Executive Summary for the Occupational Health and Safety Assessment of 1400 MW coal based thermal power plant at Kamalanga, Odisha, India

GMR Kamalanga Energy Limited

Executive Summary

July 2014

www.erm.com

The world's leading sustainability consultancy

ERM

EXECUTIVE SUMMARY INDEPENDENT OCCUPATIONAL HEALTH AND SAFETY COMPLIANCE AUDIT FOR GKEL THERMAL POWER PLANT, JULY 2014

ERM India Private Limited (ERM) was commissioned by GMR Kamalanga Energy Limited (henceforth referred to as 'the client' or 'GKEL') to undertake an independent Environment, Occupational Health & Safety and Social Compliance Audit for their 1400 MW captive coal based thermal power plant located at village Kamalanga, Dhenkanal District in the state of Orissa (henceforth referred to as the 'GKEL TPP' or the 'Project'.

The purpose of the Environment, Occupational, Health and Safety (OHS) and Social Compliance Audit was to identify gaps in the existing compliances and systems/practices against national/state regulatory requirements as well as the Fund's Performance Standards and related EHS guidelines. The compliance audit is at the behest of the investors (IIF and IDFC) in order to evaluate ongoing environmental and social performance of the project and provide recommendations to close the gaps through a time bound action plan.

This report covers the Occupational, Health and Safety aspects and provides a gap assessment with respect to the above mentioned applicable reference framework describing areas of conformance and non-conformance highlighting key issues of non-conformance along with proposed recommendations and suggested Corrective Action Plan (CAP) for the gaps identified.

GMR Kamalanga Energy Limited-Thermal Power Project Overview

GKEL is an Special Purpose Vehicle (SPV) for a 1,400 MW (1050 MW in Phase-I and 350 MW in Phase-II) captive coal based thermal power plant ('Project') being built by GMR Energy Limited ('GEL') in the state of Orissa over two phases. GMR Energy Limited has 85.99% stake in the SPV along with the balance stake being held by India Infrastructure Fund (IIF) having 11.37% and IDFC as 2.64 %.

Phase I of the project achieved financial closure in 2009 with total installed capacity of 1,050 MW and with the first, second and third unit commissioned on April 2013, November 2013 and March 2014 respectively.

Phase II of 350 MW capacity has secured all related regulatory approvals and work on the same has to commence after the contract is awarded. The plant has been awarded Mega Power Status by the Ministry of Power.

The Project has an existing fuel linkage with Mahanadi Coalfields Limited (MCL) for 500 MW of capacity and also has tapering linkage for 550 MW. ERM understands that the balance coal requirement will be met from Rampia Coal Mines, Odisha, which has been allocated for joint development to 6

companies including GMR. GKEL has executed a Power purchase agreement (PPA) with GRIDCO (Odisha) and DHBVNL& UHBVNL (Haryana) as well as the Bihar State Electricity Board.

Applicable Reference Framework

The Occupational, health & Safety compliance audit has been carried out and evaluated against the following reference framework:

- Applicable National and Local legislations on occupational safety and health;
- The IIF's Occupational policies and guidelines, particularly:
  - IIF's Performance Standards on Social and Environmental Sustainability (January, 2012) covering OHS related aspects;
  - Environmental Health & Safety Guidelines – General and for Thermal Power Plants;
  - Good International Industry Practices (GIIP) including elements of ISO 14001, Occupational Health and Safety Management System and IS 14489: Code of practice on occupational safety and health audit.

Approach & Methodology

The approach and methodology for the assignment was based on information made available from GKEL, ERM's previous experience of working on similar projects and understanding of key Occupational, Health and Safety sensitivities related to the thermal sector in general.

The approach and methodology adopted for this assessment included meeting and discussions with the GKEL management team for background and understanding their operations. It was followed up with documentation review and visit to the facility to ascertain the ground implementations and interactions with staff and contractors. Finally, a closure meeting was held with GKEL to flag the key findings and clarify any remaining issues.

ERM organized a kick-off discussion with GKEL team at the first day of site visit to obtain an overview about the present status of the Kamalanga Power plant project and discuss their expectations, request for documents and finalize timelines for the site investigation and the deliverables.

This was followed by a desk-based review of information of the thermal power plant and its ancillary components along with a review of documentation on corporate-level systems and procedures for Occupation, Health and Safety Management aspects.

