



**UNIT IGC3 – THE HEALTH AND
SAFETY PRACTICAL APPLICATION**

nebosh

Student number:

Location: Head Race Tunnel of under construction XYZ* Hydro Electric Power Plant

Date of review: 25 / February / 2012

* - Name of the power plant is confidential and may infringe with my employment contract conditions and hence has not been revealed herewith in this report.

Introduction:

This Health & Safety inspection was carried out by me on 25th February 2012 between 1230 hrs and 1330 hrs at the Head Race Tunnel (HRT) area of the under-construction XYZ* Hydroelectric power plant. The project is a run-of-river type 100 MW hydro electric power plant designed with a 4 Meter diameter and 1.2 KM long Head race Tunnel. During the time of this inspection, construction of the HRT was in progress, with approximately 300 meters out of the 1.2 KM length being completed. The selected contractor had deployed 30 workers inside the head race tunnel for this job.

Following activities were in progress inside the HRT during the time of inspection: Concreting on the inner tunnel surfaces using the Hydraulic Gantry, removal of muck, transportation of concrete, Use of winches to support the Gantry, Constant De-watering and part-assembly of the Gantry parts using hot work.

Executive Summary

A Health & Safety inspection was carried out on 25th February 2012 at the Head Race Tunnel (HRT) area of the under-construction XYZ* Hydroelectric power plant. The main objective of this inspection was to identify prevalent HSE hazards which may cause ill-health and or Human Injury. At the time of inspection, following jobs were being undertaken: Concreting on the inner tunnel surfaces using the Hydraulic Gantry, removal of muck, transportation of concrete, Use of winches to support the Gantry, Constant De-watering and part-assembly of the Gantry parts using hot work.

This inspection clearly reveals that there are very serious hazards (mechanical handling, electrical systems, geological hazards, machinery related) which if left unattended, may result in multiple serious injuries or even multiple fatalities. The major area of concern is the Gantry works, where-in, the possibility of winch failure, injury by falling rocks, serious electrocution and high noise hazards exist. Mitigation and initiation and implementation of risk reduction measures is highly recommended in this case. The other aspect, which has less potential of human injuries, but, more potential of business loss (due to possible cancellation of work licence) is the failure to provide worker welfare facilities at Adit** 3. Keeping view of the management commitment towards HSE, it is recommended that immediate action is undertaken to safe guard the company's social, financial & moral interests.

** - Adit means : Approach passage to reach the main HRT Tunnel

Main findings of the inspection

Observation No: 1 (Damaged Winch Wire Rope)

Wire rope of the 5 Tonne winch (Make: Quality) installed at the Gantry works found to be cut at number of places along its entire length. On an average more than 3 wire rope strands are found to be cut at a distance of 2 every inches making this entire set up extremely unsafe. The winch supports and moves the entire gantry and use of this wire rope would pose serious injury threat to all workers in that region.

Urgent action is required to stop the gantry work and support the gantry with 2 10 Tonne chain pulley blocks before replacing the 5 Tonne winch wire rope with a new (and certified) rope. Works shall only be resumed once the 5 Tonne winch has been satisfactorily inspected and certified for use by a Government authorized competent person.

The Company is presently failing to comply with requirements of **The Building and Other Construction Workers Act, 1996** and any injury due to the failure of the winch may result in fatalities and huge claim compensation under this regulation. This unsafe condition can be mitigated with negligible costs (around Rs. 15000), as all required resources are already available in-house.

Observation No: 4 (Loose Rock Fall Hazard)

Workers carrying out maintenance jobs in the de-watering channel are at the risk of being struck & hit by loose rock pieces falling from the HRT tunnel edges. Though the number of workers doing the maintenance job is less (around 5 workers), the severity of such a rock fall may be very high and lead to serious injuries or even fatalities.

Immediate measures like cordoning-off suspect areas, ensuring use of personal protective equipment, limiting access and provision of nets / mesh would alert all workers, but would not reduce the potential of the hazard. I recommend that all known suspect areas be rock-bolted or suitably treated immediately. Additionally, inspection of the entire HRT be carried out daily to identify and treat susceptible rock fall zones. This shall be continued and practiced on regular basis.

The company by failing to mitigate this hazard does not comply with the provisions of **The Building and Other Construction Workers Act 1996**. The cost of mitigating this hazard is almost negligible, as all the proposed mitigation measures do not require any procurement and are a mere implementation of the Hydropower industry best practices.

Observation No: 2 (Electrical Earthing Protection)

There is a very high risk of electrocution to numerous personnel working with electrical power at the Gantry works, as none of the twelve incoming power circuits to the main electrical panel have been provided with Earthing Leakage circuit breakers (ELCB). Use of hand held welding machines, concrete mixers and other devices pose a serious electrocution risk to these workers.

All the twelve incoming power circuits need to be provided with individual ELCB of 30 mA rating, so as to contain this risk firstly. However, the permanent solution to this problem shall be replacement of all existing main electrical panels at HRT with an in-built ELCB type panel. Keeping view of the practicalities, the time required to procure & replace the panels and the imminent hazard, it is recommended that, electrical systems be inspected & monitored weekly by the electrical engineer.

Owing to this observation, the company is failing to comply with the requirements of **The Electricity Rules 2003 and The Building and Other Construction Workers Act, 1996**. As this condition severely risks large number of human lives, it is extremely important to address this issue at the earliest. The immediate cost is nominal (around Rs. 40,000) whereas the cost to significantly reduce this hazard permanently is extremely less (around Rs. 200,000) in comparison to the losses which the company may be liable to pay in-case of an accident arising out of this hazard.

