low lying filling areas by trucks inside the plant boundary.	Flyash is being used in filling of low lying land within the plant premises and is also been given to the manufacturing units for brick manufacturing.
10.	Fly Ash composition study for leaching test, heavy metals testing etc. should be carried out by the site management prior to supplying it to brick manufacturers and the document should be submitted to the Regional office of the Ministry.	Fly ash composition study has been carried out by GKEL. Ground water quality monitoring near the ash pond has been conducted and heavy metals analysis has also been carried out.
11.	ETP sludge and Oily Sludge should be quantified and recorded by GKEL	ETP Log books are being maintained and have been provided for ERM's review.
12.	Solid waste bins should be provided across all waste generating areas inside the plant premises and good regular housekeeping should be maintained. Construction debris should be regularly collected from the dumped areas and stored in a designated closed area. Regular monitoring should be carried out by the EHS team to ensure that cleanliness is maintained within the plant premises.	The project is already through with the construction stage and has been operational since past two years. Solid waste dust bins have been provided at respective corners for collection of domestic waste and housekeeping practices have been maintained. Colony domestic waste has been contracted for collection of kitchen waste.
13.	The existing Emergency Response Plan should also include the response mechanism for ash dyke breach and failure.	Ash Dyke breach failure action points have been included in the existing Onsite ERP. The communication plan and the control procedures have been included as an SOP.
14.	GKEL's EHS team should strengthen the internal monitoring and auditing procedures on monthly basis till the project is complete with its all is construction activities. GKEL's Corporate should further undertake external auditing of the plant activities quarterly to ensure the implementation of the environmental and social mitigation measures.	Audit Plan has been prepared by GKEL. Corporate Audit would be carried out once in a year in the operation phase and internal audits by site team will be carried out half-yearly.
15.	The statement (in The code of conduct in para 5.14.6) to be amended as follows: 'No employee shall involve in any political activity directly or indirectly while on duty'	This is GMR's Corporate Policy statement and hence cannot be changed.
16.	GKEL to provide basic training to security staff for managing community.	This has been completed. Human Rights training and Behavioural Safety trainings have been provided to the security workers. Other

SN.	Corrective Actions	Status in Apr 2016
		trainings included: • Access control & pass system • Antisabotage check + practical • Security of material and store • Duties at gates and control room • Perimeter wall, fencing, lighting, patrolling • Do's & don'ts for RAXA personnel • CCTV • Contingency plan • Explosive IED • Mock drill • Technical gadgets • Safety consideration in thermal plant • Safety basic training • Fire training • IMS training • Soft skill training • MMS/VMS system • Traffic management • BBS training • Communication skill behaviour • Development of personality • General awareness • Personal hygiene and sanitation • Service &social etiquettes • Stress management
17.	GKEL should follow the theoretical model of developing Greenbelt based on the Agro-climatic zone of the Plant and refer the Guidelines for developing Greenbelts by CPCB, March 2010. Based on this, a Comprehensive Green Belt Development plan should be prepared by GKEL.	Green Belt Development Plan has been updated as per the Agro-climatic zones and guidelines by CPCB and the local horticulture department is also being followed up on regular basis for the selection of species.
18.	• Performance on green belt management should also be included in monthly EHSS performance report; • GKEL should explore the possibilities of developing green belt around the CHP, ash pond so as to develop as barriers for air and noise pollution into the nearby settlements.	Green Belt Development Plan has been updated as per the Agro-climatic zones and guidelines by CPCB and the local horticulture department is also being followed up on regular basis for the selection of species.
19.	GKEL should ensure that no invasive alien species are planted onsite.	Green Belt development Plan does not include plantation of any invasive alien species.
20.	Maintain MSDS's and ensure all containers containing hazardous chemicals are labelled properly with details from the manufacturer such as the content, physical, and chemical properties and toxicological data. It is recommended to ensure a provision of adequate warning signage in storage areas regarding the potential hazards associated with chemicals through the usage of signs, labels and instructions. It is recommended to ensure disclosure of information pertaining to handling of hazardous chemicals, to all the personnel	MSDS's have been maintained and chemical warnings have been displayed. The workers in the section are aware of the hazardous nature of the chemicals and the possible controls to be taken in case of any spillage and also for the handling of such chemicals. Trainings are also being provided.

