For discussion on
6 December 2011

Legislative Council Panel on Security
Review Proposals of the Daya Bay Contingency Plan

Background

With the objective of mitigating the adverse effect of ionizing radiation and protecting people and the environment, contingency planning for nuclear emergencies has been well developed in the international community, as enshrined in the standards set by the International Atomic Energy Agency (IAEA) and other international organizations. Going from strength to strength, such standards are widely practised by countries in emergency preparedness and response. These international standards and practices, especially the precious experience gained by the local and international communities in responding to the Fukushima accident earlier this year, are the cornerstones for reviewing our contingency planning, subject to necessary adaptation for application in local circumstances.

2. This paper reports the main findings of the comprehensive review of the Daya Bay Contingency Plan (DBCP) and sets out a proposed framework for enhancement.

Review Findings

International Standards and Practices

3. Our examination of the international standards and practices (see *LC Paper No. CB(2)2435/10-11(01)* of July 2011 and *LC Paper No. CB(2)224/11-12(01)* of November 2011 for reference) has distilled a number of basic principles for nuclear contingency planning as generally accepted by the international community (see ***Annex A***). The key is that nuclear emergency planning is to cover a range of reasonably foreseeable (including remote but conceivable) scenarios for prioritising deployment of defined resources and the planning details should be proportional to the degree of the risks assessed. Detailed pre-planning of protective actions to a reasonable extent would provide a useful basis in expanding the scope to handle an accident with wider implications if happened.

4. Central to emergency preparedness is the concept of Emergency Planning Zones (EPZs) as defined areas around a nuclear facility for which detailed planning and preparations are made in advance to ensure that appropriate protective actions can be applied in a timely and predetermined manner to protect

the general public in the event of a nuclear accident. The establishment of EPZs should follow international standards and practices, subject to a comprehensive risk assessment of the nuclear facility in question.

EPZs of Hong Kong

5. The DBCP was prepared following a consultancy study undertaken by the United Kingdom Atomic Energy Authority (UKAEA) on risk assessment and contingency planning with reference to international standards and practices. Based on the consultancy findings (summary at ***Annex B***), the DBCP provides for the maximum range of 20 km from the nuclear power stations in Daya Bay as "Plume Exposure Pathway EPZ1" (Ping Chau as the only landmass in Hong Kong within this zone) with possible evacuation, sheltering or the use of stable iodine[1] as a precautionary measure, and also 85 km as "Ingestion Pathway EPZ2" (covering the whole territory of Hong Kong) with controls over food, livestock, and water imported from areas close to the nuclear facilities or locally produced or available.

6. We have critically reviewed the methodologies, assumptions, parameters, etc in the original consultancy assessment (the observations are set out in ***Annex C***). There are no material or significant changes that would fundamentally affect the consultancy conclusion or the EPZ arrangements. One important prerequisite to note is that the State Council has launched comprehensive safety inspections[2] of all nuclear power stations on the Mainland. All nuclear power plant operators are obliged to implement additional safety measures in full compliance with the new requirements resulting from the inspections. The inspections are expected to complete in 2012 and we will closely follow up the implementation arrangement with the Daya Bay nuclear power plant operators.

7. In addition, we have made use of an Accident Consequence Assessment System (ACAS) (paragraphs 26 and 27 below) to simulate the consequences of possible serious accidents at nuclear power stations in Daya Bay, using two nominal source terms (i.e. the nature and amount of radioactive substances released in a nuclear incident) which would typically represent severe accidents involving a core meltdown followed by containment failure qualifying at ratings of Level 5 and Level 7 of the International Nuclear and Radiological

[1] Taking an appropriate amount of stable iodine tablets (a non-radioactive isotope of iodine) can saturate the iodine levels in the thyroid gland and reduce its uptake of radioactive iodine. To achieve the best results, stable iodine must be taken before or shortly after the inhalation of the radioactive iodine.

[2] The inspections are to identify any new risks perceived from lessons learned from the Fukushima and cover robustness of assessment of external events in site selection, assessment of plans and abilities for flood and seismic protection, effectiveness of quality assurance system, inspection of fire protection systems, prevention of incidents caused by multiple extreme natural events and remedial measures, assessment of complete loss of power including emergency power and contingency plans and availability for further stand-by power supply, preventive and remedial measures of severe accidents and appraisal of their robustness, and effectiveness of the emergency response system.

Event Scale (more details of the source terms, simulation parameters and results are provided at ***Annex D***). The EPZ arrangements of the present DBCP are found appropriate.

8. We have also considered the prevailing international standards and practices of advanced countries[3]. The IAEA has maintained its recommendation for an Urgent Protective Zone (UPZ) within a range from 5 to 30 km to plan for evacuation, sheltering and distribution of stable iodine. The determination of the exact size is subject to site specific analysis of the risk and practical circumstances. Twelve countries[4] we surveyed have adopted a UPZ ranging from 7 to 20 km[5]. Hong Kong's EPZ1 up to 20 km is in line with the most stringent requirements of most of the countries, and our EPZ2 up to 85km covers the whole of Hong Kong.

9. Given the above, we consider it appropriate to maintain the present EPZ arrangements in the DBCP. At the same time, we will closely monitor any new standard that may be promulgated by the IAEA, State Council and other advanced countries following their nuclear safety inspections and reviews (paragraph 6 above and paragraph 18 below), and update and strengthen different aspects of the DBCP to meet the national or international safety levels.

Lessons from Fukushima on Emergency Preparedness

10. The serious nuclear accident at the Fukushima Daiichi Nuclear Power Station in March 2011 has triggered immediate response actions of relevant international organizations such as the IAEA and the World Health Organization (WHO) in accordance with their respective mandates and responsibilities and a joint plan[6]. Governments worldwide also implemented different measures. Hong Kong is no exception.

11. During the Fukushima accident, all relevant bureaux and departments monitored the developments, assessed possible impacts and implemented necessary response measures continuously in accordance with their respective mandates and responsibilities, with appropriate reference to different parts of the DBCP as applicable. This demonstrated a robust government response to achieve the fundamental objective of the DBCP, which is to protect

---

[3] LC Paper No. CB(2) 224/11-12 (01) in Annex C.
[4] Appendix to Annex C mentioned in footnote 3.
[5] Hungary is an exception which adopts 30 km.
[6] Joint Radiation Emergency Management Plan of the International Organizations, sponsored by European Commission, European Police Office, Food and Agriculture Organization of the United Nations, International Atomic Energy Agency, International Criminal Police Organization, International Maritime Organization, Nuclear Energy Agency of the Organisation for Economic Co-operation and Development, Pan American Health Organization, United Nations Environment Programme, United Nations Office for the Co-ordination of Humanitarian Affairs, United Nations Office for Outer Space Affairs, World Health Organization and World Meteorological Organization in co-operation with the International Civil Aviation Organization and United Nations Scientific Committee on the Effects of Atomic Radiation.

the health and safety of Hong Kong people. The overall effectiveness of the basic arrangements and response measures of the DBCP is confirmed. Nevertheless, we may pursue enhancements in various areas for better preparedness. Some pointers are suggested below.

12. As shown in the Fukushima accident, effective coordination within Government has proved essential during an emergency. Since Fukushima is far away from Hong Kong, the direct impact of the nuclear accident on Hong Kong was minimal. Despite this, enhanced radiation monitoring and full transparency of the monitoring results have proved essential to reassure the public of our emergency preparedness, the more so if any nuclear emergency occurs in future closer to home even if the impact might be minimal or small.

13. The accident saw diverse reactions of the community, with occasional circulation of unfounded rumours. There might be a general lack of understanding of radiation safety among some members of the public. Provision of timely, accurate and appropriate information and advice to the public during an emergency and enhancement of the general public education on nuclear safety protection issues in normal times are essential.

