

HONG KONG RAINFALL AND LANDSLIDES IN 1994

GEO REPORT No. 54

W.L. Chan

**GEOTECHNICAL ENGINEERING OFFICE
CIVIL ENGINEERING DEPARTMENT
HONG KONG**

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Civil Engineering Department,
Civil Engineering Building,
101 Princess Margaret Road,
Homantin, Kowloon,
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PREFACE

In keeping with our policy of releasing information of general technical interest, we make available some of our internal reports in a series of publications termed the GEO Report series. The reports in this series, of which this is one, are selected from a wide range of reports produced by the staff of the Office and our consultants. A charge is made to cover the cost of printing.

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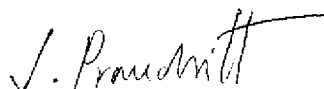


J.B. Massey

Acting Principal Government Geotechnical Engineer
July 1996

FOREWORD

This report presents a review of the rainfall and landslides in Hong Kong throughout 1994. Geotechnical engineers of the District Divisions of the Geotechnical Engineering Office provided details of the notable landslides. Supplementary landslide data were provided by the Agriculture and Fisheries Department, Architectural Services Department, Drainage Services Department, Fire Services Department, Highways Department, Housing Department and Water Supplies Department. The Royal Observatory provided rainfall information. All contributions are gratefully acknowledged.



(J. Premchitt)

Ag. Chief Geotechnical Engineer/Special Projects

ABSTRACT

This report reviews the rainfall and landslides in Hong Kong throughout 1994. Rainfall information has been obtained from the Geotechnical Engineering Office (GEO) automatic raingauge system and from the Royal Observatory (RO). Most of the landslide data have been taken from the records of incidents reported to the GEO during the year. Supplementary data have been obtained from other Government departments.

The annual rainfall in 1994 was about 23% above the annual mean. A total of 447 incidents was reported to the GEO. Of these, 436 were classified as genuine landslides. Many of them occurred during periods of heavy rainfall in July and August.

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1. INTRODUCTION

This report reviews rainfall and landslide occurrence in Hong Kong throughout 1994. Rainfall information has been obtained from the Geotechnical Engineering Office (GEO) and the Royal Observatory (RO). Most of the landslide data have been taken from the records of incidents reported to the GEO during the year. Supplementary data have been obtained from other Government departments. Only landslides reported to the GEO are analyzed and described in detail in this report, since they were inspected by the geotechnical engineers of the GEO and detailed information is available.

In this report, a landslide is defined as the collapse of a soil or rock mass, and includes the failure of fill slopes, cut slopes, natural slopes, retaining structures, rock or boulder falls. A 'major' landslide is defined as a failure in which the volume of the collapsed mass exceeds 50 m³ or fatalities are involved.

The GEO received a total of 447 incident reports in 1994. Of these, 436 were classified as genuine landslides, and 36 of them were major. The remaining incidents included minor ground or structural movements, flooding and fallen trees. It is notable that 188 landslide incidents were reported to have occurred during the heaviest rainstorm from 21 to 25 July.

The arrangement of this report is similar to the previous annual rainfall-landslide reports (Premchitt, 1991a-1991e; Siu, 1991; Tang, 1992; Evans, 1992; Chen, 1993 and Chan, 1994). This report reviews rainfall and landslide occurrences throughout the whole year rather than emphasising any one specific rainstorm. Information has been compiled from many sources throughout the government.

2. RAINFALL

2.1 The Raingauge System

In the rugged terrain of Hong Kong, the distribution and intensity of rainfall during a storm can vary dramatically with respect to both geography and time. In order to provide sufficient coverage for a meaningful analysis of rainfall distribution, the RO has installed a network of raingauges which, in 1994, comprised 21 automatic and 104 manual raingauges at a total of 82 locations. A 'principal' raingauge is located at the RO's headquarters in Tsim Sha Tsui, and a continuous rainfall record has been kept at this location since 1884. Weather summaries and rainfall statistics are normally based on the measurements made at this principal location.

Since 1978, the GEO, in cooperation with the RO, has established an automatic raingauge system (comprising 48 GEO and 21 RO automatic raingauges in 1994) which transmits real-time rainfall data via telephone lines to the GEO's Emergency Control Headquarters and to the RO at five-minute intervals. The locations of the GEO automatic raingauges (Figure 1) were selected to supplement the network of other types of raingauges and to provide specific information in areas of particular geotechnical interest.

In this report, where a comparison is being made for 'daily' rainfalls, the 24-hour

maximum rainfall will be used instead of daily rainfall, since the latter is based on an arbitrary fixed period of midnight to midnight which does not necessarily represent the maximum rainfall over a 24-hour period. In addition, when a rainfall amount is quoted without reference to the location of measurement, this refers to the amount recorded at the RO headquarters.

2.2 Royal Observatory Records

The year's weather for 1994 was summarised by the RO in the Weather Summary for 1994. Their comments on rainfall are as follows :

"[1994] ... On rainfall, the first half of the year was particularly dry with total rainfall amounting to only 556.9 millimetres, 44 per cent below normal. However, record breaking rainfall in July contributed to an overall annual total of 2725.6 millimetres, 23 per cent above the annual mean of 2214.3 millimetres ...

"[In July] ... The total rainfall of 1147.2 millimetres was the highest for the month of July and the second highest for any month on record. During the heavy rain episode from 22 to 24 July, a total of 611.2 millimetres was recorded at the Royal Observatory, the highest for any consecutive days in July."

