Development of disaster risk management plan of a thermal power plant: Spearheading the paradigm shift from disaster management to disaster risk management of NATECH in India

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With global phenomenon like climate change looming large on the horizon, occurrences of extreme events are expected to rise eventually. Rapid urbanisation and the powerful want of globalisation does little to control the exposure of our ‘assets’ to such events, thereby increasing the disaster risks. The quantum of risk rises exponentially if the exposed asset is a critical infrastructure like a nuclear power plant or a thermal power plant which might lead to ‘natural hazard triggered technological disasters’ like that of Fukushima. The damage and loss in such cases is borne not only by the infrastructure in question but also by the community in its immediate surrounding. Management of disasters, which has long been the usual trend, has a very little effectiveness in such tragic scenarios, thus rather than managing disasters, one should manage the disaster risks. Even the Sendai Framework for Disaster Risk Reduction (SFDRR) talks about reduction of the acceptable risks and management of the residual risks. However, for all this to be implemented, one needs to understand and anticipate risks, which is way more than the current practice of risk identification.

The researchers, when provided with the opportunity to develop a disaster management plan for a thermal power plant in India, took cognisance of the priorities of SFDRR embarked on a strategy of disaster risk management and disaster risk reduction rather than mere disaster management. This study elaborates on the strategy adopted during the development of the plan. The first step was to conduct field survey and collect primary geo-technical and meteorological data. Content analysis of hazard maps were done to identify the possible hazards which can affect the critical infrastructure. Earthquake, cyclone and technological hazards were identified as the main probable hazards. The methodology developed by Cornell (1968) for Probabilistic Seismic Hazard Assessment (PSHA) was applied for the estimation of seismic hazard for 10% and 2% probability of exceedence in 50 years. In this method, seismogenic zones were delineated and then seismicity parameters were estimated using the decluttered earthquake catalog and finally the ground motion was estimated using different ground motion prediction equations (GMPE). In addition to this, probable intensities of earthquakes were evaluated according to the seismic zonation and the corresponding grade of damage was estimated, taking into account the typology of building construction. To elucidate assessment of cyclonic winds and rainfall over the critical infrastructure an experiment was designed in which 9 major cyclonic systems occurring in the region in last ten years were considered. These cyclonic events were numerically simulated around the geographical location of the infrastructure. Weather Research Forecasting (WRF) model was used to carry out the simulations. As a result, the maximum windspeed and the maximum rainfall was obtained. In addition to these natural hazards, content analysis was done to enumerate all the possible technological hazards and Maximum Credible Accident Analysis (MCAA) was performed. These steps were integral in assessing the hazards and the outputs of these simulations were fed as inputs of the Quick Risk Estimation (QRE) tool developed by UNISDR. Based on the outputs of the QRE tool, the disaster risk management plan was developed.

This particular study tries to identify and assess the hazards, vulnerabilities and capacities and estimates

the risks which is then used to develop risk management plans. Offcourse, management of extreme events through institutionalisation of Incident Response System (IRS) is a part of the plan but it forms only a part of it. Thus, in a way, this plan marks the first step taken towards disaster risk management of critical infrastructures in India; a step towards the management of risks of technological disasters due to natural hazards.

Keywords: Disaster risk management, Disaster risk reduction, Weather Research Forecasting, Ground Motion Prediction Equation, Quick Risk Estimation Tool

