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**Panel on Security**

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**Daya Bay Nuclear Power Station Notification Mechanism**

**Purpose**

This paper summarizes relevant discussions of the Panel on Security ("the Panel") on the notification mechanism and contingency plan of the Hong Kong Special Administrative Region ("HKSAR") in the event of a nuclear incident at Daya Bay Nuclear Power Station ("DBNPS").

**Background**

Daya Bay Nuclear Power Station

2. DBNPS, which includes Guangdong Nuclear Power Station ("GNPS") and Lingao Nuclear Power Station ("LNPS"), is located at Daya Bay about 50 km north-east of the Hong Kong city centre. GNPS is owned by the Guangdong Nuclear Power Joint Venture Company Limited ("GNPJVC"), with a 75/25 joint venture between the Guangdong Nuclear Investment Company Limited ("GNIC") and the Hong Kong Nuclear Investment Company Limited ("HKNIC"). HKNIC is a wholly owned subsidiary of China Light & Power Holdings Limited ("CLP"). CLP is also a shareholder of the Daya Bay Nuclear Power Operations and Management Co Ltd ("DNMC") which is responsible for the management and operation of GNPS. GNIC, as the majority shareholder of DNMC, oversees its daily operation. About 70% of GNPS's electricity output is supplied to Hong Kong. The output of LNPS is entirely supplied to Guangdong Province.

3. According to the Administration, GNPS comprises two French-designed pressurized water reactors which have an excellent safety record world-wide. Each reactor is protected by three barriers to prevent the release of radioactive

material from the core. In addition, there are multiple protective systems. In the event of failure of one of the systems, there are multiple means for meeting the safety targets. The design of the pressurized water reactors at LNPS is similar to those at GNPS. The International Atomic Energy Agency ("IAEA"), established under the auspices of the United Nations, conducted safety reviews on GNPS both before and after it commenced operation to confirm that the nuclear station would be operated in strict compliance with international safety standards. The United Kingdom Atomic Energy Authority also conducted a comprehensive risk assessment on GNPS and concluded that the risk to Hong Kong residents was extremely low and much smaller than the risks encountered in everyday life.

4. GNPS and LNPS commenced operation in 1994 and 2000 respectively.

#### International Nuclear Event Scale

5. The International Nuclear Event Scale ("INES") was drawn up by IAEA as an internationally recognized standard for facilitating better understanding by the public, media and the nuclear industry of the degree of significance of nuclear-related events. Under INES, international nuclear events are classified from Level 0 to Level 7. Any event that comes within the classification of INES is considered a Licensing Operational Event ("LOE"). Level 0 is known as "below scale" event, which implies that the event has no safety significance. Levels 1 to 3 events are regarded as "incidents", which have very little or no impact to the environment. Levels 4 to 7 are regarded as "accidents", representing various degrees of radiological impact. All incidents and accidents have to be verified, reported, analyzed and rectified so as to prevent any recurrence in the future. For events falling outside the classification of INES (i.e. "out of scale" or below Level 0), they are matters which do not have any relevance to safety. The INES classification takes into account many factors, including any degradation of safety protection measures, the integrity of radiological barriers and control devices, as well as the impact on the public and the environment.

6. DBNPS also adopts the INES rating system. In case of a LOE, i.e. event at Level 0 or above, DBNPS shall, in accordance with Mainland statutory requirements, report the event to the relevant state regulatory body, namely the National Nuclear Safety Administration ("NNSA"). NNSA will handle the matter accordingly, including examining and confirming the contents of the report and the rating of the event. NNSA also has a number of inspectors stationed on-site at DBNPS to monitor the station's operation and performance.

## **Current notification mechanism**

### Notification mechanism between the Government of the Hong Kong Special Administrative Region and the Guangdong authorities

7. The HKSAR Government and the Guangdong authorities have established an official contingency notification channel. In brief, the Prevention and Emergency Administrative Commission Office of Guangdong Province for Nuclear Accident of Civil Nuclear Facility ("PEACO/GD") is responsible for coordinating contingency actions to be taken by various Guangdong authorities in response to events at DBNPS. In case of a contingency event or accident at the station, the DBNPS operator will inform PEACO/GD and other relevant state organizations immediately. PEACO/GD will notify the Hong Kong authorities of the classification of the "emergency situation" in accordance with the arrangements agreed between the two sides. The classification of "emergency situation" follows IAEA's four-category system for classifying nuclear emergencies according to its impact on safety in ascending order of severity -

<b>Classification of emergency situation</b>	<b>Description</b>
Emergency Standby	Safety levels may be reduced at the plant.
Plant Emergency	Radiological consequences of the emergency are confined to a section of the plant.
Site Emergency	Radiological consequences of the emergency are confined to the site.
Off-Site Emergency	Radiological consequences of the emergency extend beyond the site boundary.

8. In the event of an "Off-Site Emergency", PEACO/GD will immediately inform the HKSAR Government via the Hong Kong Observatory ("HKO"). HKO will acknowledge receipt, inform the Security Bureau ("SB") and commence the assessment process. SB will determine the appropriate level of activation of the Daya Bay Contingency Plan. It will also direct and coordinate the HKSAR Government's response to the nuclear incident. PEACO/GD will provide update report on the situation no longer than every six hours. It will give further notification immediately on detecting significant changes. In times of non off-site emergencies, PEACO/GD is also obliged to notify Hong Kong. Depending on the situation, SB will determine the appropriate level of activation of the Daya Bay Contingency Plan. After receiving a report of "Site Emergency" from DBNPS, PEACO/GD will make a

first notification to the Hong Kong authorities as soon as possible based on the circumstances at that point of time or at the latest two hours after being notified by DBNPS. Thereafter, PEACO/GD will make follow-up notifications once every six hours. If there are significant changes, the follow-up notifications will be made as soon as possible. When a nuclear incident leading to a "Plant Emergency" or an "Emergency Standby" occurs at DBNPS, PEACO/GD will notify the Hong Kong authorities at the same time when it notifies IAEA.

9. Pursuant to the United Nations Convention on Early Notification of a Nuclear Accident, China is obliged to notify IAEA of any accident at a nuclear facility within China leading to a release or likely release of radioactive material. IAEA, after receiving such a notification, will inform HKO. The Hong Kong authorities will follow up on the report with the Guangdong authorities through the established liaison channel. This arrangement is an additional notification channel to that with PEACO/GD.

Notification system between the Administration and China Light & Power Holdings Limited/Hong Kong Nuclear Investment Company Limited

10. HKNIC submits monthly reports of LOEs to its board of directors, members of which include representatives from SB and the Environment Bureau. Upon receipt of any such reports, SB will request relevant technical support departments, including HKO, the Electrical and Mechanical Services Department ("EMSD") and the Department of Health, to study the reports and make an assessment. Should there be any questions concerning nuclear safety, the Administration will seek clarification from HKNIC immediately.

11. Under the Electricity Ordinance (Cap. 406), CLP is obliged to notify the Director of Electrical and Mechanical Services of a loss or impending loss of all or a portion of the electricity supply from a power source outside Hong Kong. An unscheduled power interruption from GNPS may indicate an abnormality at the power station, though this does not necessarily entail the occurrence of a nuclear event. Apart from being notified by DBNPS, the CLP System Control Centre will also be able to detect power interruption immediately through its own monitoring system. The Control Centre will alert EMSD and HKO in accordance with the established notification mechanism. Generally speaking, the first notice will reach the Government within 15 minutes of the power interruption, and the information received can then be assessed and analyzed.

The Daya Bay Contingency Plan

12. The HKSAR Government has put in place a comprehensive Daya Bay Contingency Plan to deal with nuclear accidents. The plan can be activated for immediate response actions to minimize its impact on Hong Kong residents.

The contingency plan was prepared in consultation with IAEA and was also tested by IAEA before promulgation.

13. The HKSAR Government has conducted comprehensive testing on the Daya Bay Contingency Plan on four separate occasions under the observation of IAEA or other international experts. The testings all confirmed that the plan was sound. All relevant departments and agencies involved were fully prepared to respond immediately to a nuclear accident causing the release of radioactive material.

14. In addition, both Guangdong and Hong Kong have agreed that comparisons on measurements will be conducted between the environmental radiation monitoring departments of the two sides on a regular basis. Independent organizations are engaged to conduct the comparison exercises, including the items of the radiological measurements comparison exercises conducted by IAEA, to ensure reliability of their measurements. To ensure the effectiveness of the communication channels, the two sides also conduct monthly direct communication tests, which include tests on communication by phone and fax, and on-line communication.

### **Relevant discussions of the Panel**

15. Arising from an event which occurred at GNPS on 23 May 2010 ("the May event"), the Panel discussed at its meeting on 6 July 2010 the Daya Bay Nuclear Power Station Notification Mechanism. Arising from another event which occurred at GNPS on 23 October 2010 ("the October event"), the Panel further discussed the mechanism at its meeting on 16 November 2010.

### **Need for an overall review of the current notification mechanisms**

16. Members generally considered that the Administration lacked sensitivity in handling the May event, and the HKSAR Government was too passive in discharging its monitoring role despite the presence of established mechanisms for the relevant parties to notify the HKSAR Government of nuclear emergencies at power stations in Daya Bay. Members urged the Administration to conduct an overall review of the current notification mechanisms with PEACO/GD, CLP and HKNIC as well as the Daya Bay Contingency Plan developed by the HKSAR Government for handling nuclear incidents at DBNPS, with a view to enhancing the transparency of nuclear power stations' operation and performance, identifying areas for further improvement to the current mechanisms for monitoring nuclear and radiation-related events, and facilitating the Administration in making coordinated and proactive response to nuclear incidents.