Observation No: 16 (Worker Welfare Facilities)

Whilst having their lunch and resting, all human beings (including these workers) tend to relax, stretch, lay down, remove their protective gears and desperately seek some time for themselves. Workers at Adit 3 were found to be resting and eating their lunch at the Gantry itself, as they have not been provided with a separate rest cum lunch room. In this scenario, the workers are at a greater risk as they are not prepared to take-on the hazards.

I have mandated that all workmen, with immediate effect, not be allowed to rest and have their lunch at their workplace. I recommend that a temporary safe place at portal of Adit 3 be provided to these workmen with appropriate transportation facilities till a permanent porta cabin is provided to them.

Failure to provide basic welfare amenities like rest & lunch room may lead to cancellation of the Labour licence and or licence to work, as the company is presently non-complaint with requirements of **The Labour Act 1975 and The Building and other Construction workers Act 1996**. This situation mandates a quick action as both the health & business risks are huge. It may be noted that cost of mitigation of this hazard is around Rs. 500,000. Use of other available porta cabins may also be reviewed in this context.

Observation No: 11 (Diesel Generator Noise Hazard)

High Noise hazard witnessed due to the operation of the 132 KVA Diesel Generator (DG) set at the Adit 3 portal. This DG set does not have an acoustic enclosure and continuous exposure would pose a serious hazard to the workers of that area.

I have mandated, with immediate effect, use of ear muffs (for workers working in vicinity) and ear plugs (for others). I recommend that use of this 132 KVA DG set be discontinued and power be instead used from the 11 KV standby line. This shall be effected only after clearance from the electrical department. The permanent solution would be to replace this 132 KVA DG set with a equipment having sound proof acoustic enclosure.

In addition to the noise hazard, the Company is violating the requirements of **The Environment Protection Act 1986 and The Building and Other Construction Workers Act 1996**. Continued use of this DG set, may have serious consequences under both these legislations. I propose that a new complaint DG set (with sound proof acoustic enclosures) be procured or any other complaint equipment be deputed for this task immediately.

Conclusions

This Health & Safety inspection was carried out with the intent of identifying the extent of implementation of HSE systems in our company and the activities which have the highest possibility to cause serious damages to our Company.

Keeping view of our strong and persistent commitment towards safe HSE systems, I find that there is a clear intent amongst all employees to reduce ill Health & Human injury. However, owing to tough work terrain and job nature, we have lapses in implementation.

I hereby recommend to the Management that we urgently address the following issues to safeguard our interests, reputation and more importantly valuable human lives:

1. All Gantry works to be reviewed for mechanical handling, geological surprises, electrical systems and machinery / vehicle use.
2. Worker welfare facility provisions to be reviewed and increased. A Happy worker means Good Progress, Safe work, more profits and NO Accidents.

It may be noted that cost for mitigating or reducing all the identified HSE issues (listed below in Recommendations section) is very less in comparison to the magnitude of losses they might bring to our Company.

Recommendations:

Recommendation	Likely resource implications	Priority	Review date
<p><u>Observation No: 1</u></p> <p>Support Gantry with two 10 Tonne chain pulley blocks and then replace the damaged wire rope of 5 Tonne Winch with new certified 1 inch wire rope.</p> <p>Work using winch to resume only after inspection & certification of winch by competent person.</p>	<p><u>Resources Required:</u> Steel wire rope – around 30 meters and 2 10 Tonne chain pulley blocks.</p> <p>No Major costs envisaged as certified wire rope and chain pulley blocks are available.</p> <p><u>Cost :</u> Certification by competent persons : Rs. 15,000</p>	High	03 March 2012
<p><u>Observation No: 4</u></p> <p>Areas under suspect loose rock fall zones to be barricaded and access to be prohibited.</p> <p>Loose rocks shall be rock-bolted or suitably treated</p> <p>Daily inspection of entire HRT to identify suspect zones and treat immediately</p>	<p>Resources required: Barricading tapes, rock bolting equipment and cement</p> <p><u>Cost :</u> Negligible. (As all materials available at site)</p>	High	25 February 2012 (1530 Hrs) 25 February 2012 (1530 Hrs) Daily Morning Meeting
<p><u>Observation No: 2</u></p> <p>Provide Earthing Leakage Circuit Breakers (ELCB) on all 12 incoming electrical circuits on the main electrical panel for the Gantry works.</p> <p>Procurement, use and replacing all HRT electrical panels with in-built type ELCB panels</p>	<p>Resource required immediately: 12 ELCB.</p> <p>Cost: Around Rs. 40,000</p> <p>Resource Required : 30 in-built panels.</p> <p>Cost: Around Rs. 200,000</p>	High	27 February 2012 25 March 2012
<p><u>Observation No: 16</u></p> <p>Provision of temporary safe place to eat & rest at portal of Adit 3 for workers and arrange related transportation.</p> <p>Workers at Adit 3 shall not be allowed to eat & rest at workplace and shall be provided with a permanent porta cabin for this purpose. Use of other available porta cabin may also be reviewed</p>	<p>Resources Required: Space for lunch & rest activities at portal of Adit 3</p> <p>Cost: Nil. (Shed 3 to be used till permanent arrangements are made)</p> <p>Resources Required: 1 Porta Cabin</p> <p>Cost: Rs. 500,000.</p>	High	25 February 2012 (1900 Hrs) 25 March 2012
<p><u>Observation No: 11</u></p> <p>Discontinue use of Diesel Generator set at portal of Adit 3 and use standby 11 KV line for power</p> <p>Procure and install a 132 KVA Diesel Generator set having acoustic enclosure. Possibility of use of other complaint stand-by DG sets may also be reviewed.</p>	<p>Resource Required: Nil</p> <p>Cost : Nil</p> <p>Resource Required: 132 KVA DG set with sound proof acoustic enclosure</p> <p>Cost: Rs. 150,000</p>	Medium	27 February 2012

Prepared By:

Name :

Student Number: