

Chaoyang city after 10 kv power distribution line fault trip

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Abstract. 10 kv distribution network directly related to the user, the reliable power supply capacity and quality of power supply is not only the direct embodiment of the electric power enterprise economic benefits, and affect the safe and stable operation of the power grid. Electrical fault characteristics generally is a little difficult to find fault, fault handling easily, so the key to 10 kv line fault tripping happens can quickly find the point of failure. This article in view of the practical operation of chaoyang city 10 kv power distribution network and the statistical analysis of the characteristics of failure of distribution line after tripping quickly find are summarized, analyzed and discussed.

Introduction

Failure happens, distribution according to the dispatcher substation personnel the protection movement situation report, control loading conditions by which lines to careful analysis of the cause of the problem, at the same time see the chaoyang city 10 kv power distribution system diagram, the chaoyang city single line diagram for 10 kv power distribution lines to predict failure location, the fault line protection movement situation and may inform the area of the failure of the power distribution shipment inspection work area, distribution shipment inspection work area according to the distribution scheduling instruction targeted malfunction, will get twice the result with half the effort.

According to the relay protection movement situation forecast

Failure in different locations of the line, the relay protection movement is not the same. Chaoyang city 10 kv power distribution system adopts two sections of over-current protection, over current period I to no time current instantaneous fault protection, over current section III for the set time limit over current protection, current instantaneous fault protection action trip: electricity flow off the protection scope of protection, the maximum for the system operation mode under the short circuit occurs, protection scope biggest, accounted for about 50% of line length. And when the lines are in a minimum operation mode, minimum scope of protection, accounted for 15% of line 2-20%. Current instantaneous fault protection device trip, therefore, is described in line the front point of failure (near side of transformer substation)

Over-current protection tripping action: over-current protection scope of protection of 100% of the protected line. Usually over-current protection device has a time delay relay at the same time, when used with quick break protection device, usually in line after the period of the event of a failure to trip.

Current instantaneous fault protection and over-current protection tripping action: at the same time, the general description point of failure in quick break protection scope of common with over-current protection, fault point mostly located in the line in the middle.

So, 10 kv distribution line occurred after the trip, to find the relay protection movement situation in a timely manner. According to the relay protection device, types and characteristics of the movement to locate fault nature and scope. So it can greatly improve the quickness of malfunction, reduce outage time.

According to the situation of line path prediction

Urban center area mostly wire or steel tube pole overhead insulated cable line, line short path, suburban area line path more than grew up as the overhead bare wires, differences, branch lines, section lines in the industrial zone, the fog weather or light rain weather in the spring and autumn season, the line tripping accident occurs, should consider above all is the insulator pollution flashover or wires and discharge phenomenon, especially now the fog haze weather is more, to focus on pollution area line.

Line path in the trees, has the wind the weather in summer and fall, the line tripping accident occurs, is caused by the trees should be considered first, focus on forest, trees line for inspection.

Line path from building resident area, highway construction area, in good weather conditions, the first thing to consider is the construction of external force damage, check when should pay special attention to the situation of the construction area, damage to 10 kv distribution network is mainly manifested in two aspects: one is the base excavation and underground cable laying, secondly, the construction machinery and material ultra-high super-long touch live parts or tower. Four new variable such as 10 kv plastic wire near the development zone, the spring has hook off hook machine three cable construction, when the plastic line tripping, we should first judge is external force damage.

According to the line insulation level observation

Is the weakest part of the whole cable line insulation terminal head, junction in the middle. So the whole cable line tripping fault occurs, first check whether terminal head, intermediate joints breakdown. Overhead insulated wires and overhead bare wires of line, first consider the overhead bare wires line, because naked wire insulation level is relatively low, when the line fall foreign body, windy weather and easy to cause short circuit, in the winter because the weather was cold in the north may be because the wire sag is too small, too much stress line break, cause the line tripping. Summer may because sag is too large, and windy weather caused short circuit.

According to the line customers distribution and electricity consumption forecast

Lines if pick up has the electricity enterprises such as factories, mining and metallurgy, inspection should start from these companies, because the corporate power load is heavier, prone to failure, such as munch substation with cast steel line 1, xiangyang substation with tyre line 4 load is heavier, especially in the summer, hot weather reduce wire carrying capacity, should pay special attention to strengthening load monitoring.

