Section 4 – Compensation for Damages

4.1 If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

6.1 The Bidder(s)/ Contractor(s) undertake(s) to demand from his sub-contractors a commitment consistent with this Integrity Pact. This commitment shall be taken only from those sub-contractors whose contract value is more than 20% of Bidder's/ Contractor's contract value with the Principal.

6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 – Criminal Charges against violating Bidders/ Contractors /Sub- contractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 –Independent External Monitor(s)

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or

take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

9.1 This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

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For & On behalf of the Principal	For & On behalf of the Bidder/ Contractor
(Office Seal)	(Office Seal)

Place----------

Date----------

Witness	Witness
Name and Address	Name and Address

SAFETY PLAN

PROJECT- 100 MW Floating Solar Project ,NTPC, Ramagundam

Doc ref. No. :BHE:NTPC RDM:HSE:01 dated 03.12.2019

Prepared by

PV Sys Engg and HSE Dept, BHEL EDN Bangalore

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HEALTH SAFETY ENVIRONMENT POLICY

In BHEL, Health, Safety and Environment (HSE) responsibilities are driven by our commitment to protect our employees and people we work with, community and environment. BHEL believes in zero tolerance for unsafe work/non-conformance to safety and in minimizing environmental footprint associated with all its business activities. We commit to continually improve our HSE performance by:

- Developing safety and sustainability culture through active leadership and by ensuring availability of required resources.
- Ensuring compliance with applicable legislation, regulations and BHEL systems.
- Taking up activities for conservation of resources and adopting sound waste management by following Reduce/Recycle/Reuse approach.
- Continually identifying, assessing and managing environmental impacts and Occupational Health & Safety risks of all activities, products and services adopting approach based on elimination/ substitution/reduction/control.
- Incorporating appropriate Occupational Health, Safety and Environment criteria into business decisions, design of products & systems and for selection of plants, technologies and services.
- Imparting appropriate structured training to all persons at workplace and promoting awareness amongst customers, contractors and suppliers on HSE issues.
- Reviewing periodically this policy and HSE Management Systems to ensure its relevance, appropriateness and effectiveness.
- Communicating this policy within BHEL and making it available to interested parties.

Atul Sobti
Chairman & Managing Director

June 5, 2018

Creating BHEL of tomorrow

BHARAT HEAVY ELECTRICALS LIMITED

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1.0 INTRODUCTION

The purpose of this Safety Plan is to provide for the systematic identification, evaluation, prevention and control of general workplace hazards, specific job hazards, potential hazards and environmental impacts that may arise from foreseeable conditions during execution of the 100 MW Floating Solar Project.

This document shall be followed by Client's Sub-Contractors at all installation and servicing sites. In case customer specific documents are to be referred, the same will be followed in conjunction with this document.

2.0 APPLICATION

The document is applicable for execution of the 100 MW Floating Solar Project and it is expected that Client and Sub-contractor are committed to the following guidelines:

- Ensure that the Health and Safety of all persons at work site is not adversely affected by the work.
- Ensure protection of environment at the worksite.
- Ensure compliance at all times with the relevant statutory and contractual Safety requirements.
- Provide trained, experienced and competent personnel. Ensure medically fit personnel only are engaged at work.
- Provide and maintain plant, places and systems of work that are safe and without risk to health and the environment.
- Provide all personnel with adequate information, instruction, training and supervision.
- Effectively control, co-ordinate and monitor the activities of all personnel on the Project sites including contractors in respects of Safety.
- Establish effective communication on SAFETY matters with all relevant parties involved in the Project works.
- Ensure that all work planning takes into account all persons that may be affected by the work.
- Ensure fitness testing of all T&Ps. Lifting appliances like cranes, chain pulley blocks etc. are to be certified by competent authority.
- Ensure timely provision of resources to facilitate effective implementation of SAFETY requirements.
- Ensure continual improvements in SAFETY performance
- Ensure conservation of resources and reduction of wastage.
- Capture the data of all incidents including near misses, process deviation etc. Investigate and analyze the same to find out the root cause.
- Ensure timely implementation of correction, corrective action and preventive action.

3.0 TERMINOLOGIES

INCIDENT

Work- related event(s) in which an injury or ill health (regardless of severity) or fatality occurred, or could have occurred.

NEAR MISS

An incident where no ill health, injury, damage or other loss occurs, but it had a potential to cause, is referred to as “Near-Miss incident”.

MAN-HOUR WORKED

The total number of employee hours worked by all employees including subcontractors working in the premises. It includes managerial, supervisory, professional, technical, clerical and other workers including contract labors. Man-hours worked shall be calculated from the payroll or time clock recorded including overtime. When this is not feasible, the same shall be estimated by multiplying the total man-days worked for the period covered by the number of hours worked per day. The total number of workday for a period is the sum of the number of men at work on each day of period. If the daily hours vary from department to department separate estimate shall be made for each department and the result added together.

FIRST AID CASES

First aids are not essentially all reportable cases, where the injured person is given medical treatment and discharged immediately for reporting on duty, without counting any lost time. Please refer Format 03 for requirement of items with respect to treatment for First Aid Cases.

LOST TIME INJURY

Any work injury which renders the injured person unable to perform his regular job or an alternative restricted work assignment on the next scheduled work day after the day on which the injury occurred.

MEDICAL CASES

Medical cases come under non-reportable cases, where owing to illness or other reason the employee was absent from work and seeks Medical treatment.

TYPE OF INCIDENT / ACCIDENT & THEIR REPORTING:

The three categories of Incident / accident are as follows:

Non-Reportable Cases:

An accident, where the injured person is given medical help and discharged for work without counting any lost time.

Reportable Cases:

In this case the injured person is disabled for 48 hours or more and is not able to perform his duty.

Injury Cases:
These are covered under the heading of non-reportable cases. In these cases the accident caused injury to the person, but he still continues in his duty.

TOTAL REPORTABLE FREQUENCY RATE

Frequency rate is the number of Reportable Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula read as:

$$\frac{\text{Number of Reportable LTI}}{\text{Total Man Hours Worked}} \times 1{,}000{,}000$$

SEVERITY RATE

Severity rate is the Number of days lost due to Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula reads as:

$$\frac{\text{Days lost due to LTI}}{\text{Total Man Hours Worked}} \times 1{,}000{,}000$$

INCIDENCE RATE

Incidence Rate is the Number of LTI per one thousand manpower deployed.

$$\frac{\text{Number of LTI} \times 1000}{\text{Average number of manpower deployed}}$$

MANAGEMENT REPRESENTATIVE: Representative from Project Head

OCP: Operation Control Procedures

PPE: Personal Protective Equipment

4.0 ROLES & RESPONSIBILITIES

4.1 SAFETY OFFICER

- Carry out safety inspection of Work Area, Work Method, Men, Machine & Material, and other tools and tackles. Record observations as per Format 01 on a weekly basis.
- Facilitate inclusion of safety elements into Work Method Statement.
- Highlight the requirements of safety through Tool-box / other meetings.
- Conduct investigation of all accident/dangerous occurrences & recommend appropriate safety measures.
- Advice & co-ordinate for implementation of SAFETY permit systems & OCPs. Convene SAFETY meeting & minute the proceedings for circulation & follow-up action.
- Plan procurement of PPE & Safety devices and inspect their healthiness.
- Facilitate administration of First-Aid
- Facilitate screening of workmen and safety induction.
- Conduct fire drill and facilitate emergency preparedness
- Design campaigns, competitions & other special emphasis programs to promote safety in the workplace.
- Notify site personnel for non-conformance to safety noms observed during site visits / site inspections.
- Recommend to Site In charge for immediate discontinuance of work until rectification, of such situations warranting immediate action in view of imminent danger to life or property or environment.
- To decline acceptance of such PPE / safety equipment that do not conform to specified requirements.
- Encourage raising Near Miss Report on safety along with, improvement initiatives on safety.

4.2 ALL EMPLOYEES

- To adopt safe working practices
- To take corrective action and preventive action in case any non-conformity is observed on product / process / system with respect to Occupational Health, Safety and Environment.
- To report all incidents including near miss to SAFETY officer or

SAFETY coordinator.

- In case any particular activity / work has extremely high consequential risk or high environmental impact, the employee shall bring it to the notice of Site In charge before starting the work.
- To ensure that the workers are engaged by the contractor for the job after undergoing induction training.
- To ensure that the persons engaged in his area, follow the safety rules like using appropriate PPEs.
- To get involved in exercises like Job Safety Analysis and Work Permit System.
- To engage licensed electricians for site electrical works.
- To report any incident including near misses or safety lapses immediately to safety officer/SAFETY coordinator
- To support/co-operate with audit team members as & when safety audits are carried out.
- To involve in investigation, if any incident occurs in his work area.
- To participate in safety promotional programmers'.
- To attend the safety committee meeting, if he is a member/invitee
- To ensure that only suitable Tackles & Plants and qualified persons are engaged.

5.0 SUB-CONTRACTOR REPRESENTATIVE AT SITE

- Shall fill-up agreement form for compliance to relevant SAFETY Plan for Site Operations.
- Shall ensure fulfillment of relevant safety requirements of 100 MW floating solar Project and practice very strictly in his area of work in consultation with his concerned engineer and the safety officer.
- Shall screen all workmen for health and competence requirement before engaging for the job and periodically thereafter as required.
- Shall not engage any employee below 18 years.
- Shall arrange for all necessary PPEs like safety helmets, belts, safety, shoes, face shield, high visibility vest, hand gloves etc. before starting the job. Shall ensure that no working men/women carry excessive weight more than stipulated in BOCW Rules and Regulations.
- Shall ensure that all Tackles & Plants engaged are tested for fitness

and have valid certificates from competent authorities.

