

# **Meeting the Challenges in Industrial Safety Management in Construction Works (Dec-2007)**

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## **1.0 Introduction**

In India the construction industry is the second largest employer next to agriculture whereas it is next to the road accidents in our country. The annual turnover of the construction industry in India is about 4000 Billion Rupees, which is more than 6% of the National GDP employing a large work force. The construction works in NPCIL, are enormous. The number of fatalities occurring from construction work in the industry is quite disturbing and fall of person from height and through openings are the major causes for serious accidents.

For the last several years, NPCIL has been executing massive construction activity. During the past seven years, NPCIL has taken up construction of 8 reactors at 4 locations namely Tarapur, Kaiga, Rajasthan and Kudankulam. A faster pace of project execution with parallel construction activities in civil, electrical, mechanical and other jobs for reducing the gestation period through mega package contract employing more than 25,000 construction workers have been very successful. The mobile nature of work force poses challenge in ensuring that all of them are adequately trained.

After the completion of 2 units of Tarapur and one unit at Kaiga, at present the workforce at construction sites is about 12,000. While successfully completing projects under construction, NPCIL gained valuable experience in meeting several challenges in Industrial Safety management. Construction safety management indeed is a challenging task due to the dynamic nature of construction activity

coupled with involvement of unskilled, illiterate and mobile work force. Since the projects are located in remote regions of the country the surrounding population involved in construction activities is substantial. These personnel are generally from an agricultural background, speaking and understanding local languages only. This poses additional challenge due to limitation in communication. Construction hazards are rated as eight times more risky than those from manufacturing sector. NPCIL, proactively, has been conceiving, developing and implementing unique safety programs and mechanism to overcome this. The implementation of feedback mechanisms and developing wider appreciation of safety among executing agencies on a continual basis, since the inception of nuclear power programme, has indeed paid rich dividends in achieving higher appreciation of Industrial Safety requirements and effective implementation of the same in NPCIL.

. With strong planning, effective implementation and continual training with focussed safety management a good safety record could be achieved comparable to international level. The average Fatal Accident Frequency Rate (FAFR) in NPCIL during last five years is 0.22 incidents / 1000 employees /year as against an estimated value of 15.8 for Indian Construction Industries. In this context, it is worthwhile to mention that FAFR for construction industry in the US as per data published US Dept. of Labor for the year 2005 is 0.23. However, we are not complacent and efforts to achieve the next level of excellence are being invested on a structured manner. Therefore we need to focus on the following aspects,

- Innovation in the training methodologies to achieve higher effectiveness of training among the contractor employees.
- Developing and implementing Behaviour Based Safety Program to improve orientation of work force towards safety in work.
- Implementation of innovative engineering measures to strengthen the safety requirements at design stages to achieve safe working environment during construction.

- Training and certification, in Industrial Safety requirement, of line managers and others responsible for construction activity essentially to enhance their perception and appreciation for industrial safety.

The role of line managers and safety professionals in preventing the safety-related incidences is quite important. Therefore, it is necessary that safety requirements are assured on regular basis by scrupulous field rounds and the deficiencies identified are attended to promptly. Further, the attributes and requirements to achieve effective management of safety right from the design stage to execution and operation must be identified and addressed appropriately through a structured program. To achieve this prime objective, it is imperative to recognize the important elements of the safety management system and strengthen the same at each stage.

## **2.0 "Key drivers for effective Industrial Safety Management"**

### **2.1 Safety Organisation:**

A well designed safety organisation for contractors, sub-contractors and interface with department is are very essential. Implementation of Safety is a line management function; therefore its ownership lies with them. These line managers are to be backed up by competent persons in Industrial safety that provide expertise and supervision of work environment and equipment such as lifting tool, tackles, scaffolding, ladders etc used in construction. The principles and procedures for effective safety management in NPCIL have been evolved over a period of time and are based on the experience feedback of 170 reactor years of construction. Scrupulous implementation and adherence to the industrial safety procedure and requirements is needed to be observed at all levels as an on-going program. Some of these systems to identify areas of improvement and achieve enhanced industrial safety status are enumerated below:

- Safety surveillance and Safety Related Deficiency Management system
- Area-wise Task Force for enforcing safety at construction Projects

- Contractors Safety surveillance and correction programme
- Entry passes to the work site only after Induction Safety training etc.
- Periodical Safety Audits

Since the concept of mega package contract is implemented for construction activities in industry in general and specifically in NPCIL the interface between the Safety officer of the contractor and departmental Safety organization, for ensuring a regular communication between them, is essential. One of the administrative controls in this regard needs to be that contractor safety professionals functionally report to Head Industrial (Safety), of the department. This will help in implementing safety during work.

Appreciation of Industrial Safety requirements and their implementation takes a priority for all of us. Hence, we must develop and institute procedures, work plans and programs that are implemented with a common understanding of utility and contractor team. In this context, the regulatory requirements are equally important which need to be understood and implemented in clear and unmistakable terms by all concerned including the contractor organization.

## **2.2 Job Hazard Analysis (JHA) and Work Procedures:**

The dynamicity, complexity and parallel activities in construction are unavoidable at times. These activities, though planned, are carried out by the work force which is skilled in the execution of work but lack of awareness of safety requirements overconfidence, complacency, at times, leads to breach in safety requirements. Hence, a regular monitoring and surveillance program along with coaching & mentoring of employees during execution becomes necessary to correct the aberrations in safety implementation. The personnel are to be given required induction training and PEP talks.

Our objective is to ensure safe working conditions to prevent accidents, hence it is necessary to understand and implement proactive control measures at work place prior to execution of the work. Training to the executing team members needs to be imparted on risk management. Therefore, risk assessment/hazard analysis has to be carried out for all significant works. NPCIL has made a good progress in this regard. Generic JHAs have been evolved after Risk Assessment studies for construction and O&M activities. Several workshops have been conducted by NPCIL HQ and Sites. These JHAs need to be further evolved at site and rigorously implemented. I am happy to note that the construction and O&M groups are preparing detailed JHAs for all significant hazardous jobs and the risk management measures, which emerge, are being implemented in the work procedures and supervisory checklists. This will go a long way in further enhancement of industrial safety in our projects and stations.

### **2.3 Safety Training:**

The importance of training cannot be undermined. Over a period of time standard training modules have been evolved. In addition to this Pre Job Briefing and PEP talk also are given to bring in requisite awareness to the contract and departmental employees. However for enhanced effectiveness of training, it is necessary to develop such training modules and methodology in a lucid manner, which can provide the required safety to these personnel. The use of modern pedagogical teaching aids such as audio-visuals, mobile training with will improve the performance of training. I still feel that there is a scope of further improvement in our training methodology. Hence, I suggest that the training to such a large work force should be organized in a more structured and job specific manner through interactive methodology. The workers who demonstrate good safety behavior and practices should be motivated by way of rewards. Enhanced field visit by the line managers and interacting with the workers with the philosophy of **“each one teach one”** will go a long way in strengthening our objective of achieving safety and desired safety culture.

## **2.4 Safety Related Deficiency Management:**

Even with all things in place, while the construction work is in progress; Safety Related Deficiencies (SRD) emerges either due to change in status at work floor or multiple agencies working in parallel. SRD also get generated due to decline in safety culture. It is therefore required that SRDs are detected and corrected promptly on a routine basis. Presently a LAN based system of communicating SRD is in practice in our plants. The system is called “SRD Management System”. In this system, the detected SRD’s are communicated through e-mail and reminders are automatically sent depending upon the severity assigned to the SRD. The safety professionals/safety group is also able to get prompt feed back of corrective actions, which are verified to close the SRD. It is intended that no SRD remains for more than 24 hrs and thus safe work conditions and safety culture would be ensured.

## **2.5 Use of Near Misses and experience feed-backs:**

As could be seen from the various accident dominos, before a serious or fatal accident occurs, we get number of opportunities to correct the unsafe conditions or unsafe practices from the minor accidents or near misses, which occur as a precursor. These need to be recorded, reported and analyzed as this provides immense experience feed backs for improvement. NPCIL has a system at each site to review these feed backs and use the lessons learnt. This is a proactive method to prevent the accident rather than investigating the accidents once they occur. Regular campaigns for sharing in house and outside near miss accidents should be organized. The findings of root causes through analysis of Near Miss Accident (NMA) should be addressed by incorporation in pre job briefing or improvement of control measures. The near miss accident identification and

reporting should further grow as it will provide us with an opportunity to further improve safety and safety culture.

It is very important that the site management and senior people during their field visits encourage individuals to look for the error likely situations and near misses.

## **2.6 Safety Provisions and Personal Protective Equipment (PPE)**

Construction sites are having many types of hazards as explained earlier due to complexity of the work environment. Even after the implementation of the safety requirements through engineering means during design, there would be always residual risk to worker. Thus, as a good safety culture, all workers should be ensured to use the required PPE. At times some workers may feel some inconvenience in using the PPE, but we should scrupulously enforce the use of PPE right from day one and each worker should be made to consider these as last defense in depth to save his life. Broadly these are Safety helmets, Safety belts, Safety shoes, hand gloves, goggles, fall arrester etc. Personal protective equipment should be made available near the work spot for ease of use by workers.

I am happy to note that the use of PPE in our projects has improved to near cent percent. However we should not relax due to changing scenarios in work or manpower on a day to day basis. The monitoring and correction through field visits should continue to be the way of life.

### **2.6 Safety Meetings:**

In order to ensure proper coordination and communication on safety aspects on a periodical basis, it is necessary to have regular exchange of views and experience as given below:

- Daily interaction between Contractors' Safety Officer and departmental Safety in charge.
- Monthly Safety meetings by each Works Manager of the contractor along with his Safety Officer with departmental Safety Group.
- Sectional Safety meetings for the departmental and contractor employees.
- Quarterly Project level Apex Safety Committee meeting.
- Regular experience feed back among various agencies.

In addition to this the oversight of corporate safety organisation on contractor and utility as a peer review mechanism when in place could identify the latent areas of improvement in functioning of the above systems. Recognizing this, oversight by NPCIL HQ Safety group has been strengthened. Several periodic campaigns like cooperative campaigns, peer review processes has been instituted. This has indeed supported the Industrial Safety in our construction projects.

## **2.8 Safety enforcement by line managers:**

In order to achieve practical solutions and active involvement in accident prevention safety has to be integrated with the line function. Accordingly, the line managers should supervise and enforce safety requirements in the works. It is the line functionaries who know a hazard as soon as it is created. He has the power and resources to take an immediate corrective action. Safety personnel should act as a catalyst to enable the line managers to timely remove these hazards and any deficiency in a pro active manner.

## **2.9 Other key drivers.**

In order to enhance the safety standards and safety culture it is imperative that the existing programs and processes in safety implementation is to be pursued religiously. Additionally, the following need to be taken up as a consolidated program.

- a. Evolving and implementing engineering solutions such as safe access to work locations and mechanization
- b. Industrial Safety clauses in contract conditions which are formulated need to be pursued for effective implementation.
- b. Field surveillance through a structured checklist and prompt addressal of deficiencies.
- c. Ensuring administrative control of construction activities through institution of work permits, height pass and other work procedures.
- d. Encouraging the mock exercises by performing model and mock up for complex works.
- g. Certification of line managers in Industrial safety.
- i. Development of a pool of line managers having Industrial Safety diploma as a long term measure bring in still greater appreciation and regard for industrial safety.

### **3.0 Conclusion:**

While concluding my talk on this important topic of construction safety, I would like to refresh you all that each site poses its own unique challenges in terms of industrial safety requirements which have to be tackled by sincerity and professionalism. Modern management and machinery are helpful in achieving these objectives when used in a disciplined way.

I wish this safety and occupational health professional meet a very useful and interactive experience sharing exercise. My best wishes for the success of the meet. I also take this opportunity to convey you all, a safe, successful and Productive New Year 2008.

Jai Hind