Master the above technical measures to make distribution shipment inspection work area to find fault, targeted to eliminate the cause of the problem, will greatly improve the work efficiency and shorten the time required for troubleshooting.

The reasonable organization measures

Failure distribution after shipment inspection work area should be based on the length of the line, path and the weather, the time when the accident happened such as sure to malfunction. Short circuit, circuit path convenient transportation can be less; Long lines, the line path complex will arrange more workers. Failure in good weather, during the day can be less personnel; Failure of the bad weather, should arrange more staff at night.

To malfunction personnel must keep communication clear, has good transport, in order to find the accurate point of failure, can quickly and work, work, head of the class members, scheduling contact, end the troubleshooting as soon as possible, into the accident repair.

Block search, choose reasonable distribution network control class line in the middle of the switch, inform distribution transport work area to open the switch, and then try to send, if sending good fault in the middle of the line switch back, notice with inspection work area to line back charged to check line, if you try to send no success, illustrate the pull switch line fault early, notice with inspection work area to line pull switch malfunction recently, with the contact switch can take out the switch after the load, thus greatly reducing the loss of the load.

The cable line (usually stop reclosing) patrol to obvious point of failure, must carry on the related experiment of cable, confirmation of qualified cable, can send.

Contingency plans, conduct accident exercises

Distribution network control class contingency plans, and distribution shipment inspection work area often develop anti-accident exercises, and targeted fault, the search point prediction techniques to shift employees, processing method for training. Distribution network and distribution regulation of class shipment inspection work area QiangXiuBan group members to memorize chaoyang city 76 normally open switch location. Private users, dual power supply in chaoyang city were regular training and sign the scheduling agreement, both sides involved is clear responsibility, user substation station equipment failure, the user substation attendant must be reported in the first place to distribution scheduling in order to rapidly process faults.

Every time after handling the accident, timely summary, accumulate experience, distribution network control class in every Friday security activities were analyzed, and thus improve the employees' capability and cooperative engagement capability, so that when the accident happened, we will be able to play the role of each employee, troubleshooting of speed will be faster and faster, thus reducing the outage time of users, improve power supply reliability. Develop and perfect the accident emergency plan, often anti-accident exercise activities, is the important guarantee of excellent fault repair work done.

To strengthen the maintenance and operation management of distribution line

With inspection work area regularly for distribution transformers, power distribution lines on the insulator, lightning arrester, such as equipment, patrol, inspection on a regular basis, timely

processing equipment defects, improve the level of operation. For column oiling switch, energy-intensive with early operation of old equipment, such as changeable phased out. Distribution circuit mounted on the column on the vacuum switch, narrowing the scope of the fault, reduce the electricity blackout area and time and is beneficial to quickly find fault. Have planned to tour line, equipment, load monitoring on a regular basis. Especially the peak load, pay close attention to feeder, with the changeable load condition, timely adjustment of load balancing, avoid joint, such as connecting clamp for overload fever burned. Be done if the above work, make general defects in a timely manner to eliminate, will greatly reduce the distribution network fault. Strengthening operation personnel of technology business training, improve the comprehensive quality, high efficiency will be greatly.

Summary

Chaoyang city 10 kv distribution network for the initiative in chaoyang, the twin towers and industrial and agricultural production and people's living power supply tasks, including party and government organs, news propaganda, schools, hospitals, railway stations, airports, tyre plant heavy users, such as the safety of the power distribution network operation or not, a direct impact on the user's safety production and harmony and stability, is also a test of power supply enterprise high quality service level is one of the most important link. So we should pay attention to the management of distribution network, to keep the health level of distribution network, constantly sum up experience in practice, improve the distribution network accident and fault handling ability, in the case of 10 kv distribution line tripping found fault location and reason of the earlier, eliminate accident hidden danger, narrowing the scope of forced outage, the sooner you restore power, can reduce power supply customers the economic losses of both sides so as to improve the quality of electric power industry service levels.

References

- [1] Sun Guokai tian wen. Power grid relay protection principle Beijing: China power press, 2008
- [2] zhi-hui Yang electrical operation and management China electric power press, 2005
- [3] the chens Helen bao power supply and distribution system and its electrical equipment China hydropower press, 2004