

## Ensuring Reliability of External Power at Hamaoka Nuclear Power Station (Overview)

Following a directive from the Ministry of Economy, Trade and Industry's Nuclear and Industrial Safety Agency, Chubu Electric Power has summarized its plan for ensuring the reliability of external power at Hamaoka Nuclear Power Station and today submitted its report to the Nuclear and Industrial Safety Agency. (The agency's directive was issued in light of the loss of external power at the Higashidori Nuclear Power Station of Tohoku Electric Power Co., Inc. and the Rokkasho Reprocessing Plant of Japan Nuclear Fuel Limited due to an earthquake on April 7, 2011 off the coast of Miyagi Prefecture.) An overview is given below.

### 1. Analysis and evaluation of power system supply reliability that could impact the electric power supply to Hamaoka Nuclear Power Station

#### (1) Electric power supply system structure

Chubu Electric Power's power system is built around 500 kV lines (the highest voltage class); the major 500 kV lines operate as a loop to enhance supply reliability.

The power supply system to Hamaoka Nuclear Power Station has a total of three routes and six lines: the 500 kV Hamaoka Trunk Line (two circuits), which is the 500 kV line to Sunen Substation; the 500 kV Daini-Hamaoka Trunk Line (two circuits), which is the 500 kV line to the Shizuoka Substation; and the 275 kV Hamaoka Sunen Line (two circuits), which is the 275 kV line to Sunen Substation.

All three of these routes and six circuits can supply external power to Hamaoka Nuclear Power Station, Reactors No. 3 and 4. In addition, two of these routes (the 500 kV Hamaoka Trunk Line and 500 kV Daini-Hamaoka Trunk Line) and their four circuits can supply external power to Reactor No. 5.

Therefore, the electric power supply system to Hamaoka Nuclear Power Station is highly reliable.

#### (2) Analysis and evaluation of power system supply reliability

An analysis and evaluation were conducted on power system supply reliability in the event of the following three scenarios.

##### (1) Extreme case (extremely unlikely case)

A complete power outage at a substation connected to Hamaoka Nuclear Power Station, or another bottleneck substation (one substation)

##### (2) Severe case (unlikely case)

An accident at a generating line at a substation connected to Hamaoka Nuclear Power Station, or another bottleneck substation (one voltage class at one substation suffers a complete outage)

##### (3) Standard case

One transmission line route gets cut off

The results show that in each scenario, the power system supplying Reactors No. 3, 4 and 5 would be ensured, and therefore the power systems to Reactors No. 3, 4 and 5 were judged to be providing sufficient supply reliability.

### 2. Connecting all circuits of multiple power lines to each reactor

Each reactor at Hamaoka Nuclear Power Station has the electric power supply system structure described in 1.(1) above and is designed to satisfy the requirement in the safety regulations that "external power systems of nuclear power stations must be designed so that the station is connected to the power system by at least two transmission lines."

However, to help enhance the reliability of the power supply to each reactor at the nuclear power station, we have decided, as based on the directive, to connect all transmission lines for multiple power lines to each reactor so that they can provide power.

Specifically, we will set up an on-grounds power source circuit so that all of Reactor No. 5's 6.9 kV emergency generating lines can receive power from the 275 kV transmission line. We will be studying the details hereafter. (Scheduled for completion at end of FY2013)