- Shall adhere to the instructions laid down in Operation Control Procedures (OCPs Point No 8)
- Shall ensure that person working above 3.3 meter should use Safety Harness tied to a life line/stable structure.
- Shall ensure that materials are not thrown from height. Caution to be exercised to prevent fall of material from height.
- Shall report all incidents (Fatal/Major/Minor/Near Miss) to the Site engineer /SAFETY officer of the 100 MW floating solar Project.
- Shall ensure that adequate illumination is arranged during night work.
- Shall ensure that all personnel working under subcontractor are working safely and do not create any Hazard to self and to others.
- Shall ensure display of adequate signage/posters on HSE.
- Shall ensure that mobile phone is not used by workers while working.
- Shall ensure conductance of mock drill, induction training and training on the site.
- Shall ensure good housekeeping.
- Shall ensure adequate valid fire extinguishers are provided at the worksite.
- Shall adequate drinking water at work site.
- Shall ensure adequate emergency preparedness.

5.1 DEPLOYMENT OF TOOLS & PLANTS

- As a measure to ensure that machinery, equipment and tools being mobilized to the construction site are fit for purpose and are maintained in safe operating condition and complies with legislative and owner requirement, inspection shall be arranged by in-house competent authority for acceptance as applicable.
- The machinery and equipment to be employed for this purpose shall include but not limited to the following:
  - Mobile cranes.
  - Side Booms.
  - Forklifts.
  - Grinding machine.
  - Drilling machine.
  - Air compressors.
  - Welding machine.
  - Generator sets.
  - Dump Trucks, tractors.
  - JCBs, Excavators.

- Hand tools.
- Road Rollers
- Vibration Compacters
- Boring Machine
- Chipping Machines
- Hammer Machines
- Breakers

5.2 DEPLOYMENT OF MANPOWER

- As a measure to ensure that manpower being mobilized to the construction site is fit and competent for safe working, screening arrangement shall be made by the sub-contractors to fulfill contractual as well as legislative requirement.
- Examination of medical fitness shall be conducted through qualified medical professional for all workers to be deployed.

5.3 DEPLOYMENT OF PPEs

The following matrix recommends usage of minimum PPEs against the respective job. The PPEs shall conform to the relevant standards as listed in the reference under clause 3.0 and bear ISI mark. All the PPEs shall be periodically checked for its quality before issue. The users shall be advised to check the PPEs themselves for any defect before putting on. The defective ones shall be repaired/ replaced. The issuing agency shall maintain register for issue and receipt of PPEs. The Helmets shall have logo or name (abbreviation of agency name permitted) affixed or printed on the front. The body harnesses shall be serial numbered.

Sl. No	Type of work	PPEs (Subject to applicability of process only)
1	Concrete and asphalt mixing	Nose mask, hand glove, apron and gum boot
2	Welders/Grinders/ Gas cutters	Welding/face screen, apron, hand gloves. Helmet fitted with welding shield is preferred for welders
3	Stone/ concrete breakers	Safety goggles, hand gloves
4	Electrical Work	Rubber hand glove, Electrical Resistance shoes
5	Insulation Work	Hand gloves
6	Work at height	Double lanyard full body harness, Fall arrestor (specific cases)
7	Grit/Sand blasting	Blast suit, blast helmet, gloves
8	Painting	Plastic gloves, Respirator (for spray Painting)

Besides the PPEs mentioned above, the persons shall use helmet and safety shoe. The visitors shall be issued Helmet and any other PPEs as deemed appropriate for use in the area of work.

Color Code for Helmets:

1. Workmen: Yellow.
2. Safety staff: Green.
3. Engg, supervisor, visitor, site in charge : White.

MEDICAL FACILITIES

FIRST AID PROVIDER

- Every injury shall be treated, recorded and reported.
- Refresher course on first aid shall be conducted as necessary.
- List of qualified first aiders and their contact numbers should be displayed at major locations.

FIRST AID BOX

- First aid facilities shall be provided and maintained.
- The first aid box shall be kept by first aider who shall always be readily available during the working hours of the work place. His name and contact number to be displayed on the box.
- The first aid box shall be distinctly marked with a Red Cross on white background.
- Details of contents of first aid box is given in **Format No.02**
- Monthly inspection of First Aid Box shall be carried out by the Site In charge as per **format no 02.**

HEALTH CHECKUP

The persons engaged at the site shall undergo health checkup as per the **format no 03** before induction.

a. Height workers
b. Drivers/crane operators/riggers
c. Confined space workers
d. Shot/sandblaster
e. Welding and NDE personnel.

PROVISION OF EMERGENCY VEHICLE

- In case of any emergency a vehicle shall be made available at

workplace on short notice to handle any emergency. This shall be by way of tying up with customer's medical centre /local hospitals/ sub-contractors by mutual aid agreement.

6.0 SAFETY TRAINING & AWARENESS

SAFETY INDUCTION TRAINING

All persons entering into project site shall be given SAFETY induction training by the SAFETY officer of 100 MW floating solar Project.

