

Chapter 8 Outbreak at the Amoy Gardens

Finding of facts

Initial stage of outbreak

8.1 In the course of contact tracing conducted by the Department of Health (DH) following the re-admission of YY to the Prince of Wales Hospital on 22 March 2003, it was learnt that YY had visited his brother in Block E of the Amoy Gardens on 14 March and 19 March 2003. YY was having diarrhoea at that time and used the toilet in his brother's home.

8.2 Later, on 25 March 2003, the Hospital Chief Executive of the United Christian Hospital, Dr TSE Chun-yan, was informed by the Accident and Emergency Department (AED) that two families living in the Amoy Gardens had been admitted. They all showed symptoms of SARS. Dr TSE then asked AED to check whether there had been earlier admissions of suspected SARS cases from the Amoy Gardens. The check revealed that three more patients who had addresses in the Amoy Gardens had been admitted. They included a patient who was admitted on 24 March 2003 and later identified to be YY's brother, and a couple who was admitted on 25 March 2003. On being alerted of this initial cluster of seven cases from three families in the morning of 26 March 2003, DH immediately conducted an investigation. On the same day, eight more patients from the Amoy Gardens were admitted and DH was notified. By then, there was a total of 15 cases from seven families.

The Health, Welfare and Food Bureau Task Force meeting on 26 March 2003

8.3 The Secretary for Health, Welfare and Food, Dr YEOH Eng-kiong, informed the Select Committee that he first learnt about the outbreak at the Amoy Gardens on 26 March 2003 when DH reported the situation at the meeting of the Health, Welfare and Food Bureau (HWFB) Task Force held on that day. The meeting noted that there was a need to modify public health measures given the emergence of cases in the Amoy Gardens. The Director

of Health (D of H), Dr Margaret CHAN FUNG Fu-chun, recommended a basket of measures which included adding SARS to the First Schedule to the Quarantine and Prevention of Disease Ordinance (Cap. 141). After the Task Force meeting, he instructed the Inter-departmental Action Coordinating Committee (IACC), which was chaired by the Permanent Secretary for Health, Welfare and Food (PS(HWF)), Mrs Carrie YAU TSANG Ka-lai, to facilitate DH's work in investigating the outbreak at the Amoy Gardens and implementing the necessary public health measures to control the outbreak. The situation was also reported to the meeting of the Chief Executive's Steering Committee (CESC) held later that day.

Site investigations at the Amoy Gardens between 26 March and 30 March 2003

8.4 The Select Committee noted that between 26 March and 30 March 2003, site visits were made to the Amoy Gardens for carrying out contact tracing and medical surveillance, identifying possible sources of the outbreak and instituting control measures. In the afternoon of 26 March 2003, staff from the Kowloon Regional Office (KRO) of DH made the first site visit to Block E of the Amoy Gardens. They interviewed the residents of 20 available units on seven floors where cases had been reported. Letters were distributed to the residents of Block E advising them to contact DH or seek medical advice if they had SARS symptoms. Pamphlets about SARS were also distributed to the residents of the Amoy Gardens. The building management was instructed to disinfect Block E first, and then all the other blocks. On 27 March 2003, staff from KRO made a second site visit to Block D of the Amoy Gardens. They interviewed the residents of all available units on floors with cases reported. Letters of health advice were distributed to the residents of Block D.

8.5 Dr YEOH told the Select Committee that when the outbreak at the Amoy Gardens was first reported on 26 March 2003, the investigation was influenced by the investigation carried out at the M Hotel, i.e. for droplet infection, environments such as lifts and lifts lobbies could be contaminated. DH was actively investigating the outbreak, but no new information could be collected from the investigation on 27 March 2003 except that there was an increasing number of cases.

8.6 On 28 March 2003, on the instruction of Dr CHAN, the Consultant Community Medicine (Non-communicable Diseases) of DH, Dr Thomas TSANG Ho-fai, visited the Amoy Gardens with a team from the World Health Organization to study the disease pattern and environment. They inspected the building infrastructure and also interviewed some households.

8.7 Dr YEOH informed the Select Committee that he called Dr TSANG in the evening of 28 March 2003 to discuss the progress of the investigation as he was alarmed at the increasing number of cases in the Amoy Gardens. He was told by Dr TSANG that there was a concentration of cases in units 7 and 8 of Block E, and that YY was suspected to be the index patient. He gave the instruction that the investigations at the Amoy Gardens had to be intensified, and that assistance be sought from the Environment, Transport and Works Bureau (ETWB) and its departments to carry out a comprehensive investigation. Dr YEOH explained to the Select Committee that although the relevant government departments had already been involved in DH's investigation, he asked Dr TSANG to approach ETWB for assistance. This was because he wanted to involve officers at a higher level to ensure that Dr TSANG had the necessary support. Dr YEOH understood that Dr TSANG had followed up his instruction with ETWB accordingly.

8.8 Later in the night of 28 March 2003, Dr YEOH called Dr CHAN to ascertain whether she planned to organize visits to individual residents in Block E to find out whether there were others who had been infected. After finding out that Dr CHAN did not have such a plan, he asked her to send her staff to conduct door-to-door visits to all the flats in Block E and other affected blocks in the Amoy Gardens in order to assess the health condition of the residents and provide health advice to them.

8.9 In the early hours of 29 March 2003, Dr TSANG and a team from KRO visited the Amoy Gardens again. They interviewed the residents of all available units in Block E, which accommodated more than 100 families, until around 4:00 am and reported to Dr YEOH that there was no indication that any resident was sick. In the afternoon, Dr TSANG led a multi-disciplinary team to the Amoy Gardens to conduct a detailed investigation. Members of the team were drawn from different departments, including the Buildings

Department, Drainage Services Department (DSD), Electrical and Mechanical Services Department (EMSD), Environmental Protection Department (EPD), Food and Environmental Hygiene Department, DH, Hong Kong Police Force and Water Supplies Department. The team inspected the potable water tanks and pipes, sewer pipes and pipe connections, soil stack on roof tops, elevator rooms and lift shafts, pest infestations, garbage disposal, the ventilation systems at Amoy Plaza and water supply systems. Dr YEOH called Dr TSANG on 29 March 2003 and was told that investigation was still going on and without any new finding.