ERM undertook a desktop review of various documents related to GKEL's management systems and project related information during the site visit; also some of the information was provided after the completion of the site visit. List of key documents that are referenced in this report are as follows:

- Factories License (Sr. no. 05628) dated 25 January 2014;
- Hydrogen Cylinder Storage License (G/EC/OR/06/474) dated 20 May 2013;
- Chlorine Cylinder Storage License (G/EC/OR/06/475) dated 20 May 2013;
- Petroleum Class 'C' License (P/HQ/OR/15/1135) dated 25 June 2012;
- Fire No objection Certificate No. 4805/NR dated 29 April 2013.
- Boiler Registration (Registration No. OR -1446) dated 31 May 2013;
- Boiler Registration (Registration No. OR -1414) dated 05 Aug 2013;
- Boiler Registration (Registration No. OR -1478) dated 19 Dec 2013;
- FORM VI Fitness Certificate for Boiler (OR -1446) dated 25 March 2014;
- FORM VI Fitness Certificate for Boiler (OR -1414) dated 11 February 2014;
- Provisional Order (OR -1478) dated 14 Mar 2014;
- Provisional Order (OR -1413) dated 27 Aug 2013;
- FORM 1 –A and structural stability report for Unit 1 ,2 & 3;
- Earth Resistance Report dated 22 Aug 2013;
- Approved Factory Layout dated 8th January 2013;
- Fitness Certificate for Lifting Tools & Tackles;
- Training Records;
- Inspection Checklist for Fire- fighting arrangement at GKEL;
- Health and Safety Policy;
- GKEL Fire Incident Sheet;
- GKEL Accident Records;
- Onsite Emergency Plan;
- Fire and Mock Drill Report;
- Integrated Management System Manual of GKEL;
- SOPS and OCPs of various parameters; and
- Visitor Instruction Card.
- Organizational Chart;

ERM team comprising of an Occupational, Health and Safety expert visited the GMR Kamalanga Energy Plant from ***21st April to 25th April 2014.***

The key activities carried out during the site visits are summarized in***Table 1.1***.

Table 1.1 Fieldwork Activities

SN.	Project Name/ Scope	ERM Team	Activities
1	Coal Storage Yard, Wagon Tipper, Coal Handling Plant, Canteen Area, Coal Wastewater Treatment plant, Ash Dyke Area, Boiler TG House, Coal Bunker Area GKEL- TPP, Kamalanga, Dhenkanal district, Orissa	Abhijit Rajput, Aniruddh Gadhvi, Swayam Panda and Suvalaxmi Sen	Site walkthrough across all the units to identify the issues related to environment aspects. Discussion with the respective departments to understand the processes.
2	Fire Station, Fire Pump House, Wagon Tippler Area, Coal Waste Water Treatment area, Ash Pond Area, Admin Area, Unit 1, 2 & 3 -Boiler TG House, HFO/LDO Storage Area, Raw Water storage area, GKEL- TPP, Kamalanga, Dhenkanal	Aniruddh Gadhvi GKEL representative	Site walkthrough across all the units to identify the issues related to OHS aspects. Discussions with the Fire Pump House operator to

SN.	Project Name/ Scope	ERM Team	Activities
	district, Orissa		understand the capacity of the Fire water reservoir and Pump Capacity and It's Operation. Fire hydrant, Spray system
3	Transfer Tower 1 to 6, Crusher House, Stacker Re-claimer Area, Transformer Area, Switch Yard Area, Compressor Area, Main store area.	Aniruddh Gadhvi & GKEL representative	Site walkthrough across all the units to identify the issues related to OHS aspects.
4	Hydrogen Store Area, Acid Store Area, DM Plant, Laboratory area,	Aniruddh Gadhvi & GKEL representative	Site walkthrough across all the units to identify the issues related to OHS aspects.

Subsequent to the site assessments, ERM had a meeting with GKEL team at the GKEL complex on 25th April 2014 to discuss the observations of the compliance audit. The issues and gaps were discussed and clarifications and perspectives of the GKEL team were sought. The key issues and observations were also submitted in the form of a Key Issue Report.