17. The Administration responded that upon receipt of a media inquiry regarding the May event at GNPS, SB immediately sought verification from HKNIC and requested HKO to confirm the monitoring data concerning the radiation level in Hong Kong from the date of the May event to mid-June. According to information provided by HKNIC, the May event was due to a minor imperfect sealing of a fuel rod in the reactor core of Unit 2. Since the level of radioactivity of the cooling water remained stable and well within allowable limits, without any impact on public safety, public health or the environment, HKNIC did not activate the notification mechanism. The May event was not significant enough to be classified as a Level-0 event under INES (i.e. out of scale) and the operation of GNPS had not been affected. Furthermore, based on the data collected by HKO's Environmental Radiation Monitoring Network, there were no abnormal changes in the local radiation level in Hong Kong on or after 23 May 2010 and the daily average radiation levels in May 2010 were within the normal range of fluctuation.

18. The Administration advised that in tandem with the notification mechanisms established with PEACO/GD, CLP and HKNIC, the HKSAR Government had its own warning system to obtain first-hand information. In addition to HKO's Environmental Radiation Monitoring Network, the Water Supplies Department ("WSD") operated two identical on-line Water Contamination Monitoring Systems at Muk Wu Pumping Station to monitor incoming drinking water from Guangdong. The alarms at HKO and WSD would sound if there was any abnormal change in the radiation level. HKO and WSD would conduct detailed analysis where necessary. HKO and WSD would alert SB immediately if the alarm was found to be genuine after confirmation analysis.

19. The Administration further advised that it noted that the May and October events had aroused wide concern in the community over nuclear safety. It acknowledged the need to meet the increasing expectation for greater transparency, responsiveness and coordination among the relevant stakeholders in case of any event which might affect the normal operation of the power stations in Daya Bay. The Administration was reviewing the existing arrangement for handling nuclear events and the notification mechanism, with a view to enhancing transparency and strengthening coordination with all concerned parties. The Administration had requested CLP to disseminate information relating to nuclear incidents in DBNPS in a timely manner.

Notification mechanism and information disclosure policy for matters outside the INES classification

20. Some Members held the view that DNMC should review and fine-tune the information disclosure policy for matters outside the INES classification.

They considered that the HKSAR Government should be notified immediately of all nuclear incidents, including those classified under INES as Level 0 or Level 1 events. Some Members considered that the Chief Executive or the Secretary for Security should convey this to the central authorities.

21. CLP responded that it understood the concern of the community about the safety of the power stations in Daya Bay. For events falling outside the INES classification or matters which did not have any relevance to safety, CLP would focus on finding out what and how to communicate consistently to the public under such circumstances. HKNIC would examine how its mechanism for disclosure of nuclear incidents could be improved in respect of transparency and timing as well as method of communication.

22. Some Members were concerned whether the request for immediate notification of all nuclear incidents was not addressed because HKNIC only had a 25% share in GNPJVC. CLP responded that the request had been conveyed to GNPJVC for consideration. There was no question of the request not being addressed because of HKNIC's percentage of share in GNPJVC.

#### Appointing government officials to the Daya Bay Nuclear Safety Consultative Committee

23. Some Members were of the view that the Administration should consider putting a request to the relevant authorities of the Mainland, so that they would notify the HKSAR Government of any operational events occurring in the power stations regardless of their severity. Additionally, the Administration should explore with DNMC the possibility of appointing government officials to the Nuclear Safety Consultative Committee of the Daya Bay Nuclear Power Station and the Lingao Nuclear Power Station ("NSCC"), so as to increase the participation of the HKSAR Government in the monitoring of the safety situation of the two power stations in Daya Bay. A Member further suggested that the Administration should consider appointing observers to monitor the operational activities and production processes of DBNPS.

24. The Administration advised that the current notification mechanism had two channels. On one hand, DNMC, the operator of the two power stations, would notify HKNIC of any LOE, submit monthly reports of LOEs to its Board members and upload such information on its website for public reference. On the other hand, the HKSAR Government and the Guangdong authorities had established an official notification channel as outlined in paragraphs 7 and 8 above.

25. As regards the composition of NSCC, the Administration advised that NSCC was formed some 20 years ago by DNMC in the Mainland with its

members invited by DNMC to join the Committee. While the HKSAR Government was not represented in NSCC, the suggestion of appointing representatives of the HKSAR Government to NSCC had been conveyed through CLP to DNMC. Members were also advised that the roles of NSCC included discussing the reports on the planning and implementation of nuclear safety on operational and construction matters of the nuclear power stations under the operation and management of DNMC; and providing opinions and suggestions on nuclear safety based on national nuclear safety regulations, with reference to the nuclear safety information of international nuclear safety organizations and nuclear safety situations.

#### Inclusion of additional provisions in the Scheme of Control Agreement

26. While appreciating the difficulties faced by the HKSAR Government in monitoring the operation of GNPS given the fact that it was owned by GNPJVC with a 75/25 joint venture between GNIC and HKNIC, a Member suggested that the Administration should include additional provisions in the Scheme of Control Agreement ("SCA") entered with CLP to the effect that it was a mandatory requirement for CLP to notify the Administration of all operational events occurring in the nuclear power station.

27. The Administration advised that GNPS was currently regulated by the Mainland statutory requirements promulgated by NNSA. As such, the Administration did not consider it appropriate to monitor GNPS's operation through SCA.

#### **Relevant papers**

28. Members may access the LegCo website (<http://www.legco.gov.hk>) for details of the papers and minutes of the meetings.