8.10 On the same day, medical stations were manned by the Auxiliary Medical Services and set up at the two entrances to Block E to provide pamphlets and masks, take temperature, and answer enquiries. In the morning of 30 March 2003, Dr TSANG and the multi-disciplinary team made another visit to the Amoy Gardens. They interviewed some households and collected environmental and water samples.

8.11 The Select Committee noted that Dr YEOH reported the latest situation in the Amoy Gardens at the CESC meeting on 29 March 2003. Dr YEOH told the meeting that action was being taken to investigate whether the infection could be related to the building structure or other facilitates, and that all suspected residents in the area were put under surveillance. The Chief Executive responded that consideration should be given to whether, and, if so, when the whole building should be quarantined.

The Health, Welfare and Food Bureau Task Force meeting on 30 March 2003

8.12 Dr TSANG presented the preliminary investigation findings at the meeting of the HWFB Task Force on 30 March 2003. The Select Committee noted that the preliminary findings included -

- (a) a number of households had more than one family member infected. Movement of people in the Amoy Gardens could have contributed to person-to-person spread of the disease among its residents;

- (b) fresh water tanks were located on the roof top of Block E, supplying water for the whole block. No irregularities were found on inspection except for a missing flap on the overflow pipe of a fresh water tank;
- (c) every evening, cleaners collected garbage from the flats using the passenger lift. No lift appeared to be associated with particularly more cases, and the cleaners did not have SARS symptoms;
- (d) one soil stack ran through the same unit number vertically across floors in the same block. Soil stacks from different units did not cross until they reached the podium level. The soil stack was connected with an air vent pipe which rose to the roof level. There was a floor drain in the bathroom which discharged into the soil stack via a U-shaped water trap. The soil stack was also connected with the bath tub and wash basin in the toilet in each unit; and
- (e) there was a construction site at Jordan Valley opposite to Block E. There was one worker at the construction site with onset of SARS on 25 March 2003 who had a history of visiting the Amoy Gardens. There were no other SARS cases involving workers at the site.

8.13 Dr YEOH informed the Select Committee that it was noted at the meeting that there was an increasing number of cases in Block E, in particular, units 7 and 8, and that the cases in Block E occurred earlier than those in other blocks. As there was a possibility that the residents in Block E had already formed an infected pool, the meeting discussed the option of isolating Block E to control the spread of the disease in the community. It was considered that isolating Block E would facilitate medical surveillance of those “potentially affected” persons and prevent them from spreading the disease. As for the other blocks, the meeting did not see the need to isolate them at that stage because first, their case distribution pattern was different; second, there were much fewer cases compared to Block E; and third, their chances of infection

would be minimized once Block E was isolated. Dr YEOH told the Select Committee that he could not recall who first suggested the isolation of Block E at the meeting, but that the option had already been discussed at the meeting of CESC on 29 March 2003.

8.14 Dr YEOH also informed the Select Committee that after the findings of the investigation were presented at the first part of the Task Force meeting which lasted for about an hour, the Chief Executive arrived to join the discussion on the outbreak at the Amoy Gardens. The Chief Executive then left before the end of the meeting. After the meeting, he consulted the Chief Executive on the telephone and obtained his agreement to isolate Block E. He then asked Dr CHAN who was still in the meeting room to exercise the necessary statutory power to isolate Block E as a public health protection measure.

8.15 The Select Committee noted that by the evening of 30 March 2003, 190 cases in the Amoy Gardens had been reported. Block E had the highest number of 93 cases, Block C had 24, Block B had 20, Block D had 15, and the rest of the cases were distributed among the remaining blocks of the Amoy Gardens.

Issuance of the Isolation Order on Block E of the Amoy Gardens

8.16 Dr YEOH told the Select Committee that it was around 4:00 pm or 5:00 pm on 30 March 2003 when he asked Dr CHAN to exercise her statutory power to isolate Block E. Mrs Carrie YAU, who chaired the IACC, also initiated the planning and preparation for the isolation exercise. About two hours later when he returned to his office, he got a message from Mrs YAU and some other staff that Dr CHAN had gone back to discuss the matter within DH. Someone in DH expressed the concern that Hong Kong would become a “laughing stock” of the public health community if the Isolation Order was issued. Dr YEOH’s impression was that Dr CHAN had reservations about the issuance of the Isolation Order and expressed difficulties in implementing the decision.

8.17 An emergency meeting of CESC was convened at 9:30 pm that evening to discuss the matter again. The attendees at the meeting included the Chief Secretary for Administration, Mr Donald TSANG Yam-kuen, the Secretary for Justice, Ms Elsie LEUNG Oi-sie, the Director of the Chief Executive's Office, Mr LAM Woon-kwong, Dr CHAN and Dr YEOH. The meeting discussed very thoroughly the various issues, including the legal basis for the Isolation Order, the practicalities in implementing the measure and the justification for isolating Block E. It was agreed that there was no evidence of a continuing infection risk because the place had been cleansed. The evidence appeared to suggest the outbreak was a "point source outbreak" and that there was no risk to the residents by keeping them there. The decision to issue the Isolation Order in respect of Block E was endorsed at the meeting. The next morning, i.e. on 31 March 2003 at 6:00 am, Dr CHAN imposed an Isolation Order on Block E of the Amoy Gardens for a period of 10 days up to midnight on 9 April 2003.