In-house induction training subjects shall include but not limited to:

- Briefing of the Project .
- Safety objectives and targets.
- Site SAFETY rules.
- Site SAFETY hazards
- First aid facility.
- Emergency Contact No.
- Accident reporting.
- Fire prevention and emergency response.
- Proper safety wear & gear must be issued to all the workers being registered for the induction.
- They must arrive fully dressed in safety wear & gear to attend the induction.
- Any one failing to conform to this safety wear& gear requirement shall not qualify to attend.
- Each employee shall undergo safety induction tranning

TOOL BOX TALK

- Tool Box talk shall be conducted by safety officer to work groups prior to the start of work. The agenda shall consist of the following:

  - Details of the job being intended for immediate execution.
  - The relevant hazards and risks involved in executing the job and their control and mitigating measures.
  - Specific site condition to be considered while executing the job like high temperature, humidity, unfavorable weather etc.
  - Recent non-compliances observed.
  - Appreciation of good work done by any person.
- Record of Tool box talk shall be maintained as per format no 06

TRAINING ON HEIGHT WORK

Training on height work shall be imparted to all workers working at height by in- house/external faculty. The training shall include

following topics:

- Use of PPEs
- Use of fall arrester, life line.
- Safe climbing through monkey ladders.
- Inspection of PPEs.
- Medical fitness requirements.
- Mock drill on rescue at height.
  Dos & Don'ts during height work.

SAFETY PROMOTION-SIGNAGE, POSTERS,

Display of SAFETY posters and banners.

- Site shall arrange appropriate posters, banners, slogans in local/Hindi/,English languages at workplace

Display of SAFETY signage

- Appropriate SAFETY signage shall be displayed at the work area to aware workmen and passersby about the work going on and do's and don'ts to be followed.

SAFETY awareness program/SAFETY training program

- Site will arrange SAFETY awareness program periodically on different topics including medical awareness for all personnel working at site.

- SAFETY officer shall arrange training program based on site condition

7.0 SAFETY COMMUNICATION

MONTHLY SAFETY REPORTING

- SAFETY information of Site shall be reported monthly through Monthly Site SAFETY report (MSR) as per format 04
- The period of reporting shall be 1st of each calendar month.

8.0 OPERATIONAL CONTROL

8.1 EXCAVATION WORK SAFETY:

- Avoid damage / personal injury during excavation work at sites.
- Ensure proper barricading by ribbon or Hard barricading of the excavated area.

- Proper side slopes of the excavation as per the type of soil should be maintained.
- Where side slopes cannot be provided due to space constraints before excavation, sheet piling must be done to prevent the collapse of earth.
- As soon as the job is completed, immediate back filling to be done.
- No personnel be allowed within the swing area of mechanical excavator when work is in progress.
- Proper lighting to be arranged when the excavation is carried out at night.
- Excavated earth to be dumped/ stored in a designated place only.
- Surplus earth to be transported and disposed in the authorized area.
- Site safety department to identify all possible hazard areas related to excavation work and ensure control.
- Use proper PPE"s.
- Ensure adequate caution signs are displayed in the area of operation.

9..WORK PERMIT SYSTEM

- The following activities shall come under Work Permit System
  a. Height working of 3.3 metre and above
  b. Excavation more than 4 meter depth
  c. Heavy lifting by machinery
- "SAFETY Procedure for Work Permit System" shall be followed while implementing permit system.
- Permit applicant shall apply for work permit of particular work activity at particular location before starting of the work with Job Hazard Analysis.
- Permit signatory shall check that all the control measures necessary for the activity are in place and issue the permit to the permit holder.
- Permit holder shall implement and maintain all control measures during the period of permit
  He will close the permit after completion of the work. The closed permit shall be archived with SAFETY personnel of site.

10. HOUSEKEEPING

- Proper housekeeping to be maintained at work place and the following are to be taken care of on daily basis.
- All surplus earth and debris are removed/disposed off from the working areas to identified locations.
- Unused/Surplus cables, steel items and steel scrap lying scattered at different places/elevation within the working areas are removed to identified locations.
- All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from workplace to identified locations. Sufficient waste bins shall be provided at

different work places for easy collection of scrap/waste. Scrap chute shall be installed to remove scrap from higher location.

- Access and egress (stair case, gangways, ladders etc.) path should be free from all scrap and other hindrances.
- Workmen shall be educated through tool box talk about the importance of housekeeping and encourage not to litter.
- Fabricated steel structures, pipes & piping materials shall be stacked properly.
- No parking of trucks/trolleys, cranes and trailers etc. shall be allowed in the camp, which may obstruct the traffic movement as well as below LT/HT power lines.
- Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.

11.WASTE MANAGEMENT

STORAGE AND COLLECTION

- Different types of rubbish/waste should be collected and stored separately.
- Paper, oily rags, smoking material, flammable, metal pieces should be collected in separate bins with close fitting lids.
- Rubbish should not be left or allowed to accumulate on construction and other workplaces.
- Construction rubbish should not be burnt near working site.

SEGGREGATION

- Earmark the scrap area for different types of waste.
- Store wastes away from building.
- Oil spill absorbed by non-combustible absorbent should be kept in separate bin.
- Clinical and first aid waste stored and incinerated separately.

DISPOSAL

- Sufficient containers and scrap disposal area should be allocated.
- All scrap bin and containers should be conveniently located.
- Provide self-closing containers for flammable/spontaneously combustible material.
- Keep drainage channels free from choking.
- Maintain a schedule for collection and disposal of waste.

12. WARNING AND SIGNS

- Appropriate sign to be displayed at scrap storage area
- No toxic, corrosive or flammable substance to be discarded into public sewage system.
- Waste disposal shall be in accordance with best practice.

13.0 :EMERGENCY PREPAREDNESS AND RESPONSE

- Emergency preparedness and response capability of site shall be developed as per project requirement.
- Availability of adequate number of first aid providers and fire fighters shall be ensured by sub-contractors
- Assembly point shall be earmarked and access to the same from different location shall be shown
- Fire exit shall be identified and pathway shall be clear for emergency escape in Stores area and office area.
- Appropriate type and number of fire extinguishers shall be deployed as per fire extinguisher deployment plan of BHEL and validity shall be ensured periodically through inspection
- First aid boxes shall be strategically placed at work places to cater to emergency needs.

14.0 : FIRE SAFETY PROCEDURE

1. Site-in-charge / Safety Officer will make periodical review of the site Fire Protection, Prevention Preparedness, Site conditions and available fire protection equipment.
2. A mutual aid agreement with local Fire station for availability of Fire tender shall be made.
3. It is very imperative good contact with Local fire station for availability of Fire tender in case of emergencies, in additional to their own fire equipment.
4. Fire Protection, Prevention and Preparedness Inspections - The Contractor /Sub-Contractor will be required to make frequent fire prevention inspections of his work site and operating facilities. Deficiencies will be corrected at once.
5. Emergency telephone number to be displayed at all important places.

15. CONTROL OF DOCUMENTS

All documents shall be controlled as per SAFETY Procedure for Document Control.

16.0 SAFETY INSPECTION

Inspection on SAFETY for different activities being carried out at site shall be done to ensure compliance to safety requirements.

DAILY SAFETY CHECKS

Both the Site Supervisors and SAFETY Supervisors are to conduct daily site safety inspection around work activities and premises to ensure that work methods and the sites are maintained to the acceptable standard.

INSPECTION OF PPE

- PPEs shall be inspected by SAFETY officer at random once in a

week as per **Format no 07 for** its compliance to standard and compliance to use and any adverse observation shall be recorded in the PPE register.

- The applicable PPEs for carrying out particular activities are listed below.
- The IS standard to be complied to, for different PPEs, is given as follows:

RELEVANT IS-CODES FOR PERSONAL PROTECTION

IS: 2925 – 1984	Industrial Safety Helmets.
IS: 4770 – 1968	Rubber gloves for electrical purposes.
IS: 5557 – 1969	Industrial and Safety rubber knee boots.
IS: 5983 – 1978	Eye protectors.
IS: 9167 – 1979	Ear protectors.
IS: 3521 – 1983	Industrial Safety Belts and Harness

INSPECTION OF Tools & Plants

- A master list of Tools & Plants shall be maintained by each subcontractor.
- All Tools & Plants being used at site shall be inspected by SAFETY officer once in a month as per **Format no 08** for its healthiness and maintenance.
- The Tools & Plants which require third party inspection shall be checked for its validity during inspection.
- The certificate of Tools & Plants shall be monitored as per Format no **09**

INSPECTION OF CRANES AND WINCHES

- Cranes and winches shall be inspected by the operator through a daily checklist for its safe condition (as provided by the equipment manufacturer) before first use of the day.
- Cranes and Winches shall be inspected by SAFETY officer once in a month as per **format no 10** for healthiness, maintenance and validity of third party inspection and SWL shall be displayed.
- The date of third party inspection and next due date shall be painted on cranes and winches.

INSPECTION ON HEIGHT WORKING (ONLY FOR CMCS AS APPLICABLE)

- Inspection on height working shall be conducted by SAFETY Coordinator of Construction agency before start of work to ensure safe working condition including provision of
    - Safety Harness
    - Fencing and barricading
    - Warning signage
    - Covering of opening
    - Proper scaffolding with access and egress.
    - Illumination

- Inspection on height working shall be conducted once in a week by SAFETY officer as per format no 11

- Height working shall not be allowed during adverse weather.

INSPECTION ON ELECTRICAL INSTALLATION /APPLIANCES

- Ensure proper earthing in electrical installation
- Use ELCB at electrical booth.
- Electrical installation shall be properly covered at top where required
- Use appropriate PPEs while working
- Use portable electrical light < 24 V in confined space and potentially wet area.
- Monthly inspection shall be carried out as per format no 12

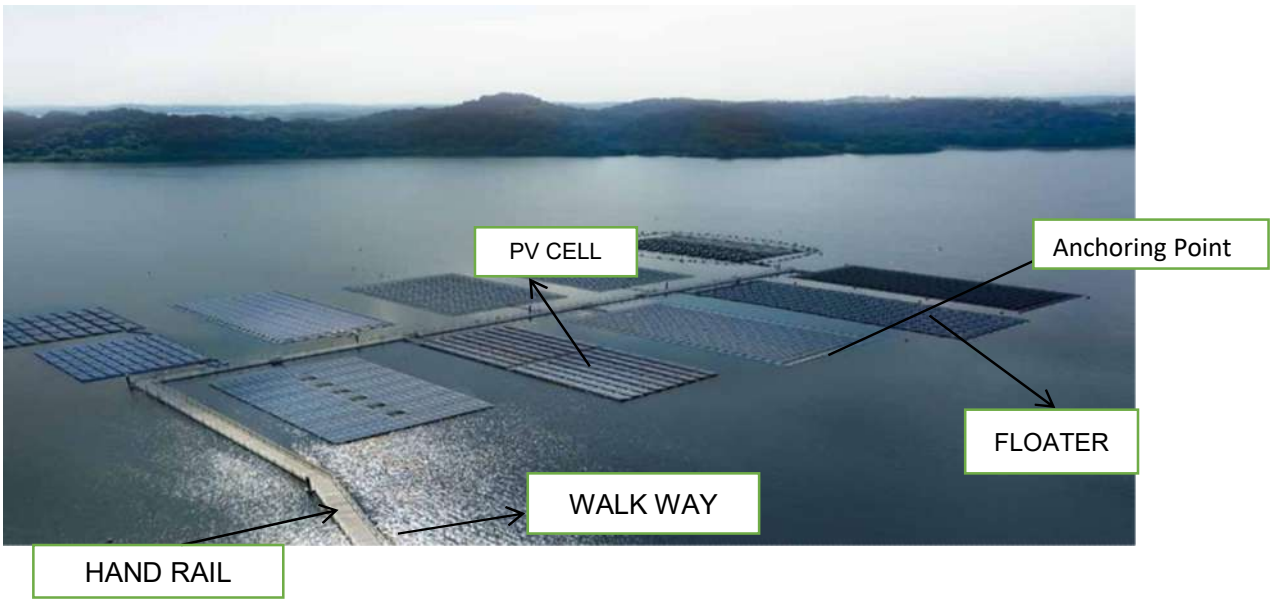
17. MONTHLY SAFETY REVIEW MEETING

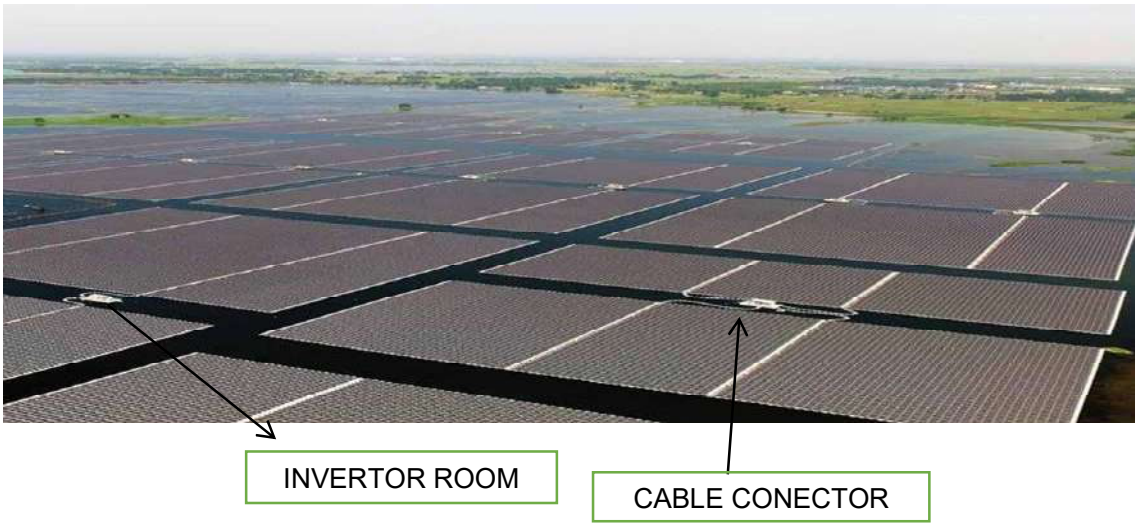
- Site shall hold SAFETY review meeting every month to discuss and resolve SAFETY issues of site and improve SAFETY performance. It will also discuss the incidents occurred since previous meeting its root cause and corrective action and preventive action.
- The meeting shall be chaired by Site In charge, convened by SAFETY coordinator and attended by all HOS, Site In charge of Subcontractors and SAFETY representative of Subcontractors.
- MOM on the discussion will be circulated to the concerned for implementation.

18.0 TYPICAL DEPICTION OF FLOATING SOLAR PV SYSTEM (FOR GENERAL REFERENCE)

FLOATING SOLAR POWER ERECTION SAFETY

(Floating platform Under construction)





(Typical View of completed Solar PV Floating platform)

SYSTEM COMPONENTS:

1. Solar PV modules for conversion of solar radiation to electrical energy/
2. Anchoring systems: Anchoring system refers to permanent under-water structure to secure floating platforms.
3. Pontoon: A pontoon is floatation device with enough buoyancy to float by itself as well as with a heavy load.
4. Floats: Multiple plastic hollow floats with effective buoyancy to self-weight ratio are combined over and over again, forming a giant pontoon. The floats are typically made of HDPE (high density polyethylene), known for its tensile strength, maintenance free property.
5. Mooring system: A mooring system usually refers to any permanent structure on the banks to which floats are secured.
6. Cables and connectors: Electricity is drawn from the solar array and transported to the land. Therefore, the power can be fed to the grid or stored in batteries.

RISKS AND HAZARDS:

1. Identified as per Job Risk Assessment exercise and HIRA Doc 1 and 2 attached.

PRECAUTIONS:

1. As mentioned in HIRA Doc 1 and 2.

19.0 SITE RECORDING FORMATS

HAZARD IDENTIFICATION AND RISK ASSESMENT (HIRA) DOC.1	
Job Task: Erection of materials and over all site work	**Equipment #:** Hydra/Crane, Welding M/c,
Project/Location: 100 MW Floating Solar Project, NTPC, Ramagundam	**Analysis done by: Roney Das, QUEST Reviewed by: BHEL EDN, Safety Dept**
PPE required: Safety helmet, vest, shoes, hand gloves, etc. (IS standard)	**Date Initiated:** **Revised date:**
Emergency Plan: Yes	
Tools used: Crane, Chain pulleys, Sling, D-shackle, Bow shackle, Gas cutting set, Welding set.	**Chemicals used:** NO

Job activities/Work	Potential Hazards	Risk/Hazard Effect	Safety Precautions	PPE
Structural materials and Equipment shifting and Liftin g	1. Pinching of leg/hands of workmen while handling Structural members. 2. Swinging of load. 3. Poor weather condition. 4. Overloading of crane. 5. Unauthorized operation of crane by helper. 6.Failure of lifting tools and tackles due to use of damaged / under capacity tools and tackles.	1. Serious injuries. 2. Property damage. 3. Chances of Fatality	1. Pre work cautioning & proper Permit must be followed before starting the work. 2. Ensure that workmen keep their body parts away from pinching points. 3. Ensure proper stacking of Structural members. 4.While fit up work structural member must be secured safely. 5. Qualified opeator, rigger and signalman should be assigned. 6. Ensure use of tag lines at both ends to control the load. 7. Use crane/Hydra within the capacity and do not over load. 7a. Safe working load should be displayed on all matl handling eqpt. 8. Avoid work in poor visibility / poor weather condition / Raining and in heavy wind. 9. Affected area to be cordoned off and caution sign to be posted to avoid unauthorized entry. 10. Ensure to use of certified and tested lifting tools and tackles with proper capacity, color code &identification number.	Safety shoes, Safety Helmet, Safety goggles, Safety vest, Hand gloves.

Job activities/Work	Potential Hazards	Risk/Hazard Effect	Safety Precautions	PPE
Erections of structural materials with the help of crane& rigging activity. (as applicable to CMCS building)	1.Pinching points. 3.Failure of lifting tools and tackles due to use of damaged / under capacity tools and tackles. 4. Hit by load due to swinging.	1. Serious injuries. 2. Property Damage.	1. Ensure qualified Crane operator and competent Signal man/Riggers. 3. Ensure that workmen keep their hands / leg away from pinching points. Proper communication & co-ordination with coworker. 4.Ensure proper supervisoin. 5. Ensure to use of certified and tested lifting tools and tackles with proper capacity. 6. Softener or packing shall be provided in between slings and structural member. 7. While lifting ensure no one comes under suspended load. 7a. Safe working load should be displayed on all matl handling eqpt. 8. Ensure use of tag lines to control the load. 9.Lifting affected area to be cordoned off & caution sign to be posted to avoid unauthorized entry. 10.Daily Inspection checklist of crane/hydra shall be ensured by users.	Safety shoes, Safety Helmet, Safety goggles, Safety vest, Hand gloves. Full body harness.

Job activities/Work	Potential Hazards	Risk/Hazard Effect	Safety Precautions	PPE
Erection/Dismantli ng Of Scaffolding (Only for CMCS area)	1. Dropped objects 2. Slips, trips and falls 3. Striking against 4. Collapse and fall of scaffold structure	1. Serious injuries. 2. Property Damage.	1.Performing group shall conduct check of tool box relevant to the job before the work start 2. Use tools belt for containment of loose objects 3. Secure the tubes, planks and other objects when lifting/lowering 4. Barricade the work area and place sign boards 5. Do not climb with components 6. All scaffold platforms shall be secured/lashed 7. Ensure area is not congested. 8. Maintain safe distance from energized power lines and heat sources 9. Ensure that only authorized/certified personnel are engaged in erecting & dismantling scaffolding 10. Examine all scaffold components prior to use 11. Only essential personnel are allowed access to scaffold	Safety shoes, Safety Helmet, Safety goggles, Safety vest, Hand gloves, Full body harness