This report has taken note of the clarifications and evidences submitted by GKEL against some of the observations. The report has been compiled based on the findings and observations from the site assessments; review of documentation provided by the client and selected stakeholder interactions held during the auditing process.

As part of the auditing process, a number of stakeholders were consulted during the site assessment. The stakeholders comprised of internal stakeholders including company workers, managers, site engineers, EHS officers, etc. as well as external stakeholders including the contractors, workers etc. The consultation process intended to understand their roles, responsibility, participation levels as well as their awareness about EHS.

A closing meeting was held with GKEL management, where ERM presented their observations. The issues and gaps were broadly discussed and clarifications and perspectives of the GKEL team were sought.

Limitations

Professional judgements expressed herein are based on facts and information provided by GKEL. Wherever, ERM has not been able to make a judgement or assess any process, it has highlighted that as an information gap and suggested a way forward. This report is strictly based on the review of the documents provided by the client and the site assessment undertaken for the thermal power plant and the associated components like the labour camps,

hospital, sewage treatment plant, water pipeline, transmission line, railway siding, intake well.

ERM would also like to mention that the review was based on readily available information/ documentation, visual reconnaissance, and management interviews in course of the site visit. Kindly also note that the scope of work did not include any sampling, analysis of environmental media, collection of primary data, engineering design or development of technical specifications or cost estimates among others.

Project Permitting Status

The various Occupational, Health and Safety Permits/ Licenses obtained by GKEL are as under:

- The factory licence has been issued to GKEL dated 25 January 2014 and is valid until 31.12.2014;
- The factory registration No. DL -113/05628, which has been issued to GKEL considering 2400 workers per day;
- Certificate of Stability (Ref no - AGE/STC/12/12/228) conducted on 03.12.2012 for Unit 1;
- Certificate of Stability (Ref no - AGE/STC/04/13- 405) conducted on 08.04.2013 for Unit 2 & 3;
- Certificate for use of boiler (Form VI) – OR/1446 issued by Chief Inspector of Factories and Boilers – Orissa dated 25 March 2014 valid until 13.02.2015;
- Certificate for use of boiler (Form VI) – OR/1414 issued by Chief Inspector of Factories and Boilers – Orissa dated 11 February 2014 valid until 05.01.2015;
- Provisional Order (Form V) – OR/1478 issued by Assistant Director of Factories and Boilers – Dhenkanal Zone Orissa dated 14 March 2014
- Licence for storage of LDO/HFO Petroleum Class 'C' in Bulk - No. P/HQ/OR/15/1135 (P280320) dated 25 June 2012 and valid until 31.12.2016;
- Licence for storage of hydrogen cylinders – No. G/EC/OR/06/474 (G30617) dated 20 May 2013 valid until 30.09.2017;
- Licence for storage of chlorine cylinders – No. G/EC/or/06/475 dated 20 May 2013 valid until 30.09.2017.

Occupational Health and Safety Action

The action plan for addressing the gaps is provided below.

Table.2 Occupational Health and Safety Corrective Action Plan

SN.	Corrective Actions	Priority	Expected Deliverables (Report/Measurement)
A) Key Regulatory Requirements			
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.	High	Training works/Employees on emergency evacuation – Training record Assessment Report for emergency exits at the site.
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.	High	Risk Assessment and control measures for Coal stack Area
3.	Ensure that the non-operational manual call points are repaired immediately and ensure that all manual call points are kept operational.	High	Completion record. Inspection checklist for the Manual call points.
4.	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.	High	Fire Detection and Extinguishing system
5.	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. Provide proper access, standard working platform, guardrails to all scaffolds. Provide cage ladder to the fire water tank area.	High	Work at height Programme covering following elements. - Pre-use inspection checklist for work at height equipment's; - Training program for contract/Employees on Work at height activities; - Strengthening Work permit system by surprise visits, evaluation of closed permits. - Constant Vigilance/ supervise work at height activities. - Not to use Bamboo scaffolding and not to use non-standard & damaged ladders.

SN.	Corrective Actions	Priority	Expected Deliverables (Report/Measurement)
6.	Ensure that all electrical panels installed at the facility are equipped with rubber conforming to relevant Indian Standard specification (IS- 15652:2006) in front of the panels. Danger notice was not provided on the electrical panels and other electrical equipment's.	High	Rubber Mats confirming IS-15652:2006 Danger notice in English, Hindi & Local Language as per IS – 2551.
7.	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.	High	Inspection report for Cable Trenches
8.	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.	High	To reduce the capacity. Out of the 03 tanks of 1000 Litters, one is for 4th unit, which is empty and not in operation.
9.	• 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.	Medium	Check list/ Survey report for the machine guard.
10.	• 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.	Medium	Training material, evaluation of effectiveness of training and training records
11.	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. 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.	Medium	Hazard Communication signage's, Inspection report for all the stairs and Walking surfaces at the premises.
12.	Ensure that the instructions provided in the emergency response related display boards are also provided in the local language as well.	Medium	Emergency instruction and contact numbers display board.

SN.	Corrective Actions	Priority	Expected Deliverables (Report/Measurement)
13.	Consider development of traffic management plan and install the speed limit signage and control at the conspicuous location.	Medium	Traffic Management Plan
14.	Consider Preparing emergency management plan in conformance with the schedule III of On-site Emergency management plan for electrical plants and electrical lines.	Medium	Emergency Management plan
15.	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.	Medium	Material Safety Data Sheets
16.	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.	Medium	Documentation associated with the verification against the design criteria.
17.	Ensure that the pressure vessels are tested before expiry of the "next due date" marked on the test certificate.	Medium	Fitness certificate for pressure vessel.
	Ensure that the Lifting equipment are tested before expiry of the "next due date" marked on the test certificate.	Medium	Fitness certificate for pressure vessel.
18.	Hydrogen Building area – Housekeeping, Electrical distribution boards in open condition and working of hydrogen leak sensors.	Medium	Safe Hydrogen station area.
19.	Adherence to NO SMOKING policy by displaying signage, training and awareness and Administrative control	High	Awareness Administrative control with training. Training record.
B)Funds performance Standard & General EHS and Thermal Power Guidelines			
1.	GKEL should ensure that the LOTO procedure in place and implementation of the LOTO by training employees of Maintenance (Mechanical and Electrical) department.	High	LOTO training and Procedure
2.	Ensure that all vessels are appropriately labelled for the substances stored with their emergency actions against different scenarios like Fire, Spill etc.	High	Appropriate hazard communication signage at all vessels.
3.	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	Medium	Survey report of exposure level
4.	GKEL should revisit hazard identification and risk assessment already undertaken in view of the observations made during this audit.	Medium	Updated HIRA Register
5.	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.	Medium	Inspection checklist
6.	GKEL should develop a PPE program for the Facility.	Low	PPE Program with following essential elements:

SN.	Corrective Actions	Priority	Expected Deliverables (Report/Measurement)
			- Workplace Survey; - Selecting appropriate controls; - Training; - Maintenance; - Audit of the program.
7	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.	Low	SOP and documents on mock drills

ERM has over 140 offices
Across the following
countries worldwide

Argentina	Netherlands
Australia	Peru
Belgium	Poland
Brazil	Portugal
China	Puerto Rico
France	Singapore
Germany	Spain
Hong Kong	Sweden
Hungary	Taiwan
India	Thailand
Indonesia	UK
Ireland	USA
Italy	Venezuela
Japan	Vietnam
Korea	
Malaysia	
Mexico	

ERM India Private Limited

Building 10, 4th Floor
Tower A, DLF Cyber City
Gurgaon – 122 002, NCR , India
Tel: 91 124 417 0300
Fax: 91 124 417 0301

Regional Office – West
102, Boston House,
Suren Road, Chakala
Andheri Kurla Road, Andheri (East)
Mumbai- 400093 India
Office Board Telephone: 91- 22 -4210 7373 (30 lines)
Fax: 91- 022- 4210 7474

Regional Office – West
702 Abhishree Avenue,
Near Nehru Nagar Circle, Ambawadi
Ahmedabad -380006 India
Tel: +91 79 66214300
Fax: +91 79 66214301

Regional Office -South
Ground Floor, Delta Block
Sigma Soft Tech Park
Whitefield, Main Road
Bangalore- 560 066, India
Tel: +91 80 49366 300 (Board)

Regional Office –East
4th Floor, Asyst Park,
GN-37/1, Sector-V,
Salt Lake City,
Kolkata 700 091
Tel : 033-40450300

www.erm.com