8.18 Dr YEOH informed the Select Committee that Dr CHAN did not attend the first part of the HWFB Task Force meeting in the afternoon on 30 March 2003. Dr CHAN came to the meeting almost towards the end of the meeting. Dr YEOH said to the Select Committee, "maybe she did not have privy to the inter-discussions prior to that but certainly at the end of the meeting the experts in the Task Group were of the view that there was sufficient evidence to isolate the E Block residents because, as I described, those unique features which distinguished E Block from the other blocks and that the epidemiological evidence suggested that it was the E Block that was the source of infection in the other blocks". Dr YEOH pointed out that no one raised any issues relating to or disagreed with the isolation of Block E. Dr CHAN also did not voice her reluctance or concerns when he asked her after the meeting to exercise her statutory powers to isolate Block E. He added that, "I think I respect that she should raise these concerns if they were issues. Obviously I would have preferred that she had raised this with me directly at that time, but she did not. But even raising it to the Chief Executive, I accepted that". In response to a subsequent enquiry from the Select Committee as to the reason for her not have raised her concerns at the HWFB Task Force meeting, Dr CHAN informed the Select Committee that Dr YEOH ordered the isolation of Block E of the Amoy Gardens at the close of

the meeting. She was unable to give any opinion, as there was no discussion on the matter.

8.19 Dr YEOH pointed out that the discussion on the issuance of the Isolation Order at the emergency meeting of CESC held in the evening of 30 March 2003 did not cause delay to its implementation. The Order would still have to be implemented in the following morning as there were logistical arrangements and preparations that had to be made through the night of 30 March 2003.

8.20 According to Mr LAM, Dr CHAN called him after the HWFB Task Force meeting expressing her concerns about implementing the Isolation Order on Block E and the legal basis for issuing the Order. It was he who suggested to the Chief Executive that a meeting be convened that evening to further discuss the matter. Mr LAM explained to the Select Committee that there was no question of the Chief Executive having to intervene because Dr YEOH failed to convince Dr CHAN of the need to issue the Isolation Order. As Dr CHAN was concerned about the legal basis for the Order, it was only appropriate for CESC to discuss the matter. Moreover, since a number of government bureaux and departments were involved in implementing the Isolation Order, having a meeting to sort things out would save the time of calling everyone concerned by telephone.

8.21 The Select Committee noted that when Dr CHAN was asked why it was decided on 30 March 2003 to isolate Block E, she explained to the Select Committee that the reasons were the increasing number of cases and the need to prevent the spread of the disease to the community. The options of whether the residents should be quarantined at home or at recreation camps had also been considered. The main concern of the Government was that the residents would go “underground”. Although the isolation of Block E was for the protection of the health of the people of Hong Kong, it was also necessary to ensure that the public would not feel that the Government was acting unreasonably.

8.22 Dr CHAN also informed the Select Committee that following the meeting of the HWFB Task Force, she immediately held an urgent meeting

with the senior staff in DH to discuss Dr YEOH's order. It was their view that many questions associated with the issuance of the Isolation Order had not yet been clearly addressed or fully discussed. They had raised the following points -

- (a) what were the criteria for triggering off an Isolation Order to restrict movements of residents of other blocks of the Amoy Gardens and other housing estates?
- (b) would the action be sustainable given the additional heavy workload on the law enforcement agencies and other departments to provide meals and other support services?
- (c) what would be the signals that the action would send to the local and international communities?
- (d) were there other equally good or even better options such as compulsory attendance at designated medical centres or immediate removal of residents to camps?

8.23 Dr CHAN explained that she tried to contact Dr YEOH to request a second meeting in the same evening to address the outstanding issues. Despite various attempts to get in touch with him and his office for almost two hours, she was unable to locate him. As this was a matter of great urgency, she approached Mr LAM Woon-kwong for assistance with the consent of Mrs Carrie YAU.

Issuance of the Removal Order

8.24 The Select Committee noted that on 31 March 2003, Dr TSANG and the multi-disciplinary team made another visit to the Amoy Gardens. Staff from DH and EPD entered available flats in units 7 and 8 in Block E to examine the floor drains. Staff from EPD and EMSD conducted airflow experiments in the lift shafts and collected environmental samples. According to Dr YEOH, in the morning of 1 April 2003, the Secretary for the Environment, Transport and Works (SETW), Dr Sarah LIAO Sau-tung,

informed him that her team which was working with DH staff had some preliminary findings regarding the ventilation system of the lifts and the sewerage system of Block E. When Dr LIAO told him of the preliminary findings, he was alarmed because he earlier learnt that the stool samples of some of the SARS patients had been tested Polymerase Chain Reaction (PCR)-positive for the SARS coronavirus. They became suspicious that the sewerage system could have contributed to the vertical spread of SARS in Block E.

8.25 The Select Committee noted that on 27 March 2003, one stool specimen from the Queen Elizabeth Hospital and a number of respiratory tract specimens from various hospitals were tested PCR-positive for the SARS coronavirus. Dr YEOH explained to the Select Committee that he learnt from the Consultant in-charge of Pathology Service of DH, Dr Wilina LIM Wei-ling, two or three days before 1 April 2003, that DH had done some initial studies of stool specimens from different patients, and that in some of the fecal specimens, they were able to detect the virus using PCR. Although the information was very preliminary and having the genetic material did not mean that the virus was viable, he was already alarmed when Dr LIAO told him of the preliminary findings regarding the lifts and sewerage system of Block E because when the two findings were taken together, it immediately occurred to him that perhaps the sewerage system might have been one of the possible reasons why there was a large number of cases in Block E.

8.26 Dr YEOH told the Select Committee that he immediately reported his suspicions and concerns to the Chief Executive. The Chief Executive instructed that a meeting of CESC be convened that morning, and he and Dr LIAO reported the findings at the meeting. He strongly recommended evacuating the residents given the risk of infection if they continued to stay in Block E. The recommendation was endorsed and a decision was made to evacuate the residents to another place so that thorough cleansing and in-depth investigation work could be carried out. He instructed IACC to immediately start preparation for an evacuation exercise to move the residents into the Lady MacLehose Holiday Village and Lei Yue Mun Park Holiday Village. Later that day, the Removal Order was issued to evacuate the residents of Block E to the recreation camps.

8.27 The Select Committee noted that at the meeting of CESC held the day before, i.e. on 31 March 2003, the Secretary for Home Affairs, Dr Patrick HO Chi-ping, reported that four holiday camps had been identified for quarantine purposes, and that the maximum capacity could be up to a few thousand residents.

8.28 According to Dr LIAO, it was during the weekend when preparation was made to quarantine residents of Block E that there was discussion on the need to test the stool samples of SARS patients for the SARS coronavirus. Dr LIAO explained that as SARS was a respiratory tract disease, the focus of investigation had all along been on droplet infection through close contact. She was not aware that some of the SARS patients had diarrhoea. It was only when the results of the tests came back on 1 April 2003 that she realized that the sewerage system could have contributed to the spread of the disease. This finding led to the issuance of the Removal Order.

8.29 The Select Committee noted that Dr YEOH told Mrs YAU around 11:00 am on 1 April 2003 that residents in Block E would need to be evacuated. Preparation work for the evacuation of the residents started immediately. The Home Affairs Bureau and the responsible officers of the Leisure and Cultural Services Department were informed of the preparation plan. Households that had moved out of Block E before the imposition of the Isolation Order on 31 March 2003 were urged to contact DH for medical surveillance. With the assistance from the Police, all except one household (as the occupant was not in Hong Kong) had been contacted for medical surveillance by 4 April 2003. As DH did not record, during contact tracing, whether the contacts had moved out of the Amoy Gardens before the imposition of the Isolation Order, DH did not have any data on whether any such residents had contracted SARS.

Further investigations at the Amoy Gardens and the findings of the investigations

8.30 Dr LIAO informed the Select Committee that at the CESC meeting on 1 April 2003, the Chief Executive asked her to conduct a detailed investigation into the environmental factors which might have contributed to

the spread of the infection in Block E as soon as possible. A ETWB Task Force was set up on 1 April 2003 under her leadership to undertake the investigation. The Task Force comprised staff of ETWB, EPD, EMSD, DSD and the Architectural Services Department.

8.31 The Select Committee noted that Dr LIAO in leading the ETWB Task Force to conduct the investigation into the SARS outbreak at the Amoy Gardens, she was acting in her capacity of a professional practitioner of environmental health and occupational safety, and not as SETW, and she reported to SHWF. The Select Committee also noted that Dr LIAO was not aware of the setting up of the multi-disciplinary team on 29 March 2003 until 31 March 2003 when her staff reported to her the findings of their investigations at the Amoy Gardens. Dr LIAO explained that the involvement of her staff in the work of the multi-disciplinary team need not go through her. She could not recall whether the work of the team was mentioned at previous meetings of CESC.

8.32 On 2 April 2003, Dr LIAO conducted a site inspection at the Amoy Gardens with the ETWB Task Force. On 3 April and 4 April 2003, again with the ETWB Task Force, Dr LIAO conducted detailed investigation into the possible environmental transmissions of SARS at the Amoy Gardens with support from DH staff. On 5 April 2003, Dr LIAO presented the preliminary findings in the form of a technical report to CESC. The meeting was told that the sewage system was found to be the most likely environmental factor accounting for the outbreak. Dr LIAO explained how it was possible for the contaminated sewage to create droplets which could have been brought into other residential units through “the chimney effect” and the various entry points, including windows and dried up floor drains in the toilets.

8.33 The findings of the technical report were incorporated into the investigation findings on the SARS outbreak at the Amoy Gardens released by the Government on 17 April 2003. Dr LIAO pointed out that the findings of the investigation into the outbreak at Block E could not fully explain the spread of the infection in the other blocks of the Amoy Gardens. Furthermore, the occurrence of SARS cases in some residential buildings elsewhere, other than the Amoy Gardens, could not likewise be fully explained.

8.34 The Select Committee noted that the first batch of SARS cases in the Amoy Gardens was reported on 26 March 2003. Not counting YY, the SARS cases in Block E occurred three days earlier than those in the other blocks, i.e. 21 March to 23 March 2003. It was also on 21 March 2003 that the flush water system of Block E was suspended due to the breakage of a flush water pipe serving unit 8. The number of cases peaked on 31 March 2003 with 64 cases reported on one day and declined subsequently to one case on 10 April 2003. According to the main findings of the investigation into the outbreak at the Amoy Gardens announced by the Government on 17 April 2003, there were 289 SARS cases in the Amoy Gardens as at 10 April 2003. There was a concentration of cases in Block E, accounting for 43% of the cumulative total. Block C (15%), Block B (13%) and Block D (12%) recorded the second, third and fourth highest incidence of SARS infections. The probable explanation of the outbreak was as follows -

- (a) it was likely that YY initially infected a relatively small group of residents within Block E through the sewage system and the use of shared communal facilities such as lifts and staircases. These infected residents subsequently transmitted the disease to others both within and outside Block E through person-to-person contact and environmental contamination; and
- (b) the bathroom floor drains with dried-up U-shaped water traps provided a pathway through which small droplets containing viruses from the contaminated sewage entered the bathroom floor drains through negative pressure generated by exhaust fans when the bathroom was being used with the door closed. Water vapour generated during a shower and the moist condition of the bathroom could also have facilitated the formation of water droplets. The chances of exposure to the virus were higher in the Amoy Gardens given that the bathrooms in the apartment units there were generally small. Contaminated droplets could then have deposited the virus on various surfaces, such as floor mats, towels, toiletries and other bathroom equipment.

8.35 The Select Committee also noted that the findings also showed that coronavirus was detected in rodent droppings and bodies of cockroaches, and that as rodents showed no signs of the disease, it was likely that they played the role of a mechanical carrier for the virus in this outbreak.

8.36 Dr YEOH told the Select Committee that he did not personally visit the Amoy Gardens during the SARS outbreak. He was not aware that Dr Margaret CHAN had paid visits to the Amoy Gardens during the outbreak.

Cleansing and disinfection operations at the Amoy Gardens

8.37 Between 7 April and 10 April 2003, thorough cleansing and disinfection operations were conducted in the Amoy Gardens with the cooperation of the Owners' Corporation and the residents concerned and with the joint efforts of various agencies for all the flats and common areas of Block E. Advice and guidelines were given to residents of other blocks in the Amoy Gardens to disinfect their flats as precautionary measures. Disinfectants were provided for the residents. In particular, the importance of maintaining the water seal in the U-shaped water traps of drainage outlets was stressed.

“Involvement” of Dr Stephen NG Kam-cheung in the investigation into the outbreak at the Amoy Gardens

Background

8.38 The Select Committee was approached by Dr Stephen NG Kam-cheung regarding the investigation into the SARS outbreak at the Amoy Gardens. According to Dr NG, he taught epidemiologic research methods part-time at The Chinese University of Hong Kong. Dr NG told the Select Committee that during the outbreak, DH declined several offers of help from his colleagues to assist in its investigation into the outbreak and DH also refused to share any data relating to its investigation. Dr NG also sought the Chief Executive's help to obtain the data.

Meeting on 4 April 2003

8.39 Dr NG told the Select Committee that through the Chief Executive's assistance, he met with Dr YEOH on 3 April 2003 and was subsequently invited to attend a meeting with Dr Sarah LIAO, Dr Thomas TSANG and other government officials on 4 April 2003. At the meeting, he expressed the view that the outbreak at the Amoy Gardens looked like a common source epidemic with very unusually high speed and wide distribution that could not be explained by human-to-human transmission alone. An infected animal vector was very likely, and the contaminated source could be food or water. Although there was positive pressure inside water pipes, it could not be ruled out that the water inside the pipes could have been contaminated through "osmosis".

8.40 Noting that rats and cockroaches were being trapped in the Amoy Gardens, Dr NG suggested that autopsies should be performed on the trapped rats and their serum tested for antibodies to the SARS coronavirus to find out whether they had been infected. Dr NG believed that unless these pests were actively infected, they could not have caused such a massive outbreak as a tremendous amount of virus was needed and some mechanism of amplification was necessary.

8.41 Dr YEOH informed the Select Committee that subsequent to the initial introduction of Dr NG through the Chief Executive's Office on 3 April 2003, he made arrangements for Dr NG to attend a meeting with him and Dr LIAO on 4 April 2003. Representatives from ETWB and DH were also in attendance. At the meeting, Dr NG expressed his views on the outbreak in Block E of the Amoy Gardens, citing rats as the most probable cause. Dr NG postulated that the rats had been contaminated at the garbage collection point or the restaurants on the podium of Block E, and that they in turn had contaminated the water supply either by urinating on the pipes or at the main water tanks of Block E.

8.42 The Select Committee noted that in response to Dr NG's hypothesis, Dr LIAO made the observation that it was not possible for the urine of rats to have seeped through the cracks, if any, of the pipes supplying water to the

residential units owing to the positive pressure of the water inside the pipes. Dr LIAO also considered that the chlorine in the water inside the water tanks should have prevented extended isolated survival of the virus. The meeting also noted that no workers at the garbage collection point and the restaurants on the podium of Block E had been infected. If those areas had been the “sources” of the contamination for the rats, then the possibility of infections of those individuals would be extremely high.

8.43 Dr LIAO told the Select Committee that Dr NG appeared to know very little about rats. For instance, he could not tell the difference between sewer rats and roof rats. Dr NG also postulated rats urinating on the water pipes while standing up and the water supply thus becoming contaminated through “osmosis”. Dr LIAO pointed out that there could not be any “osmosis” as the surface of a water pipe was not a semi-permeable membrane. She said that such knowledge was very fundamental, and that the other participants appeared to have been taken aback by what Dr NG had said at the meeting.

8.44 Dr TSANG told the Select Committee that he could not recall whether or not he attended the meeting with Dr NG on 4 April 2003 because so much happened during the few months of the outbreak.

Meeting on 5 April 2003

8.45 Dr NG attended another meeting in the morning of 5 April 2003 with representatives from the Agriculture, Fisheries and Conservation Department (AFCD), DH and the Food and Environmental Hygiene Department (FEHD). The Select Committee noted that there was no record of the meeting and that there were numerous inconsistencies between Dr NG’s evidence of what happened at the meeting on 5 April 2003 and that of Dr YEOH and the other attendees, viz, Dr Thomas TSANG, Head of the Research Office of HWFB, Dr LO Su-vui; Senior Veterinary Officer (Veterinary Laboratory) of the Veterinary Laboratory Division of AFCD, Dr Trevor Maxwell ELLIS; the Pest Control Officer In-charge of the Pest Control Advisory Section of FEHD, Mr YUEN Ming-chi; and Dr Paul SAW

Thian-aun, a retired Deputy D of H who worked in DH as a volunteer from 29 March to 15 April 2003.

8.46 The evidence given by these seven witnesses covered a number of issues. However, given the time constraint, i.e. the need for the Select Committee to complete its inquiry and table its report in Council before the end of the current term of the Council, the Select Committee has to confine its study to those issues which are most relevant to the terms of reference of the Select Committee. The Select Committee has therefore focused on the following areas of concern -

- (a) whether Dr YEOH had tried to suppress the investigations on rats; and
- (b) whether the Government had tried to cover up the possibility that rats might have been a factor of transmission.

8.47 The gist of Dr NG's evidence on what was discussed in relation to these two areas of concern at the meeting on 5 April 2003 is detailed in paragraphs 8.48 to 8.53 inclusive below.

8.48 Dr SAW arrived at the meeting and announced that the results of the tests on rat specimens were positive. Specifically four out of eight droppings and one throat swab were PCR-positive. Noting that four rats had been trapped the day before, Dr NG requested that the four rats be autopsied immediately. Dr ELLIS was instructed by Dr SAW to conduct the autopsies. Dr NG described to Dr ELLIS what the pathologies were and Dr ELLIS left immediately to do the autopsies. Dr YEOH arrived at the meeting after Dr ELLIS had already left.

8.49 According to Dr NG, the broader ramifications of the spread of SARS were discussed at the meeting. All those at the meeting agreed that it would deal a severe blow to Hong Kong's economy as travel and trade might be further restricted by foreign countries. Rats and diseases associated with rats would remind people of plague. Hong Kong's image would be tarnished

and Hong Kong could lose its status as a world-class city. At one point, Dr YEOH expressed the fear that there might be riots in Hong Kong.

8.50 The meeting also discussed what to say to the public regarding the investigations on rats. Everyone agreed that it would create a big alarm if the public were told that rats had spread SARS in the Amoy Gardens. Dr YEOH suggested that an alternative was not to tell the public anything and just concentrate on killing rats. Dr YEOH further suggested stopping all investigations on rats since any positive findings would have to be disclosed to the public. Dr NG quoted in his evidence what Dr YEOH had said: "If you don't do anything, there is nothing to tell". In those circumstances, he could not be accused of withholding information and the rat hypothesis could be downplayed as just one of the many possibilities as long as there was no confirmation.

8.51 Dr YEOH then asked all those present to keep the rat findings confidential. Objections were raised by some members of the group. Dr TSANG remarked that it had never been possible to keep anything in DH secret and that the press was already asking questions on the results of the tests on pests found in the Amoy Gardens. Dr NG then said that even if it was possible to keep it secret in Hong Kong, scientists from other places would eventually find out the truth if the rat hypothesis should prove to be correct. These objections were ignored by Dr YEOH.

8.52 Dr SAW mentioned that Dr ELLIS was already on the way to perform autopsies on the four rats. Dr YEOH then sent someone to call Dr ELLIS to stop the autopsies but Dr ELLIS could not be reached on the phone at that time. Dr NG left the meeting before it ended as he felt that he was in a dilemma of not wanting to breach the promise of confidentiality on the one hand, and feeling duty-bound to inform the public of the potential danger on the other.

8.53 Dr NG told the Select Committee that after the meeting on 5 April 2003, he wrote to Dr YEOH on 7 April 2003 urging him not to give up the investigations on rats. He received a call from Dr LO Su-vui in the morning of 8 April 2003 thanking him on behalf of Dr YEOH for his letter of 7 April

2003, and also telling him that the decision not to continue with the investigations on rats was reversed shortly after he had left the meeting on 5 April 2003.

8.54 The Select Committee noted the evidence of Dr YEOH and the other attendees of what was discussed in relation to the two areas of concern as detailed in paragraphs 8.55 to 8.66 below.

8.55 Dr YEOH informed the Select Committee that he was certainly concerned when he was informed, at the meeting on 5 April 2003, that the test results of the rat droppings and throat swabs collected by FEHD were PCR-positive for the coronavirus in some of the samples. He instructed Dr ELLIS to carry out autopsies on the four rats trapped the night before and Dr ELLIS left the meeting to head back to his laboratory to conduct the autopsies.

8.56 Dr YEOH told the Select Committee that it was inconceivable that he could have asked Dr ELLIS to stop the autopsies as he was the one who had instructed Dr ELLIS to conduct the autopsies. In fact, he invited Mr YUEN to attend the meeting to give a briefing on the rat infestation situation in the Amoy Gardens. Following Mr YUEN's briefing, he instructed FEHD to intensify their pest control efforts in the Amoy Gardens and the surrounding areas. He also asked FEHD to collect more specimens and to extend the collection area to beyond the Amoy Gardens, such as the Lower Ngau Tau Kok Estate and the Telford Garden.

8.57 Dr ELLIS informed the Select Committee that it was Dr YEOH who sent him to conduct the autopsies. He left the meeting after hearing Mr YUEN's presentation of the investigations on rats in the Amoy Gardens and confirming with Mr YUEN where to collect the rats. Dr ELLIS also informed the Select Committee that on his way to collect the rats, he had his mobile phone turned on and did not receive any call asking him to stop performing the autopsies.

8.58 Dr ELLIS also told the Select Committee that although Dr NG might have hypothesized on the possible pathology of this new coronavirus, he considered Dr NG's written statement to be quite presumptuous when Dr NG

made the point that “I described to Dr ELLIS what the possible pathologies were”.

8.59 The Select Committee noted that while Dr TSANG could not recall who sent Dr ELLIS to perform the autopsies, both Dr LO and Dr SAW confirmed that it was Dr YEOH who sent Dr ELLIS.

8.60 Dr YEOH told the Select Committee that he had no recollection about the discussion on the ramifications of the spread of SARS by rats. Dr NG might have mentioned something about Hong Kong’s economy if the disease could be spread by rats and he had no recollection of expressing the fear that there might be riots in Hong Kong. Dr YEOH also told the Select Committee that he did not give any instruction to kill rats. He did not recall that there was any discussion on what to say to the public. Dr NG might have talked about it. He absolutely refuted Dr NG’s allegation that he had suggested not to tell the public anything and just concentrate on killing rats. As regards whether he had requested everyone at the meeting to keep the findings in respect of rats confidential, Dr YEOH recalled that he might have impressed on Dr NG to keep the findings confidential as the investigations on rats were still ongoing and the preliminary findings might be misinterpreted.

8.61 Dr ELLIS did not recall any discussions on the broader ramifications such as the effect on the economy, Hong Kong’s image or riots in Hong Kong when he was at the meeting. He also did not recall any discussion on what to say to the public or Dr YEOH asking the attendees of the meeting to keep the findings of the tests on rats confidential. He informed the Select Committee that reports on autopsies from the Veterinary Laboratory of AFCD were always kept confidential between the laboratory and the client.

8.62 Dr TSANG told the Select Committee that he had no recollection about specific comments on the ramifications on the spread of SARS by rats, including Dr NG’s claim about Dr YEOH’s mention of riots. Dr YEOH did ask the attendees not to disclose the test results to the public at that juncture as premature disclosure of this information might mislead the public. Dr TSANG expressed the view that they could not keep this information

confidential for long. Dr TSANG did not recall Dr YEOH giving any instructions to stop the investigations on rats.

8.63 Dr TSANG also told the Select Committee that there was no question of covering up the rat hypothesis as more tests needed to be carried out and that the results of the autopsies would be available within one to two days. Moreover, rodent control measures had been stepped up since the meeting on 5 April 2003, and the role played by rats and cockroaches in the outbreak at the Amoy Gardens was clearly explained in the report on the investigation into the SARS outbreak at the Amoy Gardens released by the Government on 17 April 2003.

8.64 Mr YUEN told the Select Committee that Dr YEOH asked him to continue the trapping of rats for examination and to trap rats from areas around the Amoy Gardens as well. He suggested extending the trapping area to the Lower Ngau Tau Kok Estate and the Telford Garden. Mr YUEN also told the Select Committee that more than 100 traps were placed in the Amoy Gardens and that traps were also placed in the nearby housing estates. He could not recall any discussions on the ramifications of the spread of SARS by rats. He also did not recall that Dr YEOH expressing the fear that there might be riots in Hong Kong. Dr YEOH did ask attendees not to release the preliminary results on the examination of rats as more tests would be conducted. Dr YEOH did not call Dr ELLIS to stop him performing the autopsies on rats.

8.65 Dr LO's recollection was that there was no discussion on the ramifications of the spread of SARS by rats and Dr YEOH did not express the fear that there might be riots in Hong Kong. There was no discussion on what to say to the public about the investigations on rats. However, there was a general consensus that until more light was shed on the true meaning of the PCR results, the findings should be kept confidential as they were inconclusive and could be misleading. Dr YEOH did not give any instructions to stop the investigations on rats. On the contrary, he asked that investigations on rats be intensified and more rats be collected in order to carry out more tests.

8.66 According to Dr SAW, he did have some vague memory that Dr NG might have muttered something about the impact on Hong Kong if rats had

played a role in spreading the disease, but he could not recall having heard Dr YEOH expressing the fear that there might be riots in Hong Kong. He also did not recall any discussions on what to say to the public, but he informed the Select Committee that Dr YEOH did not give instruction to stop the investigations on rats. As bits and pieces of results could be misinterpreted, he suggested that Dr ELLIS who was on his way to perform the autopsies be reminded to take steps to safeguard his findings against premature disclosure. Dr YEOH did not stop Dr ELLIS performing the autopsies.

Subsequent developments

8.67 Dr NG sent Dr YEOH a letter on 7 April 2003 stating, among other things, “while I know there are political and administrative difficulties that I may not comprehend, I think ‘see no evil’ is a greater moral lapse than ‘say no evil’. Moreover, researchers in other countries may soon find out what we have found”.

8.68 According to Dr YEOH, subsequent to the meeting on 5 April 2003, he did not have further contact with Dr NG regarding the SARS outbreak at the Amoy Gardens but he received the letter above-mentioned from Dr NG. This was dealt with by Dr LO who telephoned Dr NG on 8 April 2003. He understood that Dr NG had been informed that further investigations were being conducted by environmental health, veterinary and public health personnel, and that the results were pending until all the findings could be pieced together. He also understood that Dr NG subsequently published a hypothesis that roof rats were the culprits responsible for the transmission of the SARS coronavirus in the Amoy Gardens outbreak. However, the hypothesis did not tally with the findings of the field investigation by FEHD that rat infestation in the Amoy Gardens was not serious, and that sewer rats, rather than roof rats, was the more common species in the Amoy Gardens.

8.69 According to Dr LO, he telephoned Dr NG on 8 April 2003 because he was asked by Dr YEOH to respond to Dr NG’s letter of 7 April 2003. In the telephone conversation, he told Dr NG about the investigations that were being performed by environmental health, veterinary and public health personnel.

8.70 Dr YEOH pointed out that even before the meetings with Dr NG, he had already raised at the meetings of CESC on 2 April and 3 April 2003 the issue of investigating whether rats were linked to the outbreak at the Amoy Gardens. At the meeting on 2 April 2003, Dr LIAO reported that environmental health investigations were being conducted full steam ahead in the Amoy Gardens, and that a cat had been found to be “infected”. Dr YEOH made the point that it should be established whether the pets and rats in the Amoy Gardens had been infected, or were just passive carriers, and whether they were linked to the outbreak. The Chief Executive agreed that the risk of animal infection had to be addressed as a matter of urgency.

8.71 At the CESC meeting on 3 April 2003, Dr YEOH reported that the investigation into the outbreak at the Amoy Gardens was still ongoing but the latest indication was that the outbreak was likely to be linked to the sewage system, and possibly rats and cockroaches too. The Chief Executive instructed that all parties concerned should endeavour to find out whether the outbreak was linked to the sewage system, rats or cockroaches. The Chief Executive urged Dr LIAO to complete her investigation work as early as possible.

8.72 Dr YEOH also pointed out that the investigations on rats started on 2 April 2003 and that an extensive investigation into the outbreak at the Amoy Gardens was carried out by DH and the multi-disciplinary team. With regard to rats, approximately 100 traps were set in various parts of the Amoy Gardens every day between 2 April and 20 May 2003, and 14 rats were trapped. No dead rat was found in the Amoy Gardens during that period and no rat was trapped after 11 April 2003. A series of investigations were carried out, including the following -

- (a) autopsies were carried out on all the 14 rats trapped in the Amoy Gardens between 2 April to 20 May 2003. The autopsies showed no gross abnormalities;
- (b) a total of 83 rat specimens were collected and tested. Of these, 61 specimens were taken from the 14 autopsied rats

and with the remaining 22 from rat droppings collected in the field;

- (c) a total of 176 tests, including repeat-PCR, sequencing, culture and neutralization tests were carried out on the rat specimens. Of these, 124 tests were carried out on specimens taken from the 14 autopsied rats, while 52 tests were on specimens from rat droppings collected in the field; and
- (d) of the 83 rat specimens, six samples from droppings and two samples from throat swabs were tested positive. However, all the blood samples were negative, indicating that the rats themselves were not infected. All the culture results were also negative. The results tended to lend support to the conclusion that the rats were mere mechanical carriers for the virus.

