Research on power emergency caused by different types of disasters

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Abstract. Electrical safety is vital for coordinate development of social economic and people's life, so, power emergency management is must be carry out fully. In this paper, the significance of the power emergency rescue and power rescue types of emergencies are introduced. Besides, analyzed the current problems of the power emergency rescue, put forward the corresponding strategies to improve the power industry emergency response system.

1. Introduction

In recent years, the demand for electricity is even more urgent with rapid economic development in China, power grid construction and operation management are gradually improved, the level of security and stability of the power system also greatly improved，the number of power accidents decreased significantly. But sometimes when the event of natural disasters happened, power accident can not be completely avoided, the serious consequences can not be ignored. Establish a comprehensive power security incidents emergency system can ensure grid accidents are processed as quickly as possible, restore power in time and reduce losses of society and the people due to power outages[1]. However, there are still some problems in the current power security incidents emergency system, faced with emergency power grid accident, pre-disaster prevention, emergency rescue during the disaster and recovery, reconstruction after disaster are not perfect. in recent years, lots of regional power grid large-scale power outage events caused by the strong sandstorm in northern China, snowstorm in some areas of Xinjiang, super typhoon hit in southeast coastal areas, the severe snow and ice storms in the southern parts and earthquake in wenchuan and yushu, all remind us to establish a more comprehensive emergency response system from the practical point of view[2]. establish emergency mechanisms which government, power companies and users all participate in, and place the mechanisms under the respective policy constraints, regularly carry out emergency drills, making it a strong complement to prevention and control measures of the power system, in order to process large area power outage properly, effectively and rapidly, minimize the impact and losses caused blackouts.

2. The main problem of grid accident emergency response system

In response to the power system blackouts, our government has formulated a series of regulations, standards and emergency plans to provide guidance for the emergency power system in recent years. However, the current grid emergency system also has the following problems:

2.1 Poor organization and lack of systematic

China has not set up an independent permanent crisis management coordination agency. After each disaster, set up a temporary working group to deal with the crisis of the country or the province according to the extent of the disaster. This temporary leading group has three drawbacks[3]: does not have continuity, the experience in crisis management can not effectively be retained; crisis management requires cooperation among government agencies, the temporary group needs a lot time to coordinate with the relevant agencies every time; interim leadership group lacks an effective

crisis management plan.

2.2 No effective legal constraints

In recent years, our government makes a number of law about city public security combined with reality. Such as "People's Republic of China Production Safety Law", "destructive earthquake emergency regulations", "People's Republic of China Earthquake Disaster Mitigation Act", "Emergency Response Law" and other laws and regulations about disaster preparedness and mitigation. However, from the point of power system security, China still lacks a basic Law concerning the safe operation of the power system. Making such a Law and regulation can play a guiding role in pre-disaster prevention, emergency response during the disaster, and post-disaster recovery, reconstruction for power system, each power sector act in accordance with legal requirements and In collaboration with various departments in each period, make all kinds of work carry out according to the law efficiently and fast.

2.3 Imperfect emergency information platform

Although the power enterprises establish a corresponding information reporting system, which basically rely on the power company's command platform, the level is not high. In addition, the linkage means between power company and community is not strong enough, sharing of information resources is relatively weak, and in the event of sudden public accidents, mostly based sector as a unit to be reported progressively, so the lack of fast and effective communication channels caused that the information can not be unified mobilization and rapid summary at the critical moment. Emergency response capacity is inadequate, in relation to the public or other units of power incidents, such as power outages and important user blackouts and major equipment accidents, the starting and implementation with emergency response plan is generally still limited to the enterprise, there is no better social interaction.

2.4 Inadequate staff training

In our country power emergency drills focus on building power emergency facilities and emergency systems, such as the State Grid Corporation and China Southern Power Grid establish comprehensive emergency plans, specific contingency plans and on-site emergency plans for different power emergency scenarios, but these plans are based on department, Factors related to people involved in the body's are still lacking. Although emergency drills also attaches great importance to improve the quality of personnel involved in the exercise, but there are still some issues, such as limited participants in emergency drills (mainly the power sector employees), low public participation initiative[4]. Not enough attention to reserve and maintenance for emergency supplies, emergency drills and staff training will be in the emergency comes by surprise, overwhelmed.

2.5 Paid insufficient attention to nuclear safety emergency

China is still lagging behind compared to Europe and other countries in the nuclear emergency response work due to our nuclear industry base is still relatively weak. Nuclear emergency response has not been fully carried out due to lack of industry base, but The State Council attaches great importance to the development of China's nuclear power industry, have made the major decisions that introduce foreign third-generation nuclear power technology and form the State Nuclear Power Technology Corporation, which is responsible for organizing and implementing the introduction, digestion, absorption and re-innovation work of third-generation nuclear power technology. State Nuclear Power Technology Corporation was established in 2007, the current management of the nuclear power is still being perfected. Driven by the demand, in the future of nuclear power, China will gradually expand the industrial scale, nuclear safety emergency contradiction will gradually prominent.

3. Power incidents classification and Countermeasures

3.1 Power incidents classification

Grid Emergency Management includes response and disposal of the power grid blackouts events due to major power production safety accidents, serious natural disasters, power facilities suffered serious damage, the ongoing crisis of power supply, which have a significant impact on national security, social stability and people's lives and property. 2009 China State Electricity Regulatory Commission formulate "power emergency plan of universal norms" and "power security emergency response drills of universal norms" and a series of the specification of power emergency system, the power industry accidents are divided into three categories: natural disasters, accidents disasters, and social security incidents[5,6].