Job activities/Work	Potential Hazards	Risk/Hazard Effect	Safety Precautions	PPE
Gas cutting and Welding work	1. Fire and Explosion 2. Welding fumes 3.Fall of gas cylinders while transporting	1. Injury from cylinder fall 2. Burn injuries due to fire, spatters. 3.Eye injury to nearby workers 4. Property damage due to cylinder blast	1. Ensure flash back arrester /NRV on cylinder and torch side. 2. The combustible material shall be removed from site before starting the job. 3. No welding cable shall pass over the combustible materials/cylinders. 4. Provide fire extinguisher. 5. Check the leakage of cylinder with soap solution. 6. Hot work permit should be taken and Fire watch person should be identified & only authorized person allow to work. 7. Ensure appropriate safety goggles to all workers. 8. Provide suitable face shield for welders. 9. Use gas cylinders trolley for internal shifting of gas cylinders. 10. Ensure Fixing of the valve caps while shifting/storing the gas cylinders. 11. O2 and LPG Gas cylinders shall be stored separately chained and secured. 12. Ensure safe storage of diesel fuel if any.	Safety shoes, safety helmet, gloves, goggles. Face shield.
Electrical work	1.Electrical Shock 2.Fire	1. Injury 2. Property damage. 3. Fatality	1. Electric supply should be taken through ELCB of 30mA sensitivity. 2. All power cables should be protected from damage by improper laying. 3. All m/c and panel board should be protected against rain. 4. Proper Earthing shall be provided to all electrical equipment. 5. Ensure all portable power tools are tested and inspected by concern electrical engineer. 6. D.B Should not be overloaded.	Safety shoes, safety helmet, Rubber gloves, goggles.

Job activities/Work	Potential Hazards	Risk/Hazard Effect	Safety Precautions	PPE
Removal Of Lifting Arrangement	1. Fall of materials/objects from height.	1. Injuries 2. Property damage.	1. Trained and Authorized person only allow to perform the job. 2. All tools & tackles should be tightened by rope to prevent fall from height. 3. Safe lowering procedure should be ensured. 4 The area must be cordoned off. 5. Life line must be provided for anchoring safety harness.	Full body harness, Safety shoes, safety helmet, gloves, goggles
Excavation Work by JCB/manually	1. Fall of 2. person Soil collapse	1. Serious injuries.	1. Install cordon/warning tape around the excavated area. 2. No person allowed in during the excavation by JCB. 3. Work area clearance certificate and excavation permit must be taken before starting the work. 4. JCB inspection should be carried out before the job commencement	Safety shoes, safety helmet, goggles, hand gloves, vest.
Civil work	1. Slippery approach. 2. While work at height, fall hazard. 3. Electrical hazard for electric line/equipment's 4. . Sharp edges of construction materials. 5. Chemical component of cement.	1. Slip trip fall 2. injuries Property 3. damage. Eye injuries, skin irritation	1. Preparation of proper approach with proper slope, steps, hand railing/ ropes. 2. Barricading /cordoning the area. 3. Display safety posters 4. Inspection of all hand tools before use. 5. Ensure proper working platform	Safety shoes, safety helmet, goggles, gloves, full body harness, nose masks.

Job activities/Work	Potential Hazards	Risk/Hazard Effect	Safety Precautions	PPE
Work on Water body (NTPC reservoir)	1. Trip slip and fall hazard on floats 2. Chance of fall into water 3. Electrical hazard. 4. Effect of extreme weather condition such as Sun burn and heat stress.	1. Physical fall shock - chance of injury or fatality. 2. Fall from the work area in to the water resulting in suffocation or drowning. 3. Chance of sun burn or sun stroke	1. Before start of work check all documents (such as work permit, TPI certificates of all tools and tackles and test certificates of life saving boat) 2. Ensure all work men working in or very near to water to wear Life jackets 3. Ensure availability of rescue boat in water with spare life jackets and floatation air tubes 4. Make a proper approach into the water body with proper slope or steps if required 5. In case of emergency, rescue team consisting of expert swimmers and above rescue boat to be always prepared. 6. In case of underwater work such as diving related work, an expert for checking diving equipment prior to commencement of work. Also person shall be present for observing and monitoring diving activity during dive sessions. 7. Arrangement to be in place to summon Ambulance on Call to site for emergency shifting of any injured person to the nearest hospital. 8. Ensure drinking water to avoid de-hydration 9. Ensure Wireless / mobile/ walky- talky arrangement between site to control room/office 10. Ensure non-contamination of water body during the activities	Safety shoes, safety helmet, goggles, hand gloves, Reflective life jackets. Certified and compliant Diving gear to be used by divers if required One dedicated Rescue boat with life jackets

Date	Reviewed By sub-contractor and or their authorized competent	Is any additional precautions to be taken for