

Analysis of the Ice-snow and Frozen Disasters in Hohhot Grid On November 9, 2012

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Abstract—on November 9, 2012 the Hohhot region of sleet process lasted about 14 hours, which caused harm to the local city distribution network. The local power grid transmission line icing history occurred in the city of northwest side of Mount Dazing foothills northeast and southwest Huo Zai Gou, Naho Wetland line. The city development influences the local meteorological conditions. after entering in twenty-first Centuries, Hohhot have rapid develop, but the city terrain change also brings the corresponding effect. Due to the intereffect of extreme weather and city, the average precipitation is low in the north in particular city area, taking into account the local area with low wind speed, high temperature, air pollution, artificial water, city greening, terrain modification factors exist, and cold rain and snow caused by the fault and the probability of disaster; city planning and construction standards lower city grid resistance is low cryogenic freezing rain and snow disasters.

Keywords-component; Ice-snow; frozen; grid

I. INTRODUCTION

In November 9, 2012 the Hohhot region of sleet lasted about 14 hours, causing harm to the local city distribution network. At night the temperature is -5°C to 1°C . Urban distribution network line icing phenomenon exists generally, maximum ice cover diameter is 50 ~ 60mm. Icing caused 38 10KV line trip within the city, including 25 times successful reclosing, 13 times reclosing unsuccessful. Part 400 volt /0.22 volt lines for carrying communication optical cable, the non electric load, or being external damaged, leading to pour and rod broken.

TABLE I. THE TRIP REASON

The trip reason	Tree damage	icing	flashover	external damage
The tripping frequency	16	10	11	1

II. THE FEATURE

A. No Continuous Precipitation Process

The ice-snow from 16:00 (local time) precipitation process begins to first failure of the 20:00 (local time). After 3 days without a continuous precipitation process. Comparing to ice-snow and frozen disaster in the south area of common generally continuous precipitation process. Maintaining the Integrity of the Specifications.

B. Cryogenic Freezing Rain and Snow Disaster in Southern Ice Characteristics and Typical Differences

At the same time the local transmission line does not appear serious icing phenomenon. Place ice in large area distribution lines, but not the emergence of a large number of inverted poles, pole break phenomenon. The range of only 2 lines in the low voltage distribution line down rod, rod fracture, after the scene investigation: a communication cable common channel, resulting in ice after the occurrence of cement concrete rod load serious overload; another for suburban lines, located along the road, many more points by heavy vehicle impact, cement concrete pole is seriously damaged, because the local block failed to replace.

From the precipitation process began to a large area of icing caused the first trip, only a difference of 4 hours; from the precipitation process to ice finally end with failure, only a difference of 13 hours. 2008 in Hunan power grid ice coating to a large number of line accident, time is more than 24 hours.

The ice characteristics different from typical ice characteristics. This occurred during icing ice appearance as plush sleeve barrel, snow melting like glue, texture, dirty, dripping curve waterproof, ice prevention measures the effect is not obvious, the morning of the 10 day the weather cleared in the sliding surface line.

C. With the Local Line Icing Occurs Don't Conform to the Law

The local power grid transmission line icing history occurred in the city of northwest side of Mount Dazing foothills northeast and southwest Hugo Zhao Gou, Naho Wetland line. More than two areas belong to typical ice topography: the line to cross and repeated across the valley, the region has reservoir, forest, the humidity is higher than the other areas. The place most of the city, only 2 in the city 2 outside the ring, and the transmission line without serious icing, not due to icing caused the transmission line fault reclosing unsuccessful.

D. Snow and Tree Pest More Harm

In the cold rain and snow in the process of falling trees, broken wire or cause a short circuit fault accounted for over 42% of the total.

E. The Universal Line Dancing Short-Circuit Phenomenon Did Not Occur During Ice Melting

To November 10th seven ten last fault disconnection fault occurs, the short-circuit phenomenon caused by galloping generated scale without the cold rain and snow process line.

III. METEOROLOGICAL CONDITIONS IN HOHHOT AREA

Hohhot city is located in east longitude $110^{\circ} 46' - 120^{\circ} 10'$, north latitude $39^{\circ} 35' - 40^{\circ} 51'$, a total area of 17224km². The Hohhot city northeast, southwest low, with an average altitude of about 1000 meters, is the spring and autumn short, the climate characteristics of the temperature difference between day and night. The average annual rainfall of about 290 mm, less precipitation, extreme precipitation events is less, the average years of extreme heavy precipitation event 1.

IV. INFLUENCE OF REGIONAL CLIMATE CHARACTERISTICS OF DISASTER

From November 9, 2012 to 10 during the day caused by extreme weather events in the local power grid fault and snow events during the last 30 years are rare.

Inner Mongolia Climate Center Engineer Di Ruiqi meteorological experts put forward some views on climate characteristics of Hohhot area from 1981 to 1996, and the Chinese Academy of Sciences Institute of earth environment Zhao Jingbo in studies of the effects of El Nino / La Nina climate characteristics of Inner Mongolia area evolution point of view to explain the evolution of local climate characteristics for disaster influence constructive:

A.

The Hohhot is located in central Inner Mongolia, which is the capital of the Inner Mongolia Autonomous Region and the major industrial city, after the liberation, especially since entering 80 age, industry, transportation and business rapid development, population increase, buildings and roads is increasing, at the same time, with the development of industry, transportation, factories and vehicles produce a lot of smoke and gas into the atmosphere, pollution the city air, these factors cause the change of city climate. Mainly embodied in: there is a strong inversion layer above the city, and urban and suburban compared, high temperatures, low humidity, dust, wind speed according to the old time is short. With the expansion of city size, these features in the aggravated, serious deterioration of ecological environment in Hohhot.

B.

Extreme weather effect. The IPCC fourth assessment report of the global warming, the global increase in extreme precipitation events, Inner Mongolia area is one of the most active regional response to global climate change. Most of Inner Mongolia is located in arid and semi-arid area is sensitive to climate change area, also the ecological environment is extremely fragile area, precipitation and interregional variability. With climate warming, water

circulation is accelerated further; the temporal and spatial distribution of precipitation may be more uneven.

C.

The city development influences the local meteorological conditions. Since entering in twenty-first Centuries, the Hohhot has rapid development, but the city terrain change also brings the corresponding effect. Change of underlying surface under the city is one cause of increased urban heat island effect. Because of city underlying surface is composed of artificial structures by the asphalt road, building wall heat absorption fast, fast temperature rise, the underlying surface that strongly absorbs solar radiation energy, make the temperature rise sharply. At the same time as the concrete, asphalt road, no water seepage, increased precipitation, extremely easy to cause the city within the city, precipitation intensified or humidity is much higher than the suburbs.

D.

Before this review area of city planning, there is a view that later in the city layout, the preserve and increase the green and the trees and artificial water bodies, to reduce the effect of urban heat island effect, but increased humidity precipitation process within the city limits to rise.

V. ANALYSIS

The above analysis shows that:

A. *The Disaster Will Occur Sometimes*

Due to the combined effects of extreme weather and city, the average precipitation is low in the north in particular city area, taking into account the local area with low wind speed, high temperature, air pollution, artificial water, city greening, terrain modification factors exist, and cold rain and snow caused by the fault and the probability of disaster.

B. *The Resistance Should Grown Up*

City planning and construction standards lower city grid resistance is low cryogenic freezing rain and snow disasters. The above fault 80% occur in Hohhot area belongs to the line channel invasion caused the fault trees, such as lodging, non electric cable common channel, the collision of the vehicle.

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Although the cold rain and snow on November 9, 2012 to 10 in Hohhot area caused power failure phenomenon, which belong to the individual phenomenon of extreme weather, but it did not cause damage to the network subject. In view of the main disaster factors will exist for a long time, in conditions similar to northern city may still occur in the same disaster, for extreme weather should increase the degree of attention, especially to further strengthen the City Industrial Park, power grid meteorological, micro study meteorological point should be. In the process of city development, how in the planning process, coordination and optimization of various aspects of the use of resources, improve the overall ability to resist disasters, it is worth attention, change the

shared channel, channel of city planning and construction mix traditional habits imminent, should try to avoid the single system disaster spread to other system

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