### 3. Evaluation of seismic resistance, etc. of power line transmission towers, and countermeasures

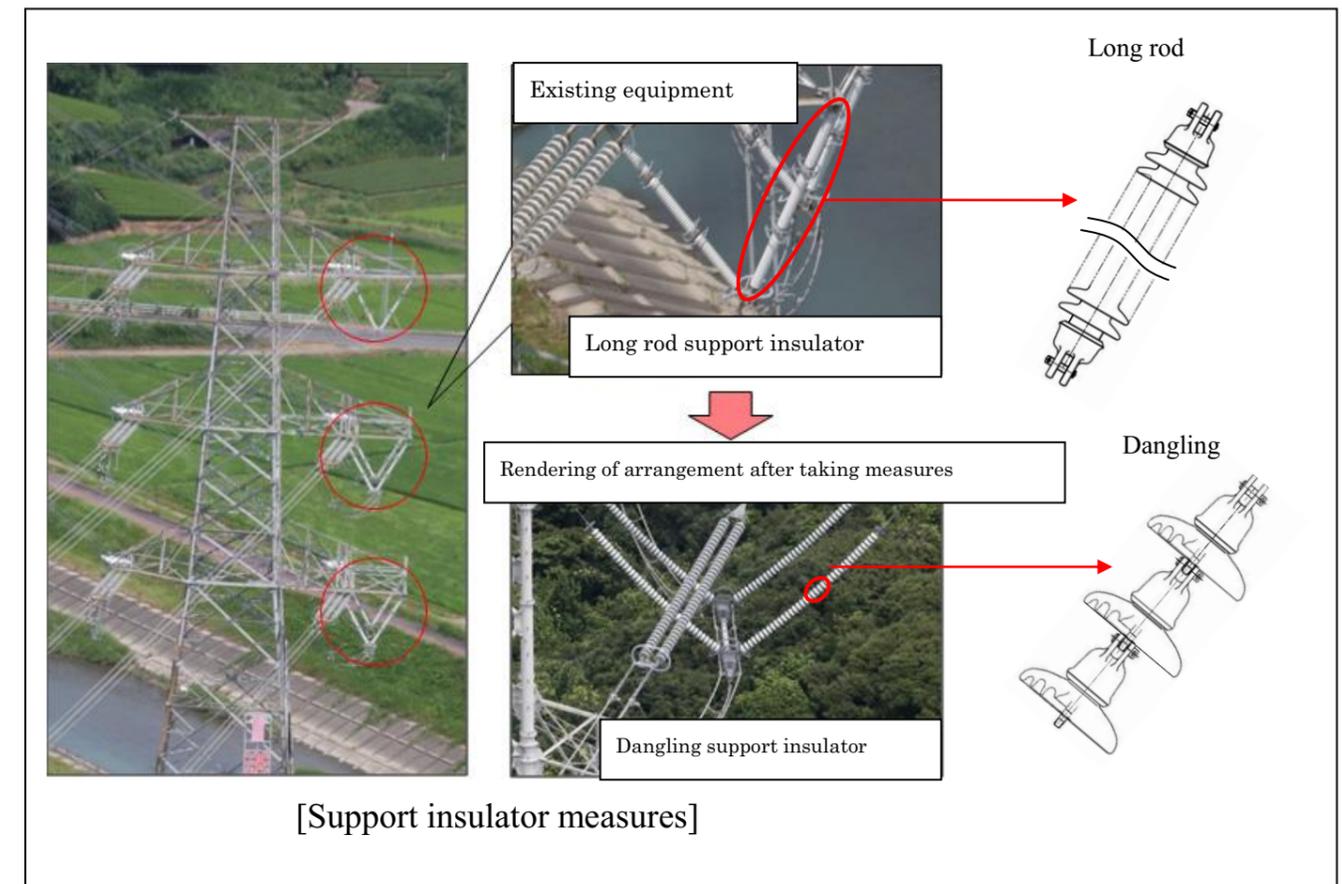
Japan's transmission towers, which were designed for wind load, have sufficient seismic resistance, and none of them have collapsed as a result of seismic motion during major earthquakes, including the Great East Japan Earthquake of March 11, 2011. Therefore, we have judged that our transmission towers designed for wind load, including the transmission lines that supply power to Hamaoka Nuclear Power Station, are sufficiently safe against seismic motion.

However, in light of the fact that transmission problems occurred because of breakage of long rod support insulators during the Great East Japan Earthquake, we have decided to replace the long rod support insulators with dangling support insulators so that similar transmission problems do not occur on transmission lines supplying power to Hamaoka Nuclear Power Station. (Scheduled for completion at end of 2011)

Our judgment is that there is no problem at this time with foundation stability. Because there is a large embankment in one area near a transmission tower, we will promptly confirm the stability of this embankment to evaluate its impact on the tower. (Scheduled for completion at end of June 2011)

Number of long rod support insulators to be addressed

Transmission line supplying power to Hamaoka Nuclear Power Station	Towers affected
275 kV Hamaoka Sunen Line	9
500 kV Hamaoka Trunk Line	0
500 kV Daini-Hamaoka Trunk Line	0



[Support insulator measures]

#### 4. Tsunami impact prevention measures at switching stations, etc.

We are currently implementing emergency safety measures at Hamaoka Nuclear Power Station in accordance with the March 30, 2011 directive of the Minister of Economy, Trade and Industry, and believe that we have ensured the reliability of the power source necessary for cooling each reactor with power from emergency generators that are already in place. However, in accordance with the directive, we have considered countermeasures necessary to further improve the reliability of external power.

During this consideration, in light of the situation at Tokyo Electric Power Co., Inc.'s Fukushima Daiichi Nuclear Power Station, we anticipated waters rising to T.P. + 15 m on the power station grounds and studied countermeasures. Our study revealed that although our 500 kV switching station was located high up at T.P. + 25 m, the startup transformers and other accessory equipment for supplying external power from the 500 kV switching station to Reactors No. 3, 4 and 5 are on the same level as the reactor buildings (T.P. + 6 m for Nos. 3 and 4 and T.P. + 8 m for No. 5), and therefore there is a risk of function loss due to flooding. Therefore, it was decided to place a new transformer on a high location close to the 500 kV switching station so that external power could be received without depending on the startup transformer. (Scheduled for completion at end of FY2013)