Natural disasters including meteorological disasters, volcanic earthquakes, geological disasters, marine disasters, forest fires and major biological disasters; accidents disasters including major transportation accidents, mining, construction and other major accidents as well as fire, explosion, nuclear radiation , environmental pollution, public health events; social security incidents is some social events which are sudden and cause or threaten to cause mass casualties, severe property damage and destruction of social life, need government to spend a lot of national resources to disposal.

3.2 Different types of disaster response

Different types of disasters have different hazards on the grid, whether it is prevention, treatment or post-accident restoration of power all should be considered, especially the establishment of the power industry emergency response system should cover natural disasters, accidents disasters, social security incidents. This paper analyzes the types of accidents, and proposes some comments and suggestions to improve power industry emergency response system.

3.2.1 focus on prevention, emergency response system specification introduced as soon as possible

Prevention is one of the main principles of power system emergency management, effective prevention can reduce the likelihood of power emergencies. But many China's power supply enterprises do not pay attention to the prevention of a power failure, resulting in avoidable power incidents occur, which bring immeasurable loss. In addition, frequency, content, methods, means and evaluation and so on in emergency drills have no standard due to that the current emergency drills have no clear specification[7], which are carried out by the sectors on their own, drill patterns vary widely. Regulating each emergency drill is not easy, but Electricity Regulatory Commission regulates a large area blackout drill from administrative duties, and asks government, power companies, power plants, users and other parties participate in the drill, which is more feasible; therefore emergency drills specification is based on blackouts and multi-stakeholder.

3.2.2 establish and improve emergency management organization system

The current establishment of contingency plans of power enterprises is not unified, which causes classification of emergencies and requirements of comprehensive, specific, on-site disposal plan is not uniform, as a result, drill content is inconsistent. Propose to regulate category of power accidents and the catalogs needed emergency plans, in order to standardize emergency drills. Organize to establish emergency response mechanism between the grass-roots units, departments (center) and the higher aid agencies affiliated to the companies, clear emergency management authorities, cooperation sectors, the participating units and their responsibilities, division of labor in all parts to achieve joint contingency plans, emergency information linkage, emergency teams linkage, emergency supplies linkage. Actively promote the emergency commodity resource integration, establish emergency resources reserve system to check all kinds of emergency response resources on a regular basis, do reserves and management of spare parts and production equipment; and strengthen the dynamic management of material reserves, replenish and update in time to ensure that emergency resources in a complete state. Improve the emergency plan system covering

the entire enterprise and the region, improve emergency management system of geographical division management, hierarchical professional management and logistics management, and strengthen emergency management structures and the rescue team; combined with the actual situation to build a unified command, reflecting the sensitivity, coordinated, orderly and efficient operation of power emergency management mechanism; perfect the mechanisms including of power emergency prevention early warning, information reporting, emergency response, reconstruction, Investigation and assessment. Establish and improve system of rewards and penalties about the power of public emergencies prevention and disposal, including persons responsible for accountability who do not perform their duties and caused the situation to expand, serious consequences, prevention and disposal sectors and individuals to carry out good reward.

3.2.3 make emergency training and drills to improve the overall quality of emergency personnel

Many power-related departments have recognized the importance of power emergency rescue, and formulated appropriate emergency plan based on the actual situation of the sector. However, for contingency plans drills, many authorities have not done, the situation of plan drill into a combat is not uncommon in the process of power emergency. Strengthen emergency response, organize full-time or part-time professional emergency response team combined with the actual, improve technology and equipment, and strengthen practical exercise, improve emergency response capabilities. strengthen the management of emergency training, bring emergency training into the training programs and the annual training plan, develop training programs and specific requirements, train people using the means of combining theory and practical operation. Training should be combined with practical work and avoid going through the motions, new posts production personnel should be trained of relevant emergency knowledge[8]. Emergency plans should be the primary training, especially let leading cadres at all levels and the staff recognize the importance of emergency management, strengthen the training to enable staff at all levels are familiar with and master the emergency plan, emergency start condition, contingency procedures of executing, improve emergency response capabilities. Production line department (Centre) should regularly organize production safety incidents emergency response drills for earthquakes, wind, fire, equipment accident, station blackout and other accidents. Emergency response drills can improve the ability to deal with the accident of emergency response agencies, emergency response teams and emergency personnel, find deficiencies and problems during the drills in order to improve the integrity and the effectiveness of the drills.

3.2.4 set up emergency system information platform

Information is core resources to achieve coordinated emergency, but also the key to ensure the effect of the emergency decision-making and emergency response. Today, information-sharing mechanisms of power emergency management is still not perfect, which lacks science in the emergency information collection, transfer and sharing. Set up an emergency command platform for information and power emergency communications security and other infrastructure, form the power emergency command system of meeting the conditions, integral structure and uniform standards to achieve monitoring in real-time, early warning and integrated judging. After power emergency command center is completed, regional and provincial power emergency command center should be constructed to improve the overall level of supervision and emergency command ability.

4. Conclusion

With the continuous growth of demand for power and China's rapid economic development, electrical safety faces with more severe challenges. Ensuring power security work to lay a solid foundation for China's healthy economic development, social stability and people's happiness life, has become a serious problem of the power sector. This paper analyzed the problems of power emergency response system and accident classification, and proposes some corresponding recommendations and principles for improving emergency response system, which is of great significance for emergency response playing a bigger role in the power accident treatment.

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