A summary of heavy rainstorms and resulting landslides in 1994 is given in Table 1. This Table shows all periods (mutually exclusive) in which the 24-hour rainfall at the RO exceeded 50 mm. The four-day and fifteen-day antecedent rainfalls which occurred prior to these 24-hour periods are also shown in the Table. The four heaviest 24-hour period rainfalls in 1994 are 21 to 22 July (310.2 mm), 23 to 24 July (198.4 mm), 24 to 25 July (132.9 mm) and 16 to 17 August (128.4 mm). The first three were recorded in one continuous rainstorm during 21 to 25 July.

The rainfall data as recorded at the RO, Tsim Sha Tsui, for 1994 are presented in Figures 2 to 5. Cumulative rainfall since 1 January is shown in Figure 2. Daily and monthly rainfalls are shown in Figures 3 & 4 respectively. Figure 5 shows the hourly rainfalls for the four highest 24-hour rainfalls in 1994.

2.3 Geotechnical Engineering Office Records

Rainfall data from the 48 GEO automatic raingauges are kept in the Civil Engineering Library.

The maximum 24-hour, five-hour and one-hour rainfalls recorded by the GEO raingauges during heavy rainstorms in 1994 are given in Table 1. The maximum 24-hour and one-hour rainfall recorded by the GEO raingauges are 954.0 mm and 185.5 mm respectively at Tai Mo Shan during 21-22 July.

Appendix A shows hourly rainfall data recorded by the GEO raingauges for the four heaviest 24-hour rainstorms.

2.4 Rainfall Distribution

Rainfall distribution with time and location can be assessed by referring to detailed GEO and RO records.

The isohyets of 24-hour rainfalls for the four heaviest rainstorms in 1994 are shown in Figures 6 to 9.

2.5 Warnings Issued by the Royal Observatory

Relevant warnings issued by the RO, and Landslip Warnings jointly issued by the GEO and the RO, are summarised in Table 2. A total of four Landslip Warnings was issued in 1994 on the basis of predetermined rainfall criteria, after consultation between the GEO and the RO.

2.6 Comparison with Past Rainstorms

A comparison between the maximum rainfall intensities of the heavy rainstorms in 1994 and those of the three major rainstorms (May 1982, May 1989 and May 1992) recorded since 1982 is given in Table 1. The highest 24-hour rainfall recorded at the RO in 1994 was slightly less than those recorded in the three major rainstorms. The maximum 24-hour and 1-hour recorded by the GEO raingauges during the rainstorm between 21 and 23 July 1994 is the highest ever recorded. They are significantly higher than the rainfalls at the RO. As shown in Figure 6, the heavy rain was mainly concentrated on central New Territories.

The return periods of the heavy rainstorms in 1994 were estimated for rainfall durations of one-hour to fifteen-days based on the rainfall recorded at the RO (Table 3). The estimated return periods range from 3 to 39 years.

In Figure 2, the cumulative rainfall for 1994 is shown in comparison with the average (1961-1990), the wettest year (1982) and the driest year (1963) since records began in 1884. The annual cumulative rainfall was 2725.6 mm, which is 23% above the average annual amount of 2214.3 mm. Figure 4 shows monthly rainfalls in 1994 in comparison with the recorded maximum (since 1884) and mean (1961-1990) monthly rainfalls. The monthly rainfall in July was the highest ever recorded for the month, and was more than three times its corresponding mean value. It is also the second highest rainfall in any month ever recorded at RO. Monthly rainfalls for five months of the year were above the mean monthly rainfall. However, in January, April, October and November the rainfalls recorded were less than 10 mm and were substantially lower than the monthly average.

3. LANDSLIDES

3.1 Landslide Occurrence in 1994

The numbers of incidents reported to various Government departments in 1994 are shown in Table 4.

A list containing details of all 447 incidents reported to the GEO is given in Appendix B. In total, 436 incidents were classified as genuine landslides. The rest of them were either not failure incidents or incidents which were of no geotechnical concern such as flooding, fallen tree etc. These eleven incidents were therefore ignored in the statistical analysis below. A location map for all the reported incidents is shown in Drawing No. GCSP 8/15. Selected incidents are illustrated in Plates 1 to 28. Details of these incidents are given in the incident files of the District Divisions of the GEO. The locations of the landslides are also marked in the 1:5000 incident location plans kept in the Civil Engineering Library.

Wherever possible, the dates and times of the landslides were assessed by the geotechnical engineers during site inspection. Some incidents were not reported for several days or weeks. For these, it was difficult to determine the exact time of occurrence. Out of the 436 reported landslide incidents, the time of occurrence was recorded to within one day for 324 incidents. The daily numbers of these incidents are plotted in Figure 3. Of these 324 incidents, the time of occurrence was determined to within one hour for 114 incidents.

The numbers of reported landslide incidents which occurred during periods of heavy rain are shown in Table 1, where the number of incidents reported in the newspapers and by the Fire Services Department are also shown for comparison. Apart from the incidents listed in Table 1, landslide incidents with known failure dates were also reported to have occurred on 55 other occasions in 1994. On these 55 occasions, no more than seven incidents were reported to have occurred on any one day. However, one of them occurred on 7 August (the 24-hour rainfall was 20.6 mm) is a major incident involving one fatality and seventeen injuries. This incident is described in Section 4.8 of this report.

The numbers of landslide incidents occurred during the Landslip Warning periods are shown in Table 9.

Based on the records of brief site visits in GEO's landslide inspection reports, 198 landslide incidents in 1994 was associated with poor maintenance. This amounted to about 45% of all the reported landslide incidents in 1994.

It should be noted that there were other landslides which were not included in the GEO's incident reports, such as failures in remote areas, open spaces and construction sites where the consequence of failure is of little concern.

3.2 Areas Affected by Incidents

The numbers of landslide incidents affecting various types of area (building lot, road etc.) in Hong Kong, Kowloon and the New Territories are shown in Table 5. The number of major failures affecting different types of area is also given in this Table. It is noted that a failure may affect more than one types of area. Landslide consequences, classified according to failure type, are shown in Table 6. A summary of the details of all the 36 major landslides in 1994 is given in Table 10.

3.2.1 Squatter Areas

A total of 60 incidents affected squatter areas. Of these, four are major.

The failures which affected squatter areas led to the permanent evacuation of 117 squatter huts and the temporary evacuation of 39 huts in total (Table 6). Most of these evacuations resulted from failures of soil cut and natural slope. Examples of failures which affected squatter areas are shown in Plates 22 and 26. Two of the major incidents viz. Nos. MW 8/24 & ME 8/28 are described in Sections 4.7 and 4.11 respectively.

Landslides affecting squatter areas are observed to be related to indiscriminate cutting and filling on steep hillsides. Uncontrolled leakage and discharge from water supply, sewage and stormwater pipes would also adversely affect slope stability in these areas.

3.2.2 Building Lots

There were 56 incidents affecting building lots and private properties, five of which were major. Examples of these incidents are shown in Plates 3, 4, 8, 16, 17, 18, 19 and 20. The landslides resulted in the temporary evacuation of four buildings, 24 houses and 51 apartments in part or in total (Table 6). Incidents HK 7/33, HK 7/37, ME 8/22 & MW 8/55 are discussed in Sections 4.5, 4.3, 4.10 and 4.12 respectively.

3.2.3 Roads and Access

A total of 225 incidents affected roads and access, including footpaths and pedestrian pavements and walkways. Twenty-eight of these incidents were major. Examples of these failures are shown in Plates 1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 23, 24, 25 and 27. Nine incidents, ME 7/4, K 7/11, HK 7/37, ME 7/27, K 7/14, MW 7/18, MW 8/3, MW 8/50 & ME 8/22 are discussed in Sections 4.1, 4.2, 4.3, 4.4, 4.6, 4.8, 4.9 and 4.10 of this report.

3.2.4 Construction Sites

There were five incidents affecting construction sites of which none was major.

3.2.5 Catchwaters and Reservoirs

Incidents affecting catchwaters and reservoirs were dealt with separately by the Water Supplies Department. There were four reported cases of landslides which affected catchwaters and culverts, one of which was major. All of the four cases took place in the New Territories. An example of these failures is shown in Plate 28.

3.2.6 Country Parks and Open Areas

A total of 88 incidents affecting country parks, open areas, carpark and playgrounds was reported directly to the GEO, one of which was major.

3.3 Types of Incidents

The landslide incidents inspected by the GEO have been classified into six types of failure, i.e. fill slopes, cut slopes, natural slopes, retaining walls, rock/boulder falls and others. The number of each failure type is shown in Table 7.

3.3.1 Fill Slopes

There were 29 fill slope failures, forming 6.6% of all landslide incidents reported. Two of these failures were major.

3.3.2 Cut Slopes

There were 287 cut slope failures, forming 65.8% of all landslide incidents reported. These failures were classified further according to types of material, i.e. soil, soil/rock and rock cut slope failures (Tables 6 & 7).

There were 241 reported incidents in soil cut slopes, 18 of which were major. Forty-five soil/rock cut slope failures were reported, nine of which were major. As for rock cut slopes, only one minor failure was reported.

3.3.3 Retaining Walls

There were 16 reported incidents related to retaining walls forming 3.7% of all incidents reported. Three of these failures were major. Incidents HK 3/37 (Plate 4) and ME 8/28 (Plate 22) are discussed in Sections 4.3 and 4.11.

3.3.4 Natural Slopes

Fifty-nine natural slope failures were reported, forming 13.5% of all incidents. Four of these failures were major. Incident MW 8/24 (Plate 26) are discussed in Section 4.7.

3.3.5 Rock and Boulder Falls

There were 36 cases of rock and boulder falls, forming 8.3% of all landslide incidents reported. None of these failures was major.

3.3.6 Other Failures

Nine incidents are not classified according to the above categories, e.g. those due to subsidence etc., forming 2.1 % of all reported landslide incidents. None of them was major. Plate 1 is an example of this category of incidents.

3.4 Landslide Volume Distribution

Table 8 shows the distribution of landslide volume for all landslide incidents which were reported to the GEO. The approximate landslide volume was recorded for 421 out of the total of 436 reported landslides. Of the landslides for which the volume was recorded, 162 (about 37%) incidents involved less than 5 m³ of material. About 8% of the reported landslide involved a failure volume of 50 m³ or above.

3.5 Rainfall-Landslide Relationships

The relationship between rainfall and landslides in 1994 can be seen from the plot of daily rainfall and daily number of landslide in Figure 3. The majority of the recorded landslides occurred at times of heavy rainfall. The geographical distribution of rainfall had a considerable influence on the occurrence of landslides in various areas. Figures 6 to 9 show the location of landslides for which dates of occurrence are known (see Section 3.1), imposed on the 24-hour rainfall maps for the four heaviest rainstorms in 1994. In the four rainstorms, about 81 % of the landslides occurred in areas where the 24-hour rainfall was 100 mm or more, and 38 % of these incidents occurred in areas where the 24-hour rainfall was 200 mm or more. It can be seen that there is generally a direct correlation between the locations of reported landslide incidents and areas of high rainfall intensity. Further details on the relationship between rainfall and landslides in Hong Kong can be found in Brand et al (1984) and Premchitt (1991, 1994).

4. NOTABLE INCIDENTS

Out of the 436 incidents reported to the GEO, thirteen are discussed in more detail in this Section in chronological order. These incidents have been selected mainly on the basis of their failure volume, consequence and technical interest.

4.1 Incident ME 7/4, Kei Ling Ha Lo Wai, Sai Sha Road, Sai Kung

(Date: 22 July 1994. Major failure of a soil cut slope resulting in the closure of a road. Plate 9.)

At about 7:00 a.m. on 22 July, a soil cut slope (No. 8NW-C/C14) along Sai Sha Road near Kei Ling Ha Lo Wai failed. The cut slope was about 11 m high and was covered by shotcrete before the failure. The failure scar covered an area of 8 m high by 20 m wide. About 260 m³ of soil were dislodged and spread over Sai Sha Road. One lane of the road was closed as a result of the failure. The probable cause of the failure was rise in pore water pressure as a result of increased seepage along relict joints in the soil during heavy rain.

4.2 Incident K 7/11, Blocks 35 & 40, Sau Mau Ping Road, Sau Mau Ping

(Date: 23 July 1994. Major failure of a soil/rock cut slope resulting in the damage of a taxi and the closure of a road. Plates 5 and 6.)

The failure occurred at about 12:45 p.m. on 23 July after the prolonged rainfall during the previous day. The soil/rock cut slope (No. 11NE-D/C4) was located at the junction of Sau Mau Ping Road and Sau Ming Road. The landslide occurred at the upper portion of a 35 m high cut slope which was partly covered by chunam. The failed portion was located at about 30 m above the ground and the failure scar was about 4 m high by 20 m wide. The volume of failure was about 150 m³. The landslide debris comprising soil and large boulders slipped down onto Sau Mau Ping Road and damaged a taxi travelling along the road. This resulted in the closure of all the four lanes of Sau Mau Ping Road. The failure was probably caused by heavy infiltration during prolonged rainfall. Poor maintenance of the chunam slope cover could have contributed to the failure.

4.3 Incident HK 7/37, Kwun Lung Lau Estate, Kennedy Town

(Date: 23 July 1994. Major failure of a masonry retaining wall resulting in five fatalities and injuries to three people. Plate 4.)

At about 8:53 p.m. on 23 July, a landslide occurred below Block D at Kwun Lung Lau, Kennedy Town, following a period of heavy rain. The ground that failed comprised a portion of an old masonry wall (No. 11SW-A/R309) and the slope below Block D. The landslide scar measured 14 m high and 28 m wide. The average depth of debris was about 3 m, with a maximum depth of 6 m. About 1 000 m³ of debris were released in the landslide, comprising mainly soil, fragments of chunam, blocks of masonry and trees. A footpath in front of the masonry wall was buried by the landslide debris, resulting in five fatalities and injuries to three people.

Detailed investigation conducted by the GEO after the landslide found that the failure was triggered by the substantial saturation of the soil behind the wall, which was appreciably thinner than the usual for walls of this type. Leakages from defective underground water carrying services were the principal sources of the water. The prolonged and heavy rainfall preceding the landslide played a contributory part in resulting in a significant quantity of water having entered the ground, initially through the defective stormwater drainage system.

This incident is described in details in "Report on the Kwun Lung Lau Landslide of 23 July 1994" (GEO, Morgenstern, 1994).

4.4 Incident ME 7/27, Hopes Villa, Tai Mong Tsai Road, Sai Kung

(Date: 24 July 1994. Major failure of a soil cut/natural slope resulting in the closure of a road. Plate 11.)

The landslide occurred at 2:00 p.m. on 24 July during intense rain at a slope along Tai Mong Tsai Road near Hopes Villa, Tai Wan. The failure involved a road-side cut slope (No. 8SW-A/C20) and the natural slope above it. Before the failure, the cut slope was covered by chunam and stone-pitching while the natural slope was covered by heavy vegetation. The

cut slope had a gradient of 50° to 70° and that of the natural slope was about 30° . The failure scar was about 16 m high and 45 m wide, with a maximum depth of failure of 5 m. The slipped material was mainly colluvium and was estimated to have a volume of 1000 m^3 , blocking both lanes of Tai Mong Tsai Road. The failure was likely due to heavy infiltration and erosion resulted from prolonged and intense rainfall.

4.5 Incident HK 7/33, Island Garden, Chai Wan Road, Shau Kei Wan

(Date: 24 July 1994. Failure of a soil cut slope resulting in the evacuation of six flats. Plate 3.)

At about 4:15 p.m. on 24 July, about 200 m^3 of soil slipped down from a soil cut slope (No. 11SE-B/CR79) during a heavy rainstorm, possibly as a result of continuous infiltration and erosion to the slope. The landslide scar measured 7 m high by 20 m wide, and part of the footing foundation which supported St. Basil's School behind the crest was exposed. Residential blocks of Island Garden at the slope toe were affected by the slipped debris, and six flats were temporarily closed.

4.6 Incident K 7/14, New Clear Water Bay Road, Choi Wan Estate

(Date: 25 July 1994. Major failure of a soil cut slope resulting in the closure of a road. Plate 7.)

At about 6:00 a.m. on 25 July, a landslide occurred at a soil cut slope (No. 11NE-A/C63) along New Clear Water Bay Road opposite Choi Wan Estate. The slope was about 25 m high and covered by vegetation. The portion that failed was about 25 m high and 40 m wide. About 800 m^3 material slipped onto the New Clear Water Bay Road, covering three lanes of the road. This resulted in the closure of New Clear Water Bay Road. The failure was probably due to infiltration resulted from the prolonged and heavy rain in the previous few days.

4.7 Incident MW 8/24, Kwu Tung Hang Tsuen, Sheung Shui

(Date: 6 August 1994. Major failure of a natural slope resulting in the permanent evacuation of 30 huts. Plate 26.)

The landslide occurred at about 4:00 p.m. on 6 August at a slope behind Ki Lun Tsuen, Kwu Tung after the intense rain in the morning. The failure occurred in a natural slope which had a gradient of about 27° and an average height of about 50 m. The failure involved three slip scars in an area of about 80 m wide and 15 m high, with an estimated failure volume of about 200 m^3 . The maximum depth of failure was about 2 m. Many boulders, with size up to 1.3 m in diameter, were found in the landslide debris. Some of the landslide debris entered the backyard of the squatter huts located at the toe of the slope. A total of 30 huts were permanently evacuated subsequent to the failure. The failure was probably triggered by infiltration during heavy rain.

4.8 Incidents MW 7/18 & MW 8/3, Milestone 14½, Castle Peak Road, Tsing Lung Tau
(Date: 23 July and 7 August 1994. Major failure of a cut and natural slope resulting in one fatality and injuries to eighteen people. Plates 24 and 25.)

Three sequential landslides occurred on a cut slope at Milestone 14½, Castle Peak Road near Grand Bay Villa on 23 July (two landslides) and 7 August (one landslide). The landslides involved a 8 m high, 60° cut slope which was covered by chunam.

Shortly before 7:00 a.m. on 23 July, a minor landslide occurred at the cut slope. The failure occurred between a cut slope in rock at the west and a no-fines concrete wall with a stone-pitching facing at the east. The volume of failure was approximately 20 m³.

At about 3:30 p.m. on the same day, a second landslide occurred. The slope failure extended to the natural ground above the cut slope. The landslide debris pushed a grab truck off the road at the toe of the cut slope and down an embankment onto the beach below. The driver of the truck was injured, and the road was closed to traffic. The volume of failure from this second failure was approximately 700 m³. Emergency repair works had been carried out to the slope after the landslides on 23 July.

At about 11:45 a.m. on 7 August 1994, a third landslide occurred at the same slope. A total of about 300 m³ of soil and rock was released from the slope in the third landslide. A public light bus travelling in the direction of Tuen Mun was hit by the debris and pushed down the embankment onto the beach below the road. About one third of the bus was filled with debris, and three people were trapped in the bus. A man on board was subsequently killed. Seventeen other people were taken to hospital and were released on the same day. Five to six subsequent minor slips occurred from the landslide scar over the next one to two hours.

The slope that failed had a complex geology with the presence of decomposed basalt dykes. The most important contributory factors to the landslides were prolonged rainfall and the specific geological conditions. Other factors that could have contributed to the landslide on 7 August 1994 were surface water flow and consequent infiltration into the natural ground, local steepening of the slope, and surface erosion.

GEO Report ADR 1/95 (Pun et al, 1994) describes this incident in details.

4.9 Incident MW 8/50, Table Hill Service Reservoir, Sheung Shui
(Date : 6/7 August 1994. Major failure of a soil cut slope affecting an access road. Plate 27.)

A massive ground movement took place around 6 and 7 August at a soil cut slope along an access road to the Table Hill Service Reservoir. An extensive area of about 20 m high and 60 m wide was affected by the movement. The slope was covered by vegetation. The slope gradient was 28° before the failure. The ground movement was probably associated with a planar slide on a pre-existing weak plane dipping downslope within the soil stratum. This resulted in subsidence of up to 600 mm at 45 m long section of the slope supporting the access road. The slope drainage system, including catchpits and surface channels, was

seriously damaged as a result of the ground movement. The movement was probably triggered by infiltration and built-up of water pressure along the pre-existing weak plane.

4.10 Incident ME 8/22, Ah Kung Wan Road, Sai Kung

(Date: 16 August 1994. Major failure of a soil cut slope resulting in the evacuation of 4 houses and the blockage of a road. Plate 20.)

The landslide occurred at about 8:45 a.m. on 16 August at a road-side slope along Ah Kung Wan Road, Sai Kung. The 10 m high, 50° gradient soil cut slope was covered by chunam before the failure. The failure scar covered a 9.5 m high and 15 m wide area. A total of 240 m³ of slipped material was deposited onto Ah Kung Wan Road. This resulted in the closure of both lanes of the road and the evacuation of 4 nearby houses. The probable cause of the failure was infiltration due to the prolonged rain and seepage behind an impermeable chunam cover. The blockage of a crest channel due to lack of maintenance was a possible contributing factor to the failure.

4.11 Incident ME 8/28, O Long Village, Sai Kung

(Date: 16 August 1994. Major failure of a retaining wall resulting in the temporary evacuation of 2 huts. Plate 22.)

Between 8:00 to 9:00 a.m. on 16 August, a masonry retaining wall at O Long Village failed amid intense rain. The wall was a pointed masonry wall with an overall height of 9.5 m divided into three panels by two berms. About 10 m long section of the lowest and the middle panels of the wall failed in the incident. The volume of failure was about 50 m³. Two huts were temporarily evacuated subsequent to the failure. The failure was likely triggered by infiltration due to overflow of stormwater and leakage from damaged drainage channels resulted from lack of maintenance.

4.12 Incident MW 8/55, Chung Shan Terrace, Kwai Chung

(Date: 27 August 1994. Failure of a soil cut slope and a square rubble wall resulting in the evacuation of 8 flats.)

At about 12:00 noon on 27 August, a slope (No. 11NW-A/C77) behind a three-storey building failed suddenly in Chung Shan Terrace, Kwai Chung. The 9 m high soil cut slope together with the 1 m high square rubble toe wall collapsed following a few days of heavy rain. The failure scar measured 10 m high and 18 m wide. The volume of the slipped material was about 45 m³. A total of eight flats on the first and second floors of the building were evacuated. The failure was probably caused by infiltration due to heavy rainfall. Possible rupture of a watermain buried in the upper portion of the slope could have contributed to the failure.

5. CONCLUSIONS

Rainfall in 1994 was 23% higher than the Hong Kong annual average. The intense

rainstorms in July and August brought most of the rainfall.

Four Landslip Warnings were issued in 1994, during the heavy rainstorms of 20 June, 22 to 26 July, 6 to 7 August and 16 to 17 August. There were 436 landslide incidents reported to the GEO during the year. Six fatalities and 21 injuries occurred due to three of these landslides. Damages resulting from the landslide incidents included: 156 squatter huts were evacuated (39 temporarily and 117 permanently), four buildings, 24 houses and 51 flats were temporarily evacuated and 225 sections of road, pedestrian pavement and access were blocked.

The large number of landslides in 1994 can be directly related to the high rainfall in July and August. Slightly less than half of the landslides were judged to be related to poor slope maintenance.

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Table 1 - Rainfall-Landslide Events in 1994 with 24-hour Rainfall Greater than 50 mm

Date ⁽¹⁾ of Event	Maximum Rainfall								Landslide Consequences				
	Royal Observatory					GEO Raingauges ⁽²⁾			Number of Landslides			Persons Killed (Injured)	Number of Huts Evacuated Permanently
	24-hr	5-hr	1-hr	Antecedent		24-hours	5-hours	1-hour	GEO ⁽³⁾	Newspaper ⁽⁴⁾	FSD		
				4 days	15 days								
21-22 Jul 94 ⁽⁵⁾	310.2	145.1	70.4	36.1	329.1	954.0(N14) ⁽⁶⁾	394.5(N14) ⁽⁶⁾	185.5(N14) ⁽⁶⁾	69	61	3	-	16
23-24 Jul 94 ⁽⁵⁾	198.4	126.3	53.6	347.6	615.1	292.0(N14)	200.0(N17)	77.0(N17)	51	100	4	5(4)	13
24-25 Jul 94 ⁽⁵⁾	132.9	56.9	21.6	546.0	774.2	258.0(H15)	151.0(H15)	39.5(H21)	64	37	7	-	14
16-17 Aug 94 ⁽⁵⁾	128.4	79.3	34.2	69.3	275.4	210.5(N15)	176.5(N15)	51.0(H04)	22	26	2	-	1
11-12 Jul 94	97.4	97.0	53.9	52.0	166.7	163.0(H13)	162.5(H13)	94.5(K03)	5	-	-	-	-
3-4 May 94	96.6	84.6	62.6	1.8	2.6	124.5(H13)	106.0(H13)	74.0(H04)	-	-	-	-	-
19-20 Jun 94 ⁽⁵⁾	94.9	62.3	23.5	49.7	139.4	254.5(N15)	188.5(K08)	79.5(K08)	11	-	-	-	2
10-11 Sep 94	93.2	73.0	42.5	10.8	216.3	174.0(H13)	145.5(H22)	92.0(H13)	2	-	-	-	-
26-27 Aug 94	90.5	34.7	27.4	0.0	245.4	129.0(N14)	65.5(N14)	32.5(H22)	1	1	-	-	-
9-10 Aug 94	74.1	46.3	27.1	81.5	205.5	271.0(N14)	188.0(N14)	97.0(N14)	10	-	-	-	-
13-14 Jul 94	65.4	43.2	24.5	103.4	268.9	131.5(N17)	82.5(N17)	40.0(N17)	5	-	-	-	3
5-6 Aug 94 ⁽⁵⁾	62.9	47.5	18.6	36.3	779.0	380.0(N14)	201.0(N14)	76.0(N14)	21	-	-	-	34
8-9 Dec 94	59.1	35.1	8.3	0.1	0.9	183.0(N15)	134.5(K05)	57.0(N08)	3	-	-	-	-
23-24 Sep 94	58.9	31.2	13.9	15.8	159.1	213.0(N14)	84.5(N14)	54.0(N14)	1	-	-	-	-
4-5 Jul 94	55.2	24.5	22.5	37.6	155.8	100.5(N14)	53.5(N12)	29.5(N12)	-	-	-	-	-
15 Aug 94	50.9	43.3	18.9	18.0	225.3	110.0(N18)	81.0(H16)	33.0(H03)	4	-	-	-	4
Recent Major Rainstorms(For Comparison Only)													
29 May 82	394	153	44	1	11	430	237	111	551	498	15	22(26)	1153
20-21 May 89	388	149	37	28	42	566	224	51	340	100	3	2(3)	199
8 May 92	324	196	110	65	71	385	244	110	350	40	9	3(5)	92
Notes:	(1) The events are arranged in order of magnitude of 24-hour rainfall at the Royal Observatory, Tsim Sha Tsui. (2) The maxima are selected from the 48 GEO Raingauges for the same rainstorm period. The GEO Raingauge reference number is shown in brackets. (3) Reported totals are for incidents known to have occurred on specific dates. Apart from 7 August no more than 7 incidents were reported to have occurred on any one day for the rest of 1994. Reported incidents of no geotechnical concern have been ignored. (4) Newspapers searched are the South China Morning Post, the Hongkong Standard, the Sing Tao Daily and the Ming Po Daily News. (5) Landslip warnings were issued for these events. (6) GEO raingauge no. N14 is at Tai Mo Shan Peak, the maximum rainfalls in Hong Kong Island and Kowloon, where most of landslides occurred are 389.0mm(H04), 188.0mm(K06) and 102.0mm(H04) during 24-hours, 5-hours and 1-hour respectively.												
Abbreviations: GEO = Geotechnical Engineering Office; FSD = Fire Services Department													

Table 2 - Type and Date of Warnings Issued by the Royal Observatory in 1994

Month	Monthly Rainfall (mm)	Dates on which warnings were in effect				
		Thunderstorm	Flood	*Landslip	Tropical Storm	Rainstorm
January	Trace	-	-	-	-	-
February	50.5	-	-	-	-	-
March	26.5	-	-	-	-	-
April	6.0	21, 28-29	-	-	-	-
May	183.7	3-4, 11, 15, 17, 26-31	3, 30	-	-	-
June	290.2	10, 17-20	10, 18-20	20(00:05)-20(14:35)	5-7 (Signals 1-3, Russ) 24-25 (Signal 1, Sharon)	-
July	1147.2	2-5, 8, 11-17, 20-25, 27	11-12, 14, 22-25	22(03:00)-26(10:00)	-	12, 22 (Red) 23 (Red-Black)
August	597.6	3-11, 13-21, 26-29, 31	5-7, 10, 15-17, 26-27	6(19:00)-7(07:00) 16(09:45)-17(22:00)	25-27 (Signals 1-3, Harry)	-
September	298.9	1-3, 5-6, 8, 10-11, 17-18, 20, 22-23, 28	10-11, 23	-	11-12 (Signals 1-3, Luke)	-
October	2.2	-	-	-	-	-
November	0.2	-	-	-	-	-
December	122.6	-	8	-	-	-
Total	2725.6	75 days	26 days	4 Warnings	4 Warnings	3 days
Legend: * Landslip warnings were issued after consultation between GEO & RO						

Table 3 - Maximum Rainfalls Recorded at the Royal Observatory in 1994 and their Estimated Return Periods

Duration	Rainfall ⁽²⁾ (mm)	Ending Time		Estimated Return Period (Years) ⁽¹⁾
		Date	Time	
1 hour	70.4	22 July	3:00	4
2 hours	104.3	22 July	12:00	4
5 hours	145.1	22 July	14:00	3
12 hours	280.1	22 July	14:00	9
24 hours	310.2	22 July	19:00	5
2 days	493.9	23 July	23:00	18
4 days	677.8	25 July	17:00	38
7 days	718.5	26 July	23:00	31
15 days	946.7	26 July	23:00	43
<p>Notes : (1) Return periods derived from the Gumbel equation, after Lam & Leung (1994). The return periods are calculated to the nearest year.</p> <p>(2) Rainfall maxima as recorded at the Royal Observatory, Tsim Sha Tsui.</p>				

Table 4 - Number of Incidents Reported to Various Offices/Departments in 1994

Office/Department	Total Number	Types of Incident		
		Landslide	Flooding	Others
Agriculture & Fisheries Department	24	24	0	0
Architectural Services Department	58	49	1	8
Drainage Services Department	926	0	926	0
Fire Services Department	66	17	44	5
Geotechnical Engineering Office, CED	447	436	0	11
Highways Department	743	264	100	379
Housing Department	12	9	0	3
Water Supplies Department	83	77	2	4
Note : Landslides reported to HyD and ASD were referred to GEO and are included in the GEO incidents.				

Table 5 - Number of Landslide Incidents Reported to GEO Affecting Different Areas in 1994

Affected Area	Hong Kong	Kowloon	New Territories		All Districts
			ME	MW	
Squatters	6(1)	5(1)	16(1)	33(1)	60(4)
Building Lots/Properties	9(2)	1(0)	19(2)	27(1)	56(5)
Roads	46(5)	9(3)	33(9)	48(7)	136(24)
Pedestrian Pavements	21(2)	12(3)	12(3)	34(3)	79(11)
Footpaths, Lanes, Private Access, Footbridges	10(3)	1(0)	14(2)	12(0)	37(5)
Construction Sites	2(0)	1(0)	1(0)	1(0)	5(0)
Country and Urban Parks	2(0)	2(0)	2(0)	3(1)	9(1)
Open Areas/Hillside	14(0)	5(0)	25(0)	19(0)	63(0)
Catchwaters/ Conduits/Culvert	0(0)	0(0)	1(0)	3(1)	4(1)
Carpark/Playground Garden/Yard	4(0)	1(0)	7(0)	6(0)	18(0)
Cemetery/Urn	0(0)	1(0)	0(0)	0(0)	1(0)
Legend: 12(3) Twelve incidents of which three are <u>major</u> failures					
Notes : (1) Incidents which are not genuine landslide were excluded. (2) One incident may affect more than one type of area.					

Table 6 - Consequence Related to Type of Failure in 1994

Type of failure		No. of squatter huts evacuated		No. of blocks, houses or flats evacuated or partially closed	No. of incidents involving blockage or closure			Deaths (injuries)
		Permanent	Temporary		Roads	Pedestrian pavements	Footpaths, back lanes, private	
Fill slope		3	3	1 flat	8	3	0	-
Cut slope	Soil	65	31	20 houses 47 flats	52	16	1	1(17)
	Soil/rock	2	-	-	22	7	0	(1)
	Rock	-	-	-	-	-	-	-
Natural slope		38	1	4 houses	12	12	1	-
Retaining wall		4	4	2 blocks 3 flats	1	-	1	5(3)
Rock/boulder fall		4	-	-	11	3	1	-
Others (subsidence, etc.)		1	-	2 blocks	3	4	-	-

Note : A failure may give rise to more than one consequence.

Table 7 - Number of Landslide Incidents Reported to GEO in 1994 Classified by Type of Failure

Type of Failure		Number	Percentage (%)
Fill Slope		29(2)	6.6
Cut Slope	Soil	241(18)	55.3
	Soil/rock	45(9)	10.3
	Rock	1(0)	0.2
Retaining wall		16(3)	3.7
Natural slope		59(4)	13.5
Rock/boulder fall		36(0)	8.3
Others (subsidence, etc.)		9(0)	2.1
TOTAL		436(36)	100.0
<p>Legend :</p> <p>16(3) Sixteen incidents of which three are <u>major</u> failure</p>			
<p>Notes : (1) The total number of incidents reported to the GEO in 1994 was 447.</p> <p>(2) Eleven incidents which are not genuine landslide were excluded.</p>			

Table 8 - Landslide Volume Distribution

Volume of Failure (m ³)	Failures of known size expressed as a total number and as a percentage				
	Hong Kong	Kowloon	New Territories		All Districts
			ME	MW	
<5	45(43.69%)	10(29.41%)	51(38.93%)	56(33.33%)	162
≥5 to <10	18(17.48%)	6(17.65%)	16(12.22%)	25(14.88%)	65
≥10 to <20	14(13.59%)	5(14.71%)	21(16.03%)	30(17.86%)	70
≥20 to <50	14(13.59%)	8(23.53%)	27(20.61%)	39(23.22%)	88
≥50 (major)	8(7.77%)	4(11.76%)	12(9.16%)	12(7.14%)	36
unknown	4(3.88%)	1(2.94%)	4(3.05%)	6(3.57%)	15
not genuine landslide	[4]	[2]	[3]	[2]	[11]
Total ⁽³⁾	103	34	131	168	436
Notes : (1) Total reported failures - 447. (2) There were eleven incidents which are not genuine landslide. (3) This excludes incidents which are not genuine landslide.					

Table 9 - Number of Landslide Incidents Occurred during the Landslip Warning Periods in 1994

Landslip Warning Period	No. of incidents occurred during the days of Landslip Warning (those with dates of occurrence known)	No. of incidents with the time of occurrence known to within one hour			
		Occurred in the period from 24 hours before to 24 hours after the Warning	Occurred within 24 hours before Warning issued	Occurred when Warning was in force	Occurred within 24 hours after Warning cancelled
20/6 (00:05) to 20/6 (14:35)	7	7	4	1	2
22/7 (03:00) to 26/7 (10:00)	198	66	1	64	1
6/8 (19:00) to 7/8 (07:00)	30	6	2	2	2
16/8 (09:45) to 17/8 (22:00)	22	9	6	3	0
Notes: (1) Total number of landslide incidents reported to the GEO in 1994 was 436. (2) A total of 324 landslide incidents was recorded with the dates of occurrence known to within one day. (3) A total of 114 landslide incidents was recorded with the time of occurrence known to within one hour. (4) The above was based on the time and date best estimated by the inspection officer.					

Table 10 - List of Major Incidents in Hong Kong Reported to GEO in 1994 (Sheet 1 of 5)

Incident No.	Location (Slope Ref. No. if any)	Failure			Area Affected	Consequence	Plate No.
		Date (Time)	Type	Scale (m ³)			
HK 5/1	Opposite 11 Repulse Bay Road, Repulse Bay (11SE-D/F33)	19/5 (11:00)	Fill slope	Major (65)	Road Pedestrian pavement	1 lane of road and pedestrian pavement closed	3
HK 6/1	Cape Collinson Road near Correctional Institution, Chai Wan	19/6 (23:00)	Soil/rock cut slope Natural slope	Major (200)	Road	1 lane of road closed	
HK 7/33	Behind Island Garden, Chai Wan Road, Shaukeiwan (11SE-B/CR79)	24/7 (16:15)	Soil cut slope	Major (200)	Building lot Pedestrian pavement School	6 flats evacuated	
HK 7/37	Kwun Lung Lau Estate, Kennedy Town (11SW-A/R309)	23/7 (20:53)	Retaining wall	Major (1000)	Building lot Building access	5 persons killed, 3 persons injured and 2 blocks evacuated	
HK 7/47	A Kung Ngam Village, Shaukeiwan (11SE-B/C93 & C116)	23/7 (5:00)	Soil cut slope	Major (50)	Squatter hut	5 huts temporarily evacuated	
HK 7/48	55-57 Shouson Hill Road, Wong Chuk Hang (15NW-B/C48)	25/7 (15:00)	Soil/rock cut slope	Major (60)	Road Building access	Road blocked	
HK 7/58	Che Choong Hong Industrial Building, 65 Wong Chuk Hang Road, Aberdeen (11SW-D/C91)	23/7 (6:00)	Soil/rock cut slope Rock slope	Major (300-400)	Road Building access	Road blocked	

Table 10 - List of Major Incidents in Hong Kong Reported to GEO in 1994 (Sheet 2 of 5