8.73 Dr YEOH wrote to the Select Committee on 14 May 2004 to explain, among other things, the decision made at the meeting on 5 April 2003 to keep confidential for the time being the results of the tests on some of the samples of the rat droppings collected from the Amoy Gardens. Dr YEOH cited four reasons. First, there was uncertainty whether the PCR-positive results were due to the rat coronavirus which had been in existence for a long time, or the new human SARS coronavirus. Second, the PCR-positive results in the rat droppings were most likely to have been due to environmental contamination. Third, further studies would be undertaken immediately to clarify whether rats played any contributory role in the outbreak at the Amoy Gardens. Fourth, actions had been taken in the Amoy Gardens to intensify pest control efforts and decontaminate the environment to improve environmental hygiene. Dr YEOH pointed out that in the circumstances, it would have been imprudent to release the preliminary data. This was also in line with the prevailing practice internationally, and the established principles of scientific investigation. Dr YEOH also explained to the Select Committee that the preliminary positive PCR results were meant to be kept confidential only for the time being, until they were clarified by the rat autopsies.

Other issues

8.74 As mentioned in paragraph 8.46 above, the evidence given by the witnesses covered other issues raised at the meeting on 5 April 2003 which the Select Committee did not have time to study and therefore is not in a position to make analysis and draw conclusions thereon. The main points of the evidence obtained are summarized in Appendix VIII.

Analysis

8.75 The Select Committee has considered whether there was delay in investigating the outbreak at the Amoy Gardens. The Select Committee notes that upon notification of an initial cluster of seven cases in the morning of 26 March 2003, DH immediately conducted contact tracing. DH took the additional step of interviewing the residents of the available units on the seven floors in Block E of the Amoy Gardens where cases had been reported. On the same day, letters were also distributed to residents of Block E advising them to contact DH or seek medical advice if they had SARS symptoms.

8.76 The Select Committee has also considered whether there was delay in making the decision to isolate Block E of the Amoy Gardens. The Select Committee is of the view that there was no delay as the higher level multi-disciplinary team was only formed on 29 March 2003. It conducted its investigations at the Amoy Gardens on 29 March and 30 March 2003, and presented its preliminary findings at the meeting of the HWFB Task Force on 30 March 2003. The decision to isolate Block E was made at the same meeting.

8.77 The Select Committee is also of the view that Dr Margaret CHAN's reluctance to issue the Isolation Order, resulting in the need for a meeting of CESC to be held in that evening, had not led to any delay. The Select Committee accepts that the Isolation Order would still have to be implemented in the following morning as prior logistical arrangements and preparation work had to be made.

8.78 As regards the evacuation of residents of Block E, the Select Committee notes that the decision was made on 1 April 2003 by CESC as soon as it was realized that the infection cases in Block E might have been caused by environmental factors. The Select Committee is also aware that based on the number of SARS cases in Block E reported after 1 April 2003, no conclusion can be drawn as to whether or not the isolation of Block E and the keeping of residents there for the period of 30 hours before their actual evacuation did or did not result in more residents being infected.

8.79 The Select Committee notes that a large number of residents had already left Block E after the outbreak on 26 March 2003. Consideration should have been given to addressing the fears and worries of these residents. It might have been easier for them to come forward if the decision on 30 March 2003 was to evacuate the residents from Block E and not to quarantine them in the Block, from which some of them had fled in the first place. The Select Committee is of the view that as little was then known of the cause of the large number of cases in Block E, it would have been better to evacuate the residents, rather than to isolate Block E, on 31 March 2003.

8.80 As regards the allegation that Dr YEOH Eng-kiong has suppressed the investigations on rats, the Select Committee notes that there are material discrepancies in the evidence given by Dr Stephen NG and the other six witnesses, which included Dr YEOH, as to whether Dr YEOH had tried to stop the investigations on rats during the meeting on 5 April 2003. The Select Committee notes that there is no evidence to substantiate the allegation, and that the fact was that the investigations on rats were carried out in the end and the results published.

8.81 As regards the allegation that the Government had tried to cover up the information relating to the possibility that rats might have been a means of transmission, the Select Committee is unable to find one way or the other whether such allegation was substantiated. The Select Committee, however, considers that it was not appropriate for Dr YEOH to request that the preliminary findings of the investigations on rats be kept confidential. The Select Committee also considers that, in the circumstances, there was room for misunderstanding in this regard. The Select Committee is of the view that the

public should be informed of the preliminary results of the tests so far conducted and of the need to carry out more tests. The public should be assured that there would be full disclosure of the results of the tests. Keeping the public informed would have been consistent with the Government's policy of maintaining a high degree of transparency on matters relating to the SARS epidemic. According to the supplementary information provided by Dr YEOH to the Select Committee, Dr LEUNG Pak-yin mentioned during an interview with the media on 8 April 2003 the contributory roles of rodents and cockroaches in the spread of SARS in the event of contamination of the environment, and gave preventive public health advice in that context.

Performance and Accountability

8.82 The Select Committee considers that the additional steps taken by DH to interview individual residents in Block E and to distribute letters of health advice on 26 March 2003, as discussed in paragraph 8.4 above, were positive actions in the handling of the SARS outbreak.

8.83 The Select Committee also notes that Dr YEOH Eng-kiong gave the instruction on 28 March 2003 for door-to-door visits to be conducted in the entire Block E and other affected blocks and for the higher level multi-disciplinary team to be formed to conduct a thorough investigation into the outbreak at the Amoy Gardens. The Select Committee considers that these were reasonable actions.