14. International organizations such as the IAEA and the WHO, given their respective mandates and responsibilities, monitored the accident development and provided information and advice. In addition to Japan, a few advanced countries also gave their advice and observations on the accident. Practical experiences demonstrate that during a nuclear incident, we need to pay close attention to the information and advice of the international community when considering necessary response arrangements in local practical circumstances. For example, whether or not it is necessary to enhance radiation monitoring, whether or not it is necessary to monitor food produced in the vicinity of the accident site to ensure food safety, and whether or not it is necessary to monitor incoming travellers or imported goods following any guidelines of the WHO and other international organizations.

15. The Fukushima accident demonstrates that a nuclear accident which occurred at a place outside Daya Bay might possibly affect Hong Kong to different extents, depending on the geographical location of the incident, the severity, and the association with Hong Kong in terms of supply of food and water, trade in goods, travel of persons, etc. We can enhance our contingency planning and suitably apply the DBCP to nuclear incidents outside Daya Bay. We will dedicate additional coverage to address this in revising the DBCP.

16. In overall terms, relevant bureaux and frontline departments have been reviewing all aspects relating to their roles and responsibilities in the DBCP and taking into account the experience gained from the Fukushima accident as well as the new developments and arrangements of the international community.

17. Although the Fukushima accident has yet to be fully settled, the IAEA and some countries using nuclear energy have been taking proactive actions to enhance nuclear safety and emergency preparedness. In May 2011, the IAEA issued a General Safety Guide on the dose criteria for protective actions in the event of a nuclear emergency[7]. The Department of Health is carefully considering its application in Hong Kong (see paragraph 33 below).

18. As mentioned in the information paper submitted to the Legislative Council in November 2011[8], the IAEA Action Plan on Nuclear Safety adopted in September 2011 includes a requirement to review and strengthen the IAEA Standards[9]. IAEA has set up a Nuclear Safety Action Team to follow up on implementation of the Action Plan. The four countries using nuclear energy that we have visited, including the United States, Canada, the United Kingdom and France, are launching reviews of their emergency planning with results pending. While such actions should take time to run their respective courses and the outcomes will go beyond our review timeframe, we are committed to following through the developments and will examine whether we should take reference of such developments when further enhancing the DBCP at the next stage.

Framework Proposals to Enhance the DBCP

19. In the light of the above findings, we would like to propose a framework to enhance the DBCP to better prepare Hong Kong in the event of any nuclear emergency affecting us.

Emergency Response Structure

20. According to the existing DBCP, in a major nuclear accident, the Chief Executive's Working Group (CEWG) will be convened to give overall direction to the Government's response. In a lesser emergency, the Secretary for Security (S for S), advised by a Technical Working Group (TWG), is responsible for implementation of the DBCP.

21. The existing system (schematic structure at ***Annex E***) is to facilitate

---

[7] Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency (GSG-2) is the most up-to-date set of international reference that takes account of the experience gained from past nuclear emergencies. Published in 2011, it is jointly sponsored by the Food and Agriculture Organization of the United Nations ("FAO"), the IAEA, the International Labour Office, the Pan American Health Organization and the World Health Organization.

[8] LC Paper No. CB(2)224/11-12(01).

[9] The original text is "The Commission on Safety Standards and the IAEA Secretariat to review, and revise as necessary using the existing process in a more efficient manner, the relevant IAEA Safety Standards in a prioritised sequence." and "This review could include, inter alia, regulatory structure, emergency preparedness and response, nuclear safety and engineering (site selection and evaluation, assessment of extreme natural hazards including their combined effects, management of severe accidents, station blackout, loss of heat sink, accumulation of explosive gases, nuclear fuel behaviour and ways to ensure the safety of spent fuel storage)."

proper coordination of government efforts at all levels, drawing on expertise and support from all relevant professional and frontline departments. To ensure that each of the units implementing the DBCP will play out its proper role, we propose the following enhancements –

- Secretary for Food and Health, as the principal official responsible for the food safety and public health portfolios, should join the CEWG which will be renamed as the Steering Group (new membership at ***Annex F***).
- The TWG should be responsible for implementing the DBCP and revamped into an Implementation Task Force (ITF) to support S for S in following up and implementing the directions of the Steering Group. The composition of the ITF should be expanded to cover all major professional departments and frontline operational departments (new membership at ***Annex G***).

Radiation Monitoring

22. Hong Kong Observatory (HKO) operates an environmental radiation monitoring programme to monitor the ambient environmental radiation level in Hong Kong, by analyzing different samples collected all over Hong Kong and operating 10 real-time atmospheric monitoring stations (locations at ***Annex H***). The Water Supplies Department (WSD) runs two identical on-line water contamination monitoring system to monitor real-time raw water imported from Guangdong Province and checks water samples collected from different sources, including local reservoirs, water treatment works and consumer taps. The Food and Environmental Hygiene Department (FEHD) samples food, livestock and poultry coming from the Mainland for radiation checking. All such efforts will be enhanced in the event of a nuclear emergency. For example, HKO may activate special radiation monitoring arrangements at 13 fire stations to take readings of ambient gamma dose-rate, collect air particulates and radioiodine samples and deploy an Aerial Radiation Monitoring System on board a helicopter and a mobile radiation survey team to two designated routes on the ground.

23. To enhance the above measures –

- HKO is working to establish two new radiation monitoring stations at Chek Lap Kok in the west and Cape D'Aguilar in the south for comprehensive coverage of the territory.
- HKO plans to discuss with the Macao Meteorological and Geophysical Bureau for mutual exchange of radiation monitoring data, in addition to the exchange arrangements already in place with the Mainland.
- HKO plans to recruit more suitable fire stations over the western part of the territory for radiation monitoring all over Hong Kong during emergencies.

- HKO may, to better complement the aerial radiological survey, implement a more flexible scheme to assign additional land radiation survey routes for ground contamination monitoring during emergencies, which will help identify any hotspot in the territory.
- Environmental Protection Department (EPD) and HKO may enhance the radiation monitoring of marine water as necessary in case of nuclear emergencies, including at public beaches and Fish Culture Zones.

Notification Arrangements

24. Apart from picking up radiation data from our own efforts in monitoring air, drinking water, food and different samples collected from the environment, we may be alerted to a possible nuclear incident affecting Hong Kong and provided with accident information through the following direct means –

- Notification by Guangdong (GD) authorities in accordance with the cooperation arrangements in an off-site emergency as mutually agreed by both sides. For Site Emergency and Off-site Emergency[10] situations, GD authorities must notify Hong Kong as soon as possible, in any case within two hours from a report by the plant operator to the GD authorities. For Emergency Standby and Plant Emergency situations, GD authorities should issue a notification to Hong Kong in parallel with a notification to the IAEA.
- Notification by the IAEA. China is a signatory to the United Nations Convention on Early Notification of a Nuclear Accident and is obliged to notify the IAEA of any accident with possible offsite consequences.
- Notification by CLP Power Hong Kong Limited (CLP). According to the Electricity Ordinance, CLP is obliged to notify EMSD of a loss or impending loss of electricity supply from a power source outside Hong Kong, which may or may not be related to a nuclear accident.

25. To enhance the notification arrangements –

- We have been discussing with the GD authorities that even if an incident is minor in nature under the Emergency Standby and Plant Emergency situations, they should issue an early notification to Hong Kong within a specific timeframe.
- We will keep in view the development on the IAEA front to benefit from any improvements in notification in due course. Under the IAEA Action Plan on Nuclear Safety endorsed in September 2011, the IAEA is set to provide Member States, international organizations and the

[10] Higher two of the four categories for classifying nuclear plant emergencies. The other two categories are Emergency Standby and Plant Emergency, with impacts confined to within a nuclear power plant.

general public with timely, clear, factually correct, objective and easily understandable information during a nuclear emergency on its potential consequences, including analysis of available information and prognosis of possible scenarios based on evidence, scientific knowledge and the capabilities of Member States.

Accident Consequence Assessment

26. HKO will be the mainstay of Government in assessing accident consequences with support from DH and EMSD. HKO has put in place the ACAS to simulate and assess the radiological consequences of a release. This computer-based system can ingest latest meteorological information as well as information on the magnitude of the radiological release to model the transport and dispersion of the released radioactive materials and predicts the radiation dose to the public in various parts of the territory. The assessment, which could be available within hours, will serve as a useful basis for forward planning and pre-arrangement of appropriate protective actions when the accident is still in the early stage and evolving, and the actual off-site release might not yet have happened.

27. To enhance its capabilities, HKO has acquired an up-to-date sophisticated ACAS software adopting latest technology and algorithm for use in a nuclear accident at Daya Bay as well as in the vicinity of Hong Kong.

Public Information

28. According to the current DBCP, in case of a nuclear emergency at Daya Bay, the Director of Information Services will convene the Information Policy Committee to advise the CEWG (suggested to be renamed as the Steering Group) on the media strategy. As always, it is essential to provide timely, accurate information to the public in a bid to stem panic which might be caused by a radiological release (or even rumours of such), to advise members of the public what to do and what not to do, and to reassure the public and overseas communities. Apart from the traditional means of press releases and the mass media (TV and radio broadcast), we may make use of more channels to get our messages across to all sectors of the public.

29. We propose enhancements along the following lines –

- As illustrated in the Fukushima accident, daily press conferences with coordinated attendance of officials of responsible departments and outside experts (to provide technical support) have proved to be a most effective way to update members of the public (and overseas communities) of the latest situation of an evolving emergency with public concern.

- A dedicated website of the DBCP, to be developed and used for public education in normal times, will provide one-stop up-to-date information to the public during emergencies. It will also be a portal to other websites providing essential information, such as radiation monitoring data hosted by HKO (including measurement results of air samples and the hourly-updated ambient gamma radiation dose rates), food and water surveillance results hosted by FEHD and WSD, health information hosted by DH, emergency information hosted by GD and other Mainland authorities, and information hosted by international organisations such as the IAEA and the WHO.
- In urgent and truly justified situations, emergency information may be sent out in the form of an SMS message to some 14 million mobile phone accounts in Hong Kong with support from telecom operators.

Public Education

30. To enhance public education, we propose to produce television and radio Announcements in Public Interests, pamphlets, booklets and posters as well as to launch a thematic website, with a view to promoting knowledge on radiation safety and enhancing public awareness in protective measures to be taken in case of nuclear incidents.

31. In the meantime, Government also encourages the operators to outreach to the public and to enhance their operational transparency -

- CLP plans to set up a Nuclear Resources Centre at Kowloon Bay in 2012 to provide the public with educational materials on nuclear energy and nuclear safety. The Centre will also feature Government's emergency preparedness and response in the unlikely event of a nuclear incident at Daya Bay.

- As reported at the special meeting held on 17 January[11] 2011, the Daya Bay Nuclear Power Operations and Management Co. Ltd. would notify the public through its website within two working days of any non-emergency events (i.e. those classified at Level 0 and Level 1 as well as events at Level 2 or above but not involving emergency response) at Guangdong Daya Bay Nuclear Power Station once it is confirmed. The information to be disclosed would include a brief description of the event, the initial classification of the event and the initial assessment on the impact of the event on environment and public safety. With the further agreement of the China Guangdong Nuclear Power Holding Co. Ltd, the arrangement is also applicable to the Lingao Nuclear Power Station.

[11] LC Paper No. CB(2)767/10-11(01)

Intervention Levels

32. An important concept in emergency preparedness and response is Intervention Levels. When the radiation dose of the public is expected to reach the Intervention Levels, protective actions should be taken to avert it to protect public health and safety.

33. The Radiological Protection Advisory Group (RPAG)[12] appointed by DH, at its recent meeting in late October, has reviewed the application of the latest safety guidelines promulgated by the IAEA in this regard (para.17 above) and made recommendations to the Director of Health (see ***Annex I***). The Director of Health is considering the RPAG's recommendation and will give professional advice as soon as possible to enhance the DBCP. The generic criteria, based on the framework put up by the IAEA in its latest safety guidelines, are generally consistent with the earlier recommendations of the RPAG, but are more concise in terms of the dose levels for the purpose of implementation of protective actions and are more updated in terms of radiological protection principles.

Plume Exposure Pathway Countermeasures

34. The CEWG (or the Steering Group as renamed in future) may decide on the implementation of principal countermeasures against plume exposure which may include evacuation of the affected people, sheltering and taking stable iodine. Such measures are applicable within the 20-km EPZ1 from the nuclear power stations.

35. We propose the following enhancements –

- The CE's Steering Group, after taking into consideration DH's advice on the intervention levels and health impacts and HKO's assessment on the radiation dose, should as appropriate advise the general public to stay indoors where possible during the passage of a plume across the

[12] The term of reference of Radiological Protection Advisory Group (RPAG) are listed as follows:-
RPAG is required to advise the Director of Health on health matters relating to the radiological consequences that might eventuate from radioactive releases from nuclear facilities. In particular the Group is required to advise on:-
(a) the development and subsequent review of 'Dose Models' designed for use in assessing the consequences for the public of any accidental radiation release to the environment;
(b) the dose limits that should apply to the Hong Kong population and in particular to individuals in certain critical groups;
(c) the criteria that should be used to interpret emergency environmental monitoring data;
and, without prejudice to any decision that may be taken by the Director of Health, during the intermediate and recovery phases, of any nuclear accident situation affecting Hong Kong to advise on:-
(a) the interpretation of environmental radiation monitoring data and their impact on the public;
(b) the countermeasures that should be adopted having regard to the widely applied principle that the risks should be reduced to a level which is as reasonably practicable.

territory, even if the projected dose is below the criteria for evacuation/sheltering. Generally speaking, the passage of a plume may last for a few hours or longer, depending on the meteorological conditions and the duration of the radiological release.

- DH should arrange for the strategic stockpiling, storage and management of a sufficient amount of stable iodine in the territory for use as thyroid blocking agents. The distribution and use of stable iodine are subject to the advice of the Director of Health at the time based on scientific evidence in practical circumstances.
- DH may draw up guidelines on the use of stable iodine in suitable circumstances and dosages, taking reference from the WHO's advice.

Monitoring of Persons within Hong Kong

36. If evacuated members of the public and incoming local travelers and visitors were contaminated, they might need to be subject to monitoring and decontamination. Where necessary, they should further receive medical treatment. In such cases, the current DBCP provides for -

- the setting up of Monitoring Centres (MCs) by Auxiliary Medical Services (AMS) at nine designated public swimming pools as necessary to carry out monitoring and decontamination (by showering) for persons in need.
- the setting up of MCs by Fire Services Department (FSD) at 10 designated fire stations for emergency responders, and
- the activation of two Decontamination Centres by the Hospital Authority at two public hospitals to provide treatment to people who are injured and contaminated and who are internally contaminated or radiologically injured.

37. We propose the following enhancements –

- The removal of the outer clothing and use of damp cloth / adhesive tapes on skin may be able to remove some 90% of contamination[13]. This decontamination procedure will be performed in-situ (e.g. at boundary control points) for persons in need. Only those still found to be contaminated after the procedure may need to be sent to showering or treatment.

---

[13] For details, please see "Guidelines for Mass Casualty Decontamination During a HAZMAT/Weapon of Mass Destruction Incident", US Army Chemical, Biological, Radiological and Nuclear School and U.S. Army Edgewood Chemical Biological Centre, December 2008 (http://hps.org/hsc/documents/MassCasualtyDeconGuideUpdateVol2.pdf) and "Procedures for Medical Emergencies Involving Radiation", Health Physics Society, August 2006 (https://hps.org/hsc/documents/HPS_President_Elect_Poster.pdf).

- FSD has acquired mobile decontamination units with showering facilities and will deploy them to priority locations (discharge points for evacuees) to meet the need of both evacuated members of the public and emergency responders. This would reduce the need to transfer contaminated persons to swimming pools and fire stations, and mitigate other risks in this relation.
- With LCSD's support, Tung Chung Swimming Pool in Lantau will be additionally designated as one of the MCs to cover the airport at Chek Lap Kok.
- The treatment facilities at the two public hospitals will be renamed as "Emergency Radiation Treatment Centres" to better reflect their functions and to avoid confusion to the public.

Boundary Control Measures on Inbound Travelers and Goods

38. The current DBCP provides for detection and decontamination of radiologically contaminated persons, luggage, cargo and lorries showing up at land boundary control points with the Mainland. This is to provide appropriate treatment of persons in need, prevent entry of sources of contamination and reassure the public.

39. We propose the following enhancements –

- In considering the need for undertaking boundary control measures, the CE's Steering Group should prudently examine any guidance and recommendation given by relevant international bodies, the advice of bureaux and professional departments and the actual situation at the time.
- The detection and decontamination procedures may be implemented according to needs at respective land, air and sea boundary control points, as well as at points where goods (and mail) enter Hong Kong (e.g. Kwai Tsing Container Terminals), and may also apply as appropriate to conveyances entering Hong Kong.
- Relevant departments may make use of the latest technology and equipment to minimize intrusion to travelers, optimize manpower deployment and increase throughput. For example, in addition to hand-held scanners, installation of new automated screening equipment like walk-through radiation monitoring portals at where traveler traffic is high may be considered. The feasibility of building radiation monitoring facilities may be considered as part of the customs infrastructure to be erected or upgraded in future.
- AMS may also join the monitoring and scanning duties.

Ingestion Pathway Countermeasures for Food and Water

40. The Mainland is our important food source, especially for fresh produce. A certain proportion of these Mainland imports may come from the Daya Bay area.

41. Under the current DBCP, cooperation arrangements have been made for the Mainland authorities to monitor food grown or produced within 50 km of the nuclear power stations at Daya Bay to stop the export of contaminated food to Hong Kong. FEHD will conduct contamination checks for imported foodstuffs, livestock and poultry at points of entry, slaughterhouses, wholesale markets and retailers. AFCD will monitor primary produce including fish, vegetables, livestock and poultry at farm and wholesale market levels. Indeed, the whole territory of Hong Kong falls within the ingestion pathway EPZ2 up to 85 km from the nuclear power stations at Daya Bay providing for such ingestion countermeasures.

42. As regards water supply, WSD monitors incoming raw water through an automated system and samples water from different sources, including impounding reservoirs, water treatment works and consumer taps for checking. In case of an emergency and detection of a contamination, WSD will implement necessary countermeasures including rejection of contaminated inflow, preferential water draw-off from non-contaminated or least contaminated sources, adjustment of treatment processes etc to reduce the radiation level in water, temporary suspension of raw water imported from Guangdong Province, water rationing, etc.

43. Over the Fukushima accident, FEHD detected certain contaminated food samples and implemented the corresponding banning of certain food items from Japan. This experience confirms the effectiveness of our monitoring system. We should distil good practices for reflection in the DBCP.

44. We anticipate certain enhancements as follows –

- FEHD has agreed with the Mainland authorities that both sides will use the most updated guideline level of the Codex Alimentarius Commission (CAC) under FAO/WHO in monitoring food export and import, instead of an old version quoted in the DBCP.
- During an emergency, FEHD, AFCD and WSD may publish and update the relevant surveillance information on their websites as well as the DBCP's.

Disposal of Radiologically Contaminated Waste

45. The current DBCP provides for procedures for disposing radiologically

contaminated waste from various possible sources including foodstuff and sludge at Water Treatment Works in accordance with the Waste Disposal Action Plan drawn up by EPD.

46. To enhance the arrangements, the procedures may extend to contaminated livestock as well as contaminated sludge at Sewage Treatment Works which are not currently covered.

Training and Protective Gear

47. Under the DBCP, HKO arranges specialist courses for Departmental Radiological Protection Officers (DRPO) and, as necessary, specialist courses on radiation monitoring and radiological protection for staff involved in the operation of the DBCP. Trained DRPOs will assist in drawing up the departmental contingency plan and advise departments on the application of the radiological protection principles and implementation of appropriate protective measures. The DBCP also provides for the carrying out of drills and exercises by bureaux and departments individually and collectively.

48. The protective gear and equipment used in the DBCP in different tiers have been reviewed and confirmed to be adequate for the purposes of various duties of operational staff in implementing the DBCP. Nevertheless, relevant departments will continue to pay attention to the latest technology and development of new equipment and acquire the most advanced equipment to enhance the detection and monitoring capabilities for radiologically contaminated persons, luggage, cargo and conveyances. For example, walk-through radiation monitoring portals may be used at boundary control points and more hand-held scanners may be acquired. FSD has also planned to acquire more mobile decontamination units with showering facilities.

49. We propose the following enhancements –

- HKO, with support from SB, DH, EMSD and others, may seek continuous improvements in the contents of the DRPO and specialist courses to tie in with the revised DBCP, follow the latest international standards and practices and take into account new developments in future.
- A major interdepartmental exercise focusing on the revised DBCP, with participation of members of public in relevant parts, is being planned for early next year. It should provide insights for enriching the training regime and setting out directions for future drills and exercises. At present stage, we recommend that major exercises as such should remain to be held on a triennial basis.
- We would explore the feasibility of holding a joint exercise with the nuclear plant operators towards the end of 2012, in order to follow up

with the results of the comprehensive safety inspections of all nuclear power stations on the Mainland as mandated by the State Council.

Application of the DBCP outside Daya Bay

50. Distance is the best radiation protection. The nearest nuclear power station in the Mainland beyond Daya Bay is over 130 km away[14]. The general assessment following international standards is that all these nuclear power stations outside Daya Bay carry a much smaller threat and the risk to Hong Kong is very low. Plume exposure is unlikely a concern, while we should be more guarded against possible sources of contamination brought by arrival of food, cargo and travelers.

51. Under such circumstances, responsible bureaux and departments will monitor the situation, assess the possible impacts and implement necessary measures according to their respective roles and authorities. The concerted efforts could be formally established on a firm footing in the contingency plan to ensure adequate protection of Hong Kong in case of another emergency affecting Hong Kong in the future.

52. We propose the following enhancements -

- While the DBCP will retain a primary focus on nuclear accidents at Daya Bay, it may be improved to also apply to other nuclear accidents if happened.
- We will dedicate additional coverage to address this in revising the DBCP.

Way Forward

53. Following the above framework proposals and in the light of views received, we plan to revise the DBCP by end 2011, and, on this basis, carry out a large-scale inter-departmental exercise early next year to test the preparedness and response capability of various departments.

54. We will assess the outcome of the exercise, refine the DBCP as necessary and set out the direction for carrying out future updates and exercises.

Security Bureau
November 2011

[14] An indicative map showing the locations of the nuclear power stations in East Asia is at **Annex J**.

Annex A

Basic Principles of Nuclear Contingency Planning

- Contingency planning should accommodate all accidents that are reasonably foreseeable and be capable of being applied in case of less likely but potentially very severe accidents that are credible.

- Contingency planning should provide for all practical measures to mitigate any consequences for human life and health and the environment (keeping radiation exposure as low as reasonably achievable). Such countermeasures should be justified (doing more good than harm) and optimized (maximizing the net benefit), and ensure that no individual bears an unacceptable risk of harm.

- Contingency planning is meant to provide a basis and necessary details for prompt emergency response in the early and intermediate phases of an accident when time is of essence. In the nature of the recovery phase, time will be available to think through the appropriate measures with necessary consultations.

- Criteria are to be set in advance for use in determining when to take different countermeasures. The "Intervention Levels" should be determined by appropriate authorities on advice of experts and in a manner in good agreement with international standards and practices.

- Contingency planning should allow room for decision makers to take into account the actual situation and various local, social, economic, environmental, demographic, psychological and other factors for making a judgment in the implementation of countermeasures. A balance has to be struck between attributes relating to radiation protection based on necessity, and the public perception of the problem and what could be done to protect public health and safety as a matter of prudence.

- Members of the public must be kept fully posted of the development of an accident and government response in a transparent manner and be given accurate, appropriate and timely information. This is of paramount importance to ensure public assurance and maintain public confidence in the responsible authorities.

Annex B

Summary of the Consultancy Study Report by the United Kingdom Atomic Energy Authority

In late 1980s, the United Kingdom Atomic Energy Authority (UKAEA) was commissioned to undertake a consultancy study on the environmental aspects of the building of Guangdong Nuclear Power Station (GNPS) at Daya Bay, which produced two reports, one on risk assessment and the other on contingency planning.

2. The report on risk assessment followed a Probabilistic Safety Assessment methodology[1], adopting a conservative or so called pessimistic approach (e.g. no countermeasures taken in accidents) that would lead to a deliberate over-estimation of the risks of major releases from the plant[2].

3. Factored into the assessment was the defence-in-depth concept applied in the design and operation of GNPS to ensure a multi-tier nuclear safety system, with different levels of protection including multiple reactor protection systems, engineered safety features, emergency operating procedures, barriers to prevent release of radioactive materials, on-site and off-site emergency plans, etc. One important aspect is the redundant safety features of the pressurized water reactors (PWRs) of GNPS based on the French 900 MWe design. The 0.9 metre thick reinforced concrete containment building, together with the release filtration capability, is one of the most important barriers in keeping the radiological materials away from the public. The probability of a major off-site nuclear accident as a result of simultaneous occurrence of a severe reactor core meltdown (say, due to long duration of loss of reactor core coolant) and containment failure (say, due to an extensive rupture of the reactor pressure vessel and the concrete containment building) is assessed to be extremely remote[3].

---

[1] Referencing NUREG 1150, a document of the United States Nuclear Commission entitled "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants".

[2] In this study, as is shown in the analysis of the consequences and risks of severe accidents, the pessimistic analysis did still lead to a demonstration that the risks to people in Hong Kong from severe accidents at the Guangdong plants were negligible in comparison with the normal risks of everyday life. Thus the more extensive best estimate studies were not necessary, although they could have been performed.

[3] Other areas that the UKAEA risk assessment had looked into include reactor core meltdown together with other containment condition scenarios such as deliberate venting through filter to protect the containment and by-passing of the containment to the surroundings (say due to component failure). External hazards including various natural events like earthquakes, flooding and typhoons and man-made events like aircraft crash have also been examined.

4. The main conclusion was that the risks of early death and fatal cancer associated with nuclear accidents in Daya Bay were very small, indeed much lower than analogous risks encountered by Hong Kong people in everyday life, by an enormous margin (65,000 and 20,000 times respectively). See the table below:

Comparison of everyday risks of death with those arising from the Daya Bay nuclear power station

Hazard	Average individual risk of death per annum		Approximately factor by which the everyday risk exceeds the nuclear risk
	Everyday	Nuclear (Pessimistically assessed)	
Accidental Death	$\frac{1.3}{10,000}$	$\frac{2.0}{1,000,000,000}$	65,000
Fatal Cancer	$\frac{1.5}{1,000}$	$\frac{8.4}{100,000,000}$	20,000

5. The other consultancy report focused on contingency planning for Hong Kong in the unlikely event of an off-site nuclear emergency. Its main result was that any design-basis accident at Daya Bay would not require plume countermeasures such as sheltering or evacuation. In the highly unlikely event of a beyond design basis accident, plume countermeasures might be desirable, particularly sheltering, in the north-eastern sector of Hong Kong closer to the Daya Bay site. A reasonable consensus of international opinion about the size of the plume emergency planning zone (EPZ) typically up to 5km - 20km was noted.

Annex C

New developments which might affect the level of risk assessments of nuclear power plants

Lingao Nuclear Power Station

Since the Daya Bay Contingency Plan (DBCP) was put in place, the Lingao Nuclear Power Station (LNPS) has come into operation in two phases in 2002/03 and 2010/11 respectively. Added to the original two Pressurized Water Reactors (PWRs) in the Guangdong Nuclear Power Station (GNPS) are four PWRs of similar but enhanced design in the LNPS, all originating from the same French model. The safety features of the later reactors are better than the original two[1]. The assessment by the professional departments is that such an addition of four similar reactors to the original two (i.e. increase by a factor of two) should not have material significance to the original risk assessment as the margin of risk arising from the nuclear power plant operation was lower than the normal everyday risk in the order of tens of thousands of times.

Performance of the GNPS/LNPS

2. Unlike the GNPS which is a Mainland-Hong Kong joint venture with part of the output supplying Hong Kong, the LNPS is solely a Mainland investment and its output does not supply Hong Kong. Nevertheless, the operation of both the GNPS and the LNPS is vested under one roof in a joint venture management company owned by Hong Kong and the Mainland. The arrangement enables consistency in the operation of the two nuclear power stations and the sharing of best practice and precious experiences[2] in operation.

3. Over the years, the operational performance of the GNPS and LNPS is steady with robust safety records. Based on nine performance indicators in generation capacity, safety and reliability, radiation protection and industrial safety, operation of the two nuclear power stations compares very well to similar nuclear plants worldwide[3] with good performance, with regular

---

[1] The LNPS Phase 1 (two reactors) adopts the same design as the GNPS, but with a number of design improvements and modifications, largely in the reliability of safety and conventional systems based on the operating experience of the GNPS. The LNPS Phase 2 (two reactors) is an improvement based on the LNPS Phase 1 (mainly in equipment fabrication and the reliability of safety and conventional systems based on the operating experience and design improvements at the GNPS and the LNPS Phase 1). The UKAEA report on risk assessment conservatively put the safety level of the GNPS, expressed through "Core melt frequency", at 4.5×10^{-5} per reactor year. With the continuous improvement modifications taken at the GNPS over the years, and the design improvements taken at the LNPS, a more representative value of "Core melt frequency" for the GNPS/LNPS is closer to 1.5×10^{-5} per reactor year.

[2] When the LNPS Phase 2 began full commercial operation in 2011, the GNPS and the LNPS Phase 1 have been operating respectively for about 17 and 9 years.

[3] The comparison is made with reference to performance indices promulgated by the World Association of

top rankings. The proven track records are in line with the basis of the original UKAEA risk assessment.

Demography

4. Given the fact that the mortality statistics used by the UKAEA study was based on the data available in the early 1980s, the Department of Health has conducted a review using the mortality statistics of 2002–2009. The average individual risk of death per annum due to accidents including transport accidents, falls, accidental drowning and submersion, exposure to smoke, fire and flames and accidental poisoning by and exposure to noxious substances was 8.5 in 100 000. The average individual risk of death per annum due to cancer was 2 in 1 000. With these updated data, the approximate factors by which the everyday risks exceed the nuclear risk in the UKAEA assessment have become 42 500 and 24 000 for accidental death and fatal cancer respectively, compared to 65 000 and 20 000 in the original assessment. The variation can be seen as minor and the validity of the original assessment remains.

Lessons learnt from Fukushima accident

5. While the serious accident occurred at the Fukushima Daiichi Nuclear Power Station has yet to be fully settled, the IAEA and countries across the globe using nuclear energy have been taking proactive actions to enhance nuclear safety and emergency preparedness.

6. In China, as mandated by the State Council, the National Nuclear Safety Administration and the National Energy Administration launched in April comprehensive safety inspections of all nuclear power stations on the Mainland. The general approach is to identify any new risks perceived from lessons learned from the Fukushima accident to date, to check against the safety provisions under the prevailing requirements and to put in place necessary new measures to prevent or mitigate such risks identified. Specific issues that the inspections seek to address include –

- robustness of assessment of external events in site selection
- assessment of plans and abilities for flood protection
- assessment of plans and abilities for seismic protection
- effectiveness of quality assurance system
- inspection of fire protection systems
- prevention of incidents caused by multiple extreme natural events and remedial measures

---

Nuclear Operators, with membership covering all nuclear operators in the world.

- assessment of complete loss of power including emergency power and contingency plans and availability for further standby power supply
- preventive and remedial measures of severe accidents and appraisal of their robustness
- effectiveness of the emergency response system

The comprehensive inspections, in our view, would ensure a safety level of the GNPS (and the LNPS) at least on a par with that accounted for in the original UKAEA risk assessment. We understand that the inspections are underway and the results will be released in due course[4].

7. Meanwhile, the operator of the GNPS and LNPS is already planning to explore and pursue a host of proposals for additional safety measures, taking into account the safety inspection process so far and the latest review findings of the IAEA, World Association of Nuclear Operators, European Union and many other national and international bodies as well as a number of major nuclear operators in the light of the Fukushima lessons. The operator is committed to meeting all new safety requirements to be imposed as a result of the safety inspections.

8. As far as possible within the DBCP review timetable, our risk assessment is taking into account such efforts of the operator, results of the safety inspection and follow-up and all other relevant information available to date. As an illustration, we would like to address some pertinent issues as follows.

9. Earthquake. The choice of the present Daya Bay site for hosting the nuclear power stations is subject to strict adherence to international practices and approval by the National Nuclear Safety Administration. The earth crust around the site is safe and stable, and the chance of having a massive earthquake is very low. The buildings, structures, systems and facilities of the GNPS and the LNPS are specially designed to withstand an earthquake impact at the Modified Mercalli Scale (MMS) Level VIII relative to historical records indicating a maximum earthquake intensity at Level VI. The reactors will stop operation promptly and safely if the earthquake intensity has reached a preset level. Since the UKAEA risk assessment, the seismic activities over the Guangdong Province have not shown any significant changes from the past.[5]

---

[4] The initiative is in line with a recommendation in the IAEA Action Plan on Nuclear Safety for Member States to promptly undertake a national assessment of the design of nuclear power plants against site specific extreme natural hazards and to implement the necessary corrective actions in a timely manner.

[5] The assessment made by the Geotechnical Engineering Office (GEO) in Report No. 65 of the GEO of HKSARG in 1998, and GEO's Information Note 09/2010 concluded that the seismicity of Hong Kong is "medium to low".

10. Tsunami. The Daya Bay site is located in a cove within a bay on the northern shore of the South China Sea. The water depth in the vicinity is 20m to 30m, which is adverse to the formation or propagation of tsunami. Furthermore, the offshore islands provide a natural barrier to tsunami arriving from the open sea. In South China Sea, the principal threat comes from the Manila Trench which saw the strongest recorded earthquake at magnitude 7.6 (Richter scale) in 1934 and generated a tsunami that was observed in the Philippines but not in Hong Kong. In case a magnitude 9 earthquake were to occur at the Manila Trench, the tsunami heights at some places in Hong Kong might exceed 5m based on the tsunami model operated by HKO.[6] The situation at Daya Bay is considered similar to Hong Kong.

11. Storm Surge. The risk of flooding at Daya Bay is more associated with tropical cyclones rather than tsunami. Since the publication of the UKAEA report on risk assessment, there has not been any significant increase in the height of storm surges recorded in Hong Kong. For comparison purposes, the highest storm surge in Hong Kong is 6.25m, recorded in 1937, while the height of all the storm surges recorded during the past two decades are below 2m. The situation at Daya Bay can be considered on the same basis.

12. Extreme Rainfall and Climate Change. Climate change might eventually lead to rising sea levels[7], increase in rainfall intensity and more extreme storms in the 21st Century[8]. A forthcoming IAEA Safety Guide on Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations will be published to provide guidance on the possible effects of climate change in designing, siting and operating nuclear power plants.

13. Flooding Prevention. A breakwater of about 17 metres above sea level is constructed off Daya Bay and the plants (including standby facilities) are also situated on the land at an elevation of at least 6.5 metres above sea level, which should be adequate to guard against the rise in water level discussed in paragraph 10 or 11. The Daya Bay site has also provided for an adequate drainage system for stormwater envisaged.

14. Reactor Type. The Japanese Fukushima nuclear power plant adopts a boiling water reactor design, while the GNPS and the LNPS adopts a

---

[6] After the publication of the UKAEA report, there has not been any significant tsunami wave reaching the South China coast. In Hong Kong, the highest tsunami wave during the past two decades is 0.2 meters, recorded in March 2011. This is lower than the historical high of 0.3 meters recorded in Hong Kong in 1960 and 1988.

[7] It is expected that the mean sea level rise in the South China Sea, including Hong Kong waters, would increase to tally with the global average in the late 21st century (i.e. expected to range between 0.18 and 0.59 m, relative to the average from 1980 to 1999).

[8] A review conducted by the Guangdong Meteorological Bureau suggested that, over the past 50 years, there is an increasing trend in the average rainfall intensity and the frequency of occurrence of intense rainfall event in Guangdong. A recent study also indicated that the frequency of occurrence of intense heavy rain with hourly rainfall of 100 mm or more nearly doubled in the past 100 years in Hong Kong. The highest hourly rainfall recorded at the Hong Kong Observatory is 145.5 mm, taken in 2008.

PWR design. The reactor cooling water of the GNPS/LNPS is separated into two independent circuits, namely the primary and secondary circuits. The primary circuit with radioactive contents is kept inside a strong containment with filtration capacity, while the secondary circuit outside the containment has no direct contact with the nuclear fuel and is generally non-radioactive. For the Fukushima nuclear power plant, cooling water is not separated into two independent circuits with no comparable partition to keep the radioactivity within. The GNPS and LNPS fare better in such protection.

15. Loss of cooling. At the GNPS and LNPS, this problem is mitigated by the automatic insertion of control-rods into the reactor, to stop the nuclear chain reaction and most of the heat that would be produced. Also, residual heat at the reactor can be taken away by a multiple arrangement of safety systems which operate on electricity.

16. External power supply. At the GNPS and LNPS, there are multiple main connections to the external electricity transmission network, as well as separate, auxiliary external electrical transmission lines. Each nuclear generating unit is provided with two diesel generators to supply essential safety equipment. In addition, a separate diesel generator is provided as a common emergency facility available to back up the nuclear generating units at the Daya Bay site.

17. Prolonged station black out. The present design of the GNPS and LNPS has provided for the use of steam-driven pumps as the source of power to inject cooling water into the steam generators to maintain reactor cooling. During a total loss of electrical power to drive electrical equipment for reactor cooling water flow, reactor cooling is maintained by the discharge of steam raised in the steam generators to the environment. A portion of this steam can be diverted to power a steam-driven pump to inject a continuous stream of water into the steam generators for reactor cooling. The process can be maintained as long as steam is produced.

18. Hydrogen explosion. The risk of hydrogen explosion at the GNPS and LNPS is mitigated by the use of hydrogen recombiners inside the containment building. They enable a controlled chemical reaction of any hydrogen present inside the containment building with oxygen in the air without an explosion.

19. Breach of containment. The use of safety cooling systems will suppress temperature and pressure in the reactor as well as inside the containment building. An internal water spraying system will wash out some of the radioactivity in the space inside into an internal sump. In case of a breach, radioactive releases will be implemented under control by passing the discharge through filters. All such safety features will delay as well as reduce radiological releases into the environment.

Annex D

Consequence Assessment Simulation Study

We have carried out a simulation study using the Accident Consequence Assessment System (ACAS) of the Hong Kong Observatory based on the nominal source term proposed in the UKAEA consultancy report[1] for consideration of taking protective actions during an emergency, and the nominal source term used in France as a technical basis for emergency planning[2]. The nominal source term used in the UKAEA consultancy study represents a very large release towards the upper end of the range of possible source terms in the event of a serious accident at the nuclear power station at Daya Bay. Such a severe scenario is typically a core melt followed by basemat failure, which may qualify up to Level 5 of the International Nuclear and Radiological Event Scale (INES). The French source term represents a reasonable envelope of the releases of various scenarios, and has been adopted as the maximum conceivable release. This much larger source term assumes the occurrence of very severe accidents of the French designed nuclear reactors as used in the nuclear power stations at Daya Bay with core meltdown and breach of containment at the same time, which may be classified at Level 7 of the INES rating. Using this source term as a technical basis, emergency plans in France are designed to cope, as far as possible, with the consequences of such a release.

2. The French source term is in general two to three orders of magnitude (i.e. 10^2 to 10^3 times) more conservative (pessimistic) than the UKAEA source term. Such an extremely large French source term can be considered as covering the upper end of the worst foreseeable scenarios for nuclear plants at Daya Bay.

3. An assessment is made to evaluate whether the following latest IAEA generic criteria[3] as recommended by the Radiological Protection Advisory Group (RPAG) will be reached in Hong Kong for protective actions to be taken –

---

[1] Neal, A.P., M.C. Davies, 1987: "Contingency Planning - Consultancy on the Environmental Aspects of the Daya Bay Nuclear Power Station for the Government of Hong Kong", Government Printer, Hong Kong, 1987.

[2] Charpin, F., E. Raimond and B. Chaumont, 2008: Technical Basis for Off-site Emergency Planning in France, Int. J. of Risk Assessment and Management, Vol. 8, Nos. 1/2, 2008.

[3] IAEA, 2011: IAEA Safety Standards Series No. GSG-2, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, General Safety Guide. RPAG recommendations can be found in paragraph 33 of the paper.

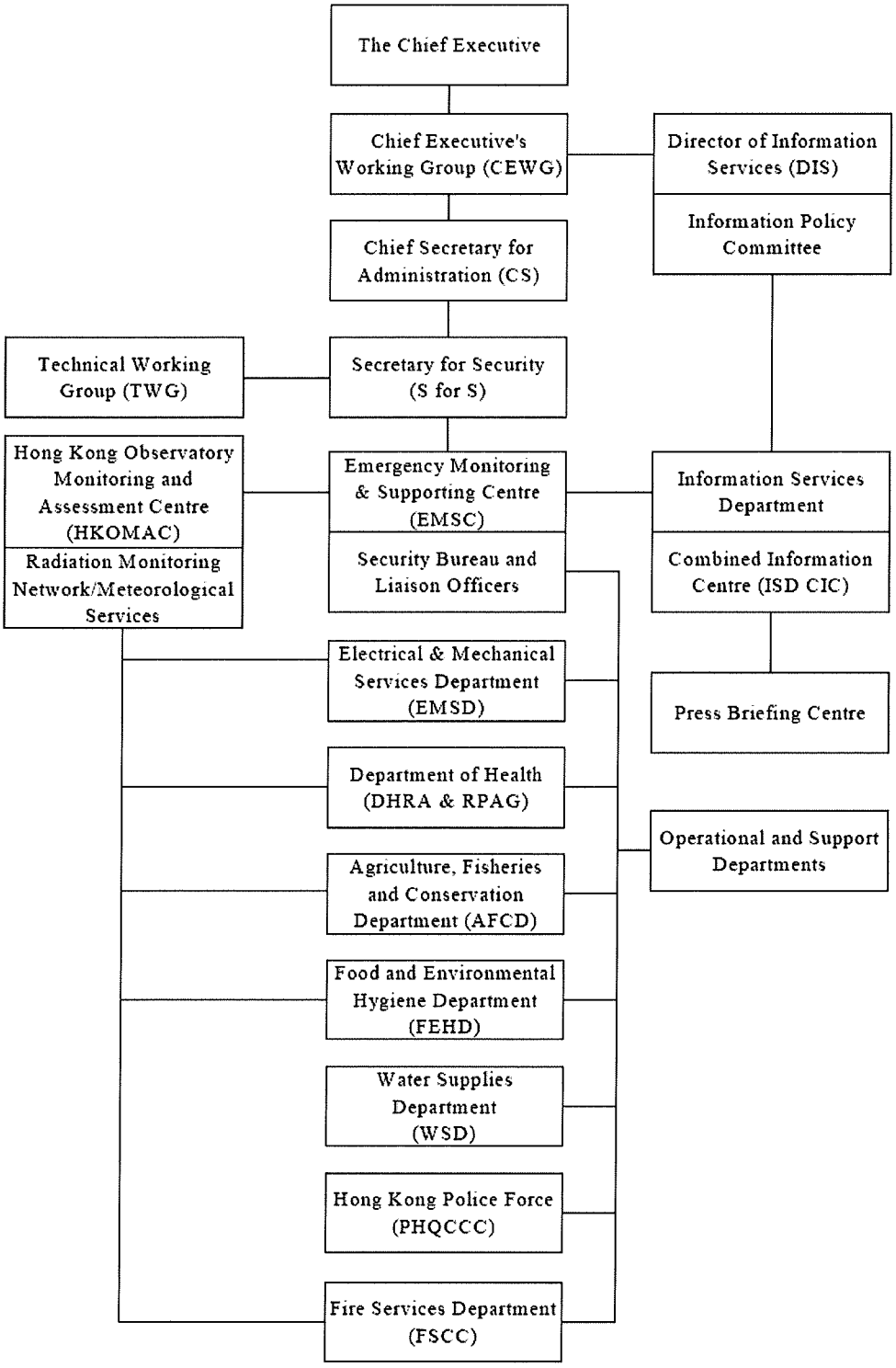
sheltering/evacuation:	100 mSv (effective dose) in the first 7 days; and
iodine thyroid blocking:	50 mSv (equivalent dose in thyroid) in the first 7 days.

4. In the assessment, the ACAS simulation is based on climatological conditions in terms of wind direction and speed over a 30-year period of 1981 – 2010. Other assumptions are neutral atmospheric stability (i.e. class D), even distribution of radioactive releases over 48 hours in the absence of rain, and normal living conditions (80% indoor and 20% outdoor).

5. In the case of the UKAEA source term, the projected doses within Hong Kong are all below the IAEA reference criteria for both sheltering/evacuation and iodine thyroid blocking. Even in the case of the French source term, similar results follow, only that a few remote areas in north-east Hong Kong up to about 30 km from Daya Bay (mostly sea areas) might meet the IAEA dose criteria for thyroid blocking.

Annex E

Government Emergency Response Structure



Annex F

Proposed Composition of the Steering Group

Chief Executive (Chairman)
Chief Secretary for Administration
Secretary for Security
Secretary for the Environment
Secretary for Food and Health
Secretary for Home Affairs
Commissioner of Police
Director of the Hong Kong Observatory
Director of Health
Director of Electrical & Mechanical Services
Director of Information Services
Assistant Secretary, Security Bureau (Secretary)

N.B.

Note: Other Heads of Bureau or Department, including Director of Home Affairs, Director of Fire Services, Director of Immigration, Commissioner of Customs and Excise, Director of Food and Environmental Hygiene, Director of Water Supplies, Director of Agriculture, Fisheries and Conservation, and the Chief Executive of the Hospital Authority may be invited to attend as and when necessary.