SN.	Corrective Actions	Status in Apr 2016
	of the facility.	
21.	• Pest control should be carried out at the facility and pest management strategies should be formulated on regular basis. A subcontractor should be hired to deploy dedicated personnel for the Pest management services within the facility and also undertake periodic internal audits to facilitate proper functioning of the control system. • Record keeping should be done on regular basis for the type of pest chemicals applied and respective infested areas. Any accumulation of stagnant water within the construction area should be immediately drained off.	Pest control has been undertaken and records have been checked. SOP on IPM is also being developed. Weekly schedule for undertaking pest control has also been provided. However, the following gaps were observed: The SOP describes the control procedure but does not mention about • The Sop developed for IPM does not define the type of pests that generate from the specific activities within the plant; and • Doesn't define about seasonal pest.
22.	Solar Power systems should be installed on the rooftops within the plant premises and the status of implementation shall be submitted to the Regional office of the Ministry from time to time.	Completed and have been installed.
23.	• GKEL should formulate and implement an integrated pest management (IPM) and/or integrated vector management (IVM) approach targeting economically significant pest infestations and disease vectors of public health significance.	SOP on IPM has been shared and the gaps have been provided above. Weekly pest control schedule has also been provided.

Table 1.2 Environment Action Items- Partially Completed by GKEL

SN.	Corrective Actions	Status in Apr 2016
1.	Leakage of fly ash from the pneumatic conveying system of Unit 1 (conveying fly ash from boiler to ESP) needs to be rectified. Further it is to be ensured that all connections such as hoods, pipes, valves, stacks and chimneys are made leak proof. Regular inspection should be carried out to identify leaks if any and maintenance activities should be carried out to rectify the same. Also the coal composition testing should be done thoroughly to identify the ash content and the nature of the ash which enables in designing the conveyor system accurately.	Coal Composition testing carried out in June 2014, post ERM's audit. Separate Fly ash leakage check SOP has been developed. However, during the ERM's monitoring visit, it was observed that there were fugitive emissions from the fly ash silos for fly ash collection (from the hopper).
2.	Leakage of coal dust from connection between coal bunker and coal mill of Unit 1 needs to be rectified. Further it is to be ensured that all connections such as hoods, pipes, valves, stacks and chimneys are made leak proof. Regular inspection should be carried out to identify leaks if any and maintenance activities should be carried out to rectify the same.	ERM undertook a physical verification of this gap. During the monitoring visit, it was observed that Unit –I was shut down for some maintenance activities and technical repair work. However, Unit 2 & 3 were running, and significant fugitive emissions were observed from the coal mill. As a part of the SAP EHS process, departmental wise notification is raised for monitoring and identification of such issues. Moreover, the design team has to take into consideration the mill make and

SN.	Corrective Actions	Status in Apr 2016
		define the capital expenditure involved in the rectification of the leakage points.
3.	GKEL should conduct AQ dispersion modelling for all the seasons and depending upon the outcome of the same, GKEL should also conduct AAQ monitoring at sensitive/ high impact receptors falling in the impact zone of power plant outside the site.	Study is being conducted by SGS expected date of completion July 2016.
4.	The industrial wastewater should not be released into the garland drains and should not be discharged outside the plant boundary. The waste water generated from the Ash handling plant and the Cooling water blow down should be directed to the Effluent Treatment Plant, treated and reused in the HCSD system and used as cooling water, makeup water respectively. The drains should be cleaned regularly and the oil mixed surface runoff should be sent to oily wastewater system.	Based on ERM's monitoring visit, it was observed that the Ash handling plant was being connected to the reclamation pond, from where the water was being recycled in the plant itself. However, there is a leakage in the underground cooling tower pipe line, due to which significant quantity of water was being released through the storm water garland drains into the Rain water Pump house pit. The fuel house was provided with oily treatment wastewater system which was further sent to the Guard pond in the STP and was used in the green belt development. During this visit, it was also observed that the drains are being cleaned and maintained regularly.
5.	The locations of water sampling points for monitoring of water quality needs to be reworked to comply with EC conditions and included in the monitoring plan.	Only one monitoring location (Khanda Nalla) has been considered by the SS Environics for collection of water sample for surface water. GKEL is planning to start the other location once in a quarter i.e. for June 2016.
6.	• GKEL should maintain records of the recycled water quantities and have an accounting system for it; • GKEL should have a benchmarking system for comparison to establish the relative level of water conservation efficiency.	Water Balance Diagram has been prepared by the respective Water department in GKEL. The same was reviewed by ERM at site and corrections were made in the revised WBD submitted by GKEL. For water conservation measures, rain water harvesting is being carried out, STP water is being used for green belt development. Ash Handling Plant water is being recycled and used in the HCSD. The plant also proposes to construct the 4th Boiler unit, for which has requested for additional 16 cusecs of water requirement. However, GKEL intends to manage the water requirement for the additional Unit within the allocated water quantity of 30 cusec. COC maintained above 5 and specific water conservation maintained is 2.6-2.7 m3/MWH.
7.	All the storm water drains should be cleaned and maintained. Concrete parapet wall of adequate height should be provided all along the concreted drains on its both the sides with rain cuts at regular intervals to prevent entry of dust/ash from the road and work zone into the drainage system.	Storm water drains were observed to be cleaned. Concrete parapet wall of adequate height on both side of the drain with rain cuts at regular intervals to prevent entry of dust/ash from the road and work zone into the drainage system is under progress and expected to be complete by June 2016. However, the height of the parapet wall will not suffice, as any overflow from the plant inside drains will cause overflow of the water

SN.	Corrective Actions	Status in Apr 2016
		into the nearby drains and only part of it will be directed to the rainwater harvesting structure.
8.	Personal protection devices should be provided to the workers in the TG Floor area. Regular Maintenance of the equipment should be undertaken.	PPEs have been provided to the workers however, workers were observed not wearing them. Regular monitoring activities by OHS have also been strengthened by GKEL. However, it is recommended that the O&M should ensure use of the same at the respective functional areas.
9.	Undertake a cumulative impact assessment for the project along with all its components to identify the E&S issues and furthermore, prepare a suitable management Plan for handling such issues.	Based on the discussions with GKEL, it was understood that IFC and IDFC suggested only undertaking Air Quality cumulative impact assessment for this observation and SGS has been engaged by GKEL to conduct this study, which is yet to be completed. Two seasons monitoring has already been completed and expected date of completion is August 2016.
10.	GKEL should develop an integrated internal and external communication procedure to be implemented at the sub-contractor level for the ongoing construction and implementation activities and documentation of such records should be maintained at site.	Internal Audit report templates are being prepared. But a communication procedure between GKEL and its sub-contractors has not been developed yet.
11.	• GKEL should ensure mandatory use of noise protection PPE while working in high noise zone; • Personal protection devices should be provided to the workers in the TG Floor area. • Site staff should encourage workers for using PPEs at site.	PPEs have been provided to the workers however, workers were observed not wearing them. Regular monitoring activities by OHS have also been strengthened by GKEL. GKEL should implement a fine collection or award system to enable the workers to actually understand the importance of wearing the PPEs.
12.	GKEL should ensure that impacts associated with the decommissioning phase are assessed and addressed at least 1 to 2 years prior to eventual decommissioning. A Project Decommissioning plan should be prepared.	GKEL will prepare this plan prior to realization of decommissioning of plant. As of now, this plan has not been prepared.

Table 1.3 Environment Action Items- In progress

SN.	Corrective Actions	Status Post ERM's Visit
1.	GHG Emission inventory should be prepared by GKEL and the Amount of CO2 equivalents should be calculated based on the amount of coal consumption as well as transportation vehicles. GKEL should follow IFC Carbon Emissions Estimator Tool (CEET) and USEPA scope of greenhouse emissions calculator tool to estimate the GHG emissions generated from its operations. Depending on the outcome of the study, arrangement of emissions offsets (including the Kyoto Protocol's flexible mechanisms and the voluntary carbon market), including reforestation, afforestation, or capture and storage of CO2 options should be adopted.	Data collection and quantity estimation has been done and provided by GKEL.

SN.	Corrective Actions	Status Post ERM's Visit
2.	• EMP to be updated to include water consumption and conservation measures considering all construction as well as operational activities; • GKEL to ensure that water metering devices are provided for incoming and outgoing water at various water usage locations within the site.	Revised EMP has been developed. Metering device have been installed.
3.	• Bio Medical Wastes shall be collected and stored at a designated Bio-Medical Waste room as described under the Bio-Medical Waste Rules, 2003 and as amended. • Standard operating procedures for waste management during operation phase need to be properly implemented and monitored.	An integrated Waste Management Plan has been developed.
4.	• GKEL should ensure that hazardous waste is collected, stored and disposed off as per Hazardous Wastes Rules, 2008; • A periodical assessment and monitoring program specifically focused on contamination issues will mitigate the potential risk to GKEL in the long term. • GKEL should ensure that all the hazardous materials are stored as per MHISC Rules, 1989; • The Diesel storage areas should be provided with proper secondary containment.	An integrated Waste Management Plan has been developed.
5.	• The Diesel barrel storage areas should be provided with proper secondary containment and concrete area with side drains and pits for collection of spilled diesel, if any.	The Oil and chemical spill management plan has been developed.
6.	• IMS Manual to be upgraded and revised based on the existing operations and the social, labor, land and CSR related aspects and management strategies along with monitoring procedures should be incorporated and integrated in the manual. • The organogram should reflect an integrated structure of the Plant Operations head with the EHS department. • IMS Manual should have specific internal auditing checklists to undertake quarterly monitoring across its production activities.	This study is being undertaken by ERM and is currently in process.
7.	• SOPs for control of fuel and chemical spillages to be prepared and communicated to related staff and workers; • The project should develop an Offsite Emergency response Plan that should integrate the aspects of the project sites and nearby communities.	Fuel and chemical spillage SOP has been prepared by GKEL .Offsite Emergency Management Plan has been prepared by the Disaster Management Institute in the year 2013.
8.	GKEL will need to update the risk assessment, disaster management plan and Onsite emergency response plan into a consolidated document with: • Identification of offsite risks, hazards, disasters and mitigation measures taken thereof; • Key community and environmental sensitivities (such as village settlements, reservoirs, etc.) and the potential of offsite consequences along with mitigation measures; • A common communication and emergency response process flow for onsite emergencies as well as their communication to authorities offsite;	Completed.

SN.	Corrective Actions	Status Post ERM's Visit
	• Disclosure to communities in the vicinity of the project on the emergency readiness of GKEL in case of any incidents.	
9.	• GKEL should compare the emergency response plan and risk assessment/disaster management plan to document a clear and stated communication procedure for any • hazards/situations with offsite consequences; • GKEL must inform the communities' offsite in Senapati berana, Bhagabatpur, Kamalanga, Budhapanka, Tentulihata about their internal emergency preparedness plan, resources and responsibilities. • The existing Emergency response Plan should also include the response mechanism for ash dyke breach and failure.	Completed.
10.	A resource sustainability study for the impacted one should be carried out by GKEL.	ERM is undertaking this study and the same have been provided to GKEL for review.

Table 1.4 Social Action Items in Progress

SN.	Corrective Actions	Status Post ERM's Visit
1.	The grievance redress mechanism should be disclosed to the community and should be displayed at community places such as Panchayat office or community halls.	Completed on 31st March 2016 and Photographical evidence to be included in the Draft Monitoring report
2.	GKEL should extend its supervision to the grievance redress mechanism available to its non-employee workers. GKEL should ask grievance registers to be maintained by its sub-contractors and quarterly statement on grievance redress to be submitted to it.	Completed on 31st March 2016 and Photographical evidence to be included in the Draft Monitoring report
3.	GKEL can consider undertaking baseline health monitoring in villages in the immediate vicinity and those at a certain distance from the plant for future reference. Adequate sanitary systems should be provided to the labour camps. Septic tanks should be renovated and made functional to avoid direct discharge on land.	Completed on 31st March 2016 & Photographical evidence will be provided in the Draft Monitoring report.
4.	A livelihood restoration plan review by an independent agency should be undertaken to assess which of the project affected families have restored their income and which ones need additional support. Targeted and time-bound interventions to restore the livelihoods of such families be undertaken.	ERM has been engaged to conduct this study and is completed.
5.	Information disclosure and a grievance redress mechanism should be prepared and implemented.	Completed by ERM

This section provides the status of the OHs action items and the ones that are partially completed.

Table 2.1 provides the status towards all the completed action items by GKEL pertaining to occupational health and safety.

Table 2.2 provides the status towards all the partially completed action items by GKEL pertaining to occupational health and safety.

Table 2.1 OHS Action Items- Completed by GKEL

SN.	Corrective Actions	Status in April 2016
1.	Ensure that the non-operational manual call points are repaired immediately and ensure that all manual call points are kept operational.	The site has installed a total of 135 Manual Call point (MCP) located across the plant. Per the site management, these MCPs are inspected at the frequency of once a week. Records pertaining to MCP inspection were made available to the assessment team. Based on discussion with the site management, it was noted that all the MCPs were operational at the time of the assessment. On a sample basis, the assessment team checked two (2) of the MCPs (located at 1st Floor of the Administrative building and Hydrogen Building respectively). The MCPs checked were found to be operational and created emergency alarm.
2.	Facility should ensure that all the fire system under commissioning and construction are in operational condition to fight the fire which is one of the most common occurrences/ hazard in thermal power plants. Identified areas without any fire protection system and should provide with appropriate fire system to detect and extinguish fire at incipient stage.	The site currently have installed and operationalized the following Fire Infrastructure and associated facilities in order to ensure fire safety: • 2 Numbers (nos.) of Fire tenders (capacities: 4500 litres water & 500 litres Foam); • 135 MCPs; • 163 nos. Fire Hydrant point; • 2 nos. Fire water reservoir (1043 cubic meters each); • Fire pump room; • 3 nos. Fire hydrant pump (of 410 cubic meter/hour capacity each); • 2 nos. Jockey pump (of 35 cubic meter/hour capacity); • 2 nos. Spray pump (of 410 cubic meter/hour capacity); • 672 nos. Smoke detectors; • 48 nos. Inert gas cylinder at Central Control Room 1&2 ; • Foam 2500 (Liquid diesel oil storage area); • 912 nos. Fire Extinguishers; • 89 nos. Deluge valve; • 2 nos. Breathing apparatus sets; The site has employed a dedicated team of 42 persons (including 1 Fire Officer, 1 Assistant Fire Officer, 4 Supervisors, 26 Fireman and 26 Driver Cum Pump Operator) for ensuring fire safety. The site has conducted Fire load calculation and Fire Audit by engaging an external agency *(National Safety Council)* October, November 2014. The site has implemented a majority of the recommendations suggested by the Fire Audit.

SN.	Corrective Actions	Status in April 2016
		The site has conducted emergency mock drill on fire breakout. The site also has provided hands on training to the employees on fire safety. The site is observing fire safety month (1 April – 30 April) to promote awareness on fire safety amongst the employees.
3.	Inspect all the cable trenches at the site and identified cables trenches with water should be emptied and make suitable arrangements to remove the rain water or any source which is polluting the trenches with water.	Cable trench inspection is carried out at the site at the frequency of once a week. Post-inspection corrective actions are taken (such as de-watering the trenches). Records pertaining to the cable trench inspections were available at the time of the assessment.
4.	Identify if the facility can reduce the storage capacity of the day tanks in the room housing diesel generators to less than 2500 litres capacity. If this is not feasible, then facility needs to obtain a valid license under Petroleum Act and Rules at the earliest.	The site has currently discontinued the practice of using one of the three (1000 litre capacity) day tanks at the Diesel Generator Set area.
5.	Design and impart specific hands-on/in-field awareness sessions on the lifting tools and tackles to the concerned GKEL and Contractor personnel. Develop a table showing safe working loads of lifting tools and tackles in use and display at prominent places inside the premises.	The site has provided hands-on training on lifting tools and tackles to the employees (including contract employees) who are involved in material handling. Records pertaining to such trainings are maintained and were made available for review. The site has developed a list of lifting tools and tackles. The list also includes the lifting tools and tackles used by the contractors. The assessment team inspected at least 30 such lifting equipment at various locations inside the site, and observed to have safe working load (along with due date of testing) displayed near those equipment. The site has conducted required testing of the lifting tools and tackles by competent person under Factories Act, 1948 *(M/s Basanti Engineering; Mr. Pramad Kuman Pattanaik).*The test reports were readily available at the site. The test reports of lifting tools and tackles incorporates the next due date of testing.
6.	Ensure that the instructions provided in the emergency response related display boards are also provided in the local language as well.	The site was observed to have displayed instructions for emergency responses both in English and vernacular language (i.e. Oriya) at various locations inside the factory premises.
7.	Consider Preparing emergency management plan in conformance	The site has revised its Emergency Management Plan and has aligned it with the requirements of Schedule III of Central Electricity Authority (Safety Requirements for Construction,

SN.	Corrective Actions	Status in April 2016
	with the schedule III of On-site Emergency management plan for electrical plants and electrical lines.	Operation and Maintenance of Electrical Plants and Electrical Lines) Regulations, 2011.
8.	Maintain MSDS's readily available at the point of use. Ensure a provision of adequate warning signage in storage areas regarding the potential hazards associated with chemicals through the usage of signs, labels and instructions.	The site currently maintains the Material Safety Data Sheet (MSDS) at the point of use of the chemicals. The assessment team inspected the chemical storage area, laboratory and the required MSDS were available for use. The persons handling the chemicals were perceived to have basic understanding of the safe usage of the chemicals and measures to be followed during emergency (involving the chemicals).
9.	Ensure that the pressure vessels are tested before expiry of the "next due date" marked on the test certificate.	The site has undertaken required testing of all the pressure vessels by Competent person under Factories Act *(Mr. Basanta Kumar Pradhan, Jagatisinghpur, Odisha)*. The due date of testing was observed to be displayed near each of these pressure vessels inspected. The test reports of pressure vessels incorporates the next due date of testing.
10.	Ensure that the Lifting equipment are tested before expiry of the "next due date" marked on the test certificate.	Refer Row no 5.
11.	Hydrogen Building area – Housekeeping, Electrical distribution boards in open condition and working of hydrogen leak sensors.	The site has installed Hydrogen leak detector at the Hydrogen building. The area was perceived to be properly maintained at the time of the on-site assessment.
12.	Adherence to NO SMOKING policy by displaying signage, training and awareness and Administrative control	The site has conducted awareness trainings on **NO SMOKING** inside the premises. Record pertaining to such trainings was made available for review during the on-site assessment. Reportedly the site also conducts tool box talks on **NO SMOKING.** Signage(s) on **NO SMOKING** was observed to be displayed at various locations inside the site premises. The assessment team did not observe any person smoking inside the site premises.
13.	GKEL should ensure that the LOTO procedure in place and implementation of the LOTO by training employees of Maintenance (Mechanical and Electrical) department.	The site has implemented Lock Out Tag Out (LOTO) system for electrical equipment /installations, mechanical devices, electrical panels etc. The site has developed Standard Operating Procedure (SOP) *[ref: GKEL/OPTN/SOP-10/20]* for isolating hazardous energy. The site has conducted training programs covering employees from electrical, mechanical departments along with the contractors who are engaged with the operation and maintenance on electrical installations/equipment *etc.* Records pertaining to the training programs were readily available during the on-site assessment.
14.	Ensure that all vessels are appropriately labelled for the	The site has provided identification labels for the substances stored at vessels *[for example Hydrochloric Acid (HCl), Sodium Hydroxide (NaOH) etc.]* The measures to be taken during an

SN.	Corrective Actions	Status in April 2016
	substances stored with their emergency actions against different scenarios like Fire, Spill etc.	emergency involving the substances were also observed to be displayed (*in vernacular language)* near the storage area.
15.	GKEL should develop an inspection schedule for first aid equipment and Initiate a regular inspection system for all the first aid and emergency response equipment.	The site has developed inspection schedule for first aid and emergency response equipment such as fire hydrant, fire spray system, fire sprinkler system, fire detection system, fire hose nozzle, manual call point, foam system *etc.*). These first aid and emergency response equipment are inspected at the frequency of once a week. The First Aid boxes are inspected once in every fifteen (15) days. The inspection record pertaining to the first aid and emergency response equipment were readily available during the on-site assessment.
16.	GKEL should develop a PPEs program for the Facility.	The site has prepared PPE Program and developed PPE matrix identifying the required PPE at each of the departments. The site has also provided trainings on the usage of PPE. Additionally, the site conducts PPE audit once in every three months.
17.	GKEL should initiate the Process for developing the procedure for severe weather condition and its effect to the operation and also conduct mock drills to practice fail safe process shutdowns in line with the procedure and test the effectiveness of the SOP.	The site has not developed a separate SOP addressing the response plan during severe weather condition. The on-site emergency response plan incorporates the measures to be taken during an emergency (including severe weather condition such as Cyclone, heavy wind, heavy rain *etc.*). The site has also developed and implemented a procedure on emergency shut down. The procedure may be used to shut down/power off any machine/ equipment in case of an emergency triggered by severe weather condition or otherwise. The on-site emergency plan has been developed as per the guidelines provided by Directorate of Factories and Boiler, Odisha. The site also has obtained approval on the on-site emergency plan from the Directorate of Factories and Boiler, Odisha in July 2014 (for one 350 MW unit) and May 2015 (for three 350 MW unit). The site has conducted emergency mock drills considering extreme weather scenario (such as chorine leakage due to cyclone). All the aforesaid documents/records (including on-site emergency plan, approval from the Directorate of Factories and Boiler, Odisha, Emergency Shutdown procedure, mock drill record) was readily available at the site during the time of the on-site assessment.
18.	Consider development of traffic management plan and install the speed limit signage and control at the conspicuous location.	The site has developed and implemented Traffic Management Plan for managing movement of vehicles (carrying materials, stuffs) inside the factory premises. The site has displayed the safe speed limit (20 KM) along the internal factory roads. The assessment team interviewed two (2) drivers (carrying stuffs). The drivers interviewed were aware about the Traffic Management plan and the safe speed limit inside the factory premises.
19.	Ensure that all electrical panels installed at the facility are equipped with rubber conforming to relevant Indian Standard specification	The site has provided insulation rubber mats at the Electrical Panels located at the Turbine Generator (1), (2), ST Switch Gear area. The insulation rubber mats were of approved Indian Standard (IS 15652:2006). The site has displayed Danger Notice [as per the approved

SN.	Corrective Actions	Status in April 2016
	(IS- 15652:2006) in front of the panels. Danger notice was not provided on the electrical panels and other electrical equipment's.	Indian Standard (IS 2551:1982)] on the Electrical Panels on both English and vernacular language (*i.e. Oriya).*

Table 2.2 Action Items- Partially Completed by GKEL

SN.	Corrective Actions	Status in April 2016
1	Inspect all the fire exits at the facility and train people on emergency evacuation to the different types of emergency encountered at the plant. All the fire exits shall be free from any obstruction and easily accessible to all workers in respective area.	The site has developed a list of all emergency exits. The site conducts weekly inspection of the fire exits. Records pertaining to such inspection were available for review. The following deviation was observed pertaining to emergency exits: • The emergency route *(following the Emergency exit at the 1st floor of the administrative building)* was observed to be partially obstructed; • The site has not demarcated the emergency exit route following the emergency exits provided across the site; • Emergency exit signage have not been displayed at the Crusher house; • The emergency exit provided at the 1st floor Central Control Room (CCR) opens towards inside; The site conducts Emergency Mock Drill at the frequency of once in every three (3) months. Records pertaining to such mock drills were available for review at the time of the on-site assessment. The emergency scenarios considered include*:* • Leakage of Chlorine from the Tonner and chlorine exposure to one workman causing head riling; • Fire near Crusher House; • Leakage of Chlorine from the running Tonner; Post Audit, the site has provided one stair at the emergency route *(following the Emergency exit at the 1st floor of the administrative building)* to facilitate easy movement of the occupants during the time of any emergency evacuation. Graphics of the newly constructed stair was provided by the site on electronic mail on 2 May 2016.
2	Conduct risk assessment for coal stack area and procure the relevant equipment for monitoring of the coal stacks such as thermo- graphic monitoring, temperature recording and Gas tests.	The site has conducted Health & Safety (H&S) risk assessment (i.e. HIRA) for Coal stack area considering the various activities undertaken. The activities captured in the H&S risk assessment include: • Coal stacking through stacker Reclaimer; • Coal reclaiming through stacker Reclaimer; • Operation of Coal Dozers; • Cleaning of peripheral drains; • Covering of coal pile by tarpaulin; and • Loading & unloading of material by Truck. The site has not identified the hazards (and associated

SN.	Corrective Actions	Status in April 2016
		risks) relating to Coal crushing, coal conveying to the transfer point (and to the bunkers) in the H&S risk assessment. The H&S Risk Assessment (as mentioned before) have not accurately identified the consequences/risks associated with each of the identified hazard (corresponding to the activities). Instances of such deviations include: **Hazard** **Consequence** Dust Exposure First aid injury Poor illumination First Aid injury The site has engaged an external agency *(M/s Acme Private Limited, Bhubaneswar)* to carry out Thermography survey of the coal yard. The Thermography Survey is conducted at the frequency of: • Once a month during summer (March – June); and • Once in every three (3) months for rest of the year. Reports pertaining to the Thermography survey were readily available at the time of the on-site assessment. As per the latest Thermography survey (dated 11 March 2016) undertaken at the Coal yard, no thermal temperature (i.e. over 60^0C) was identified and no corrective action was suggested.
3	Prepare an inventory of the work at height equipment and inspect the equipment against the requirements under pre-use inspection checklist. Discard all the equipment not meeting the requirements & provide with red tag stating *'Do not use '*. Identify contractor workers working at height and provide work at height trainings to supervisor and contractor worker group. Display the work at height related safety posters and conduct awareness program for work at height for the employees and contractor workers - Completed Provide proper access, standard working platform, guardrails to all scaffolds – Work in progress. Provide cage ladder to the fire water tank area	The site has developed an inventory for all equipment used during work at height. These include ladders, Hydraulic Platform, Step Ladder with wheel *etc.* The site has developed pre-use inspection checklist for Hydraulic platform. However, similar type of pre-use inspection checklist has not been developed for all other equipment (such as various type of ladders, vertical fall arrestor *etc.*) used during work at height. Per the site management, the equipment that are used for work at height, are inspected at the time of issuing permit to work. The site has conducted training and awareness sessions for safely working at height. The site also has displayed signage and instructions for safely performing work at height. The site has provided cage ladder to the fire water tank area. The assessment team observed one metallic platform temporarily fixed at a height of approximately 2 meters from the ground to access the Hot Air Duct located at the Mill 1A at the Coal Mill Area. The metallic platform lacked any form of barricading. No arrangement for anchoring safety belt was observed above the platform. Post Audit, the site has provided hand railing to the metallic platform (to the Hot Air Duct located at the Mill 1A at the Coal Mill Area). Also, the site has made arrangement to anchor the safety belt while working on the aforesaid metallic platform. Graphics of the newly

SN.	Corrective Actions	Status in April 2016
		provided hand rail and the anchor point was shared by the site dated 2 May 2016.
4	Consider verifying whether the illumination levels identified during the design stage fulfil the requirements stated under the Orissa Factories Rules 1950 and Fund's General EHS Guidelines and Thermal Power Plants Guidelines. Client may also consider maintaining records of lux levels undertaken during the operational stage.	The site undertakes illumination survey at various locations inside the factory premises once in every six (6) months. The locations of such survey include periphery road, AHP, BOP, CHP, BTG *etc.* Sample illumination survey reports for the year 2014, 2015 were reviewed by the assessment team. The survey reports present some level of deviation in the illumination level (compared to the regulatory requirements). The site has taken steps to replace the existing lights with LED lights as well as increase the number of lighting system to enhance the level of illumination at various places. Reportedly the site is in the process of replacing all the existing lights by LED lights.
5	Review checklist of the equipment inspections carried out during the preventive maintenance and ensure that checklist contains machine guarding related aspects which help the maintenance personnel to ensure that the machine guarding related aspects are taken care while undertaking preventive maintenance. Through existing onsite inspections being conducted by safety department or by the safety committee, consider undertaking a comprehensive review of the equipment and ensure that the appropriate machine guarding is available and provisioned and maintain corresponding documentation.	The site has included machine guarding related aspects in the Preventive Maintenance Schedule (wherever applicable). The site conducts Machine Guarding assessment for all department (by cross –functional team) once in every 6 months. Reports of such assessments were made available for review. The site has not provided adequate guarding to the rotating part of the conveyer belt used at the Crusher house. This may potentially lead to entrapment hazard.
6	Ensure that unsafe conditions posing slip and trip hazard are identified and eliminated through adequate and systemic corrective actions such that recurrence of such conditions is avoided. This can be undertaken through existing onsite safety inspections being undertaken by safety department and safety Committee. Install signage at the noticeable location to communicate the Slip and Trip hazards.	The site conducts periodic inspections to identify unsafe conditions at the site. This includes inspections of slip and trip hazards. The site was observed to have displayed signage to communicate hazards. The site has provided toe guard at the stair at the Wagon tippler area. Trip hazard identified in the following locations: • Stair (between 1st and 2nd floor) with tiles broken at the TG Building; • Stair (between 1st and ground floor) with tiles broken at the DM Plant; and • Toe guard has not been provided on the Stair railing at the TG Building. HIRA has not been revised / updated to incorporate the hazards of unloading of coal operations near Track Hopper and risks associated with size of the grid

SN.	Corrective Actions	Status in April 2016
	Review the hazard identification and risk assessment undertaken for the unloading of coal operations near Track Hopper. Identify the hazard and associated risk associated with the size of the grid opening where personnel use their legs to poke the coal. Consider provision of toe guards to the staircases provided in the wagon tippler and crusher house areas.	opening where personnel use their legs to poke the coal.
7	GKEL should carry out risk assessment to identify areas of potential exposure to employees. For such areas, carry out survey of the exposure levels. Based on the results develop action plans and implement the control measures	The site currently undertakes: • Pre-employment health check-ups (*with include Pulmonary Function Test, hearing tests etc.)* for all employees; • Annual medical check-ups. Records pertaining to these tests were available at the time of the on-site assessment. The site has however not carried out any specific risk assessment to identify areas of potential exposure to the employees. The site has undertaken HIRA for various departments. The existing HIRA registers for various departments (such as CHP, Coal yard *etc.*) has not appropriately captured the risks associated with various types of exposures *(such as coal dust, noise, vibration etc.).* The site has not developed any action plan to track the health status of the employees (over a period of time) and implement measures to mitigate the health impacts from various types of exposures.
8	GKEL should revisit hazard identification and risk assessment already undertaken in view of the observations made during this audit.	Per site management, the Hazard identification and risk assessment (HIRA) register has been revised to accommodate the identified risks/observations during the ERM Audit in April 2014. However, it could not be explicitly ascertained whether the HIRA (apart from Control &Instrumentation department) has under-gone any revision post the ERM audit (April 2014). The HIRA register lacked the revision date to ascertain when the HIRA was reviewed and updated.

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