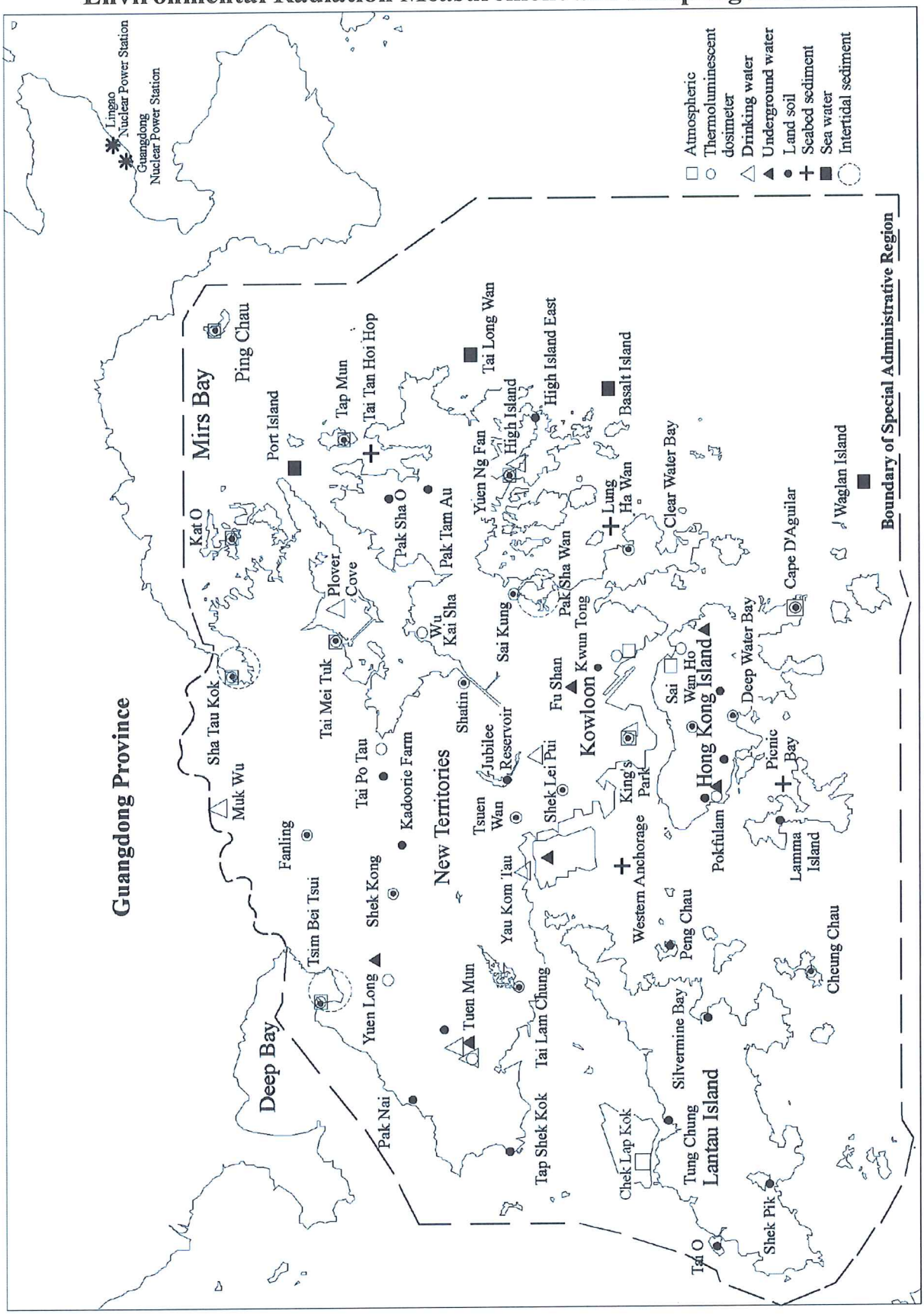
Annex G

Proposed Composition of the Implementation Task Force

Secretary for Security or his representative (Chairman)
Director of Agriculture, Fisheries and Conservation or his representative
Commissioner for Customs and Excise or his representative
Director of Health or his representative
Director of Electrical and Mechanical Services or his representative
Director of Environmental Protection or his representation
Director of Fire Services or his representative
Director of Food and Environmental Hygiene or his representative
Director of Home Affairs or his representative
Director of the Hong Kong Observatory or his representative
Commissioner of Police or his representative
Chief Executive, Hospital Authority or his representative
Director of Immigration or his representative
Director of Information Services or his representative
Commissioner for Transport or his representative
Director of Water Supplies or his representative
Assistant Secretary, Security Bureau (Secretary)

Note: Other Heads of Bureau or Department or his representatives may be invited to attend as and when necessary.

Environmental Radiation Measurement and Sampling Locations



Annex I

Recommendations by Radiological Protection Advisory Group (RPAG)

RPAG has come up with the following recommendations for consideration by the Director of Health for the purposes of the DBCP review -

(1) The set of **Intervention Levels** ("ILs") recommended earlier by RPAG in the Report No. 1 of RPAG (1990) should be updated with the set of generic criteria ("GC") based on the framework put up by the International Atomic Energy Agency ("IAEA") in its General Safety Guide No. GSG-2, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency ("GSG-2").

(2) The set of **Derived Intervention Levels** ("DILs"), which is referenced to the lower ILs recommended earlier by RPAG in the Report No. 1 of RPAG (1990) should be updated with the set of **Operational Intervention Levels** ("OILs") as detailed in GSG-2.

(3) The most up-to-date Codex Guideline Levels for Radionuclides in Food following Accidental Nuclear Contamination for Use in International Trade be given precedence in the control of all food items (including milk, milk products and bottled water) that are locally produced or imported into Hong Kong.

(4) The bilateral standards for the control of radioactivity in drinking water following a nuclear emergency in Guangdong be given precedence in the control of all sources of drinking water, of Dongjiang or local origins.

(5) In the event of shortage of certain food items (including milk, milk products and bottled water) or water as a result of the application of the more stringent standards, and such shortages cannot be reduced or averted by practicable means, the OILs as applicable to the particular radionuclide of concern in the affected food item or water be adopted instead.

(6) In the event of an emergency situation, for which thyroid blocking should be implemented at the generic criterion of 50 mSv projected dose to the thyroid in 7 days for all ages, appropriate prudent factors and considerations should be taken in the dose projection and priority should be given to the early administration of iodine blocking to infants, adolescents and pregnant or lactating women. Consideration should be given to the stockpiling of thyroid blocking agents at strategic locations to facilitate effective distribution when such protective action is necessary.

(7) The DIL for decontamination of skin and inanimate objects advised by RPAG in Report No. 3 of RPAG entitled Intervention Level and Derived Intervention Levels for Decontamination for Members of the Public (1993) be updated with the applicable OIL. Instruments for checking radiological contamination on skin and other surfaces should be appropriately chosen and calibrated to meet the requirements for the measurement at levels corresponding to the OIL. In the event adequate instruments and operating procedures are not available for the implementation of RPAG Recommendations, allowance should be given to applying the DILs where appropriate according to the scaling principle provided in Report No. 1 of RPAG (1990) so that emergency operations can be expeditiously carried out for the benefit of public safety.

(8) As indiscriminate self-initiated protective actions may do more harm than good, suitable proactive actions should be taken to better inform the public of the Government's preparedness for the unlikely event of a radiological/nuclear emergency, and how they could better react in response to the advice given by the Government at the time of an emergency.

Annex J

Nuclear Power Station in East Asia

NPSs in operation

China

1. Guangdong Daya Bay and Lingao (廣東大亞灣及嶺澳)
2. Qinshan (秦山)
3. Tianwan (田灣)
4. Maanshan
5. Chinshan
6. Kuosheng

South Korea

7. Yonggwang
8. Kori
9. Wolsong
10. Ulchin

Japan

11. Sendai
12. Genkai
13. Ikata
14. Shimane
15. Hamaoka
16. Takahama
17. Ohi
18. Mihama
19. Tsuruga
20. Shika
21. Kashiwazaki - Kariwa
22. Tokai
23. Fukushima II
24. Fukushima I
25. Onagawa
26. Higashidori
27. Tomari

NPSs under construction

China

28. Changjiang (昌江)
29. Fangchengang (防港城)
30. Yangjiang (陽江)
31. Taishan (台山)
32. Fuqing (福清)
33. Ningde (寧德)
34. Sanmen (三門)
35. Fangjianshan (方家山)
36. Haiyang (海陽)
37. Shidaowan (石島灣)
38. Hongyanhe (紅沿河)
39. Lungmen

(as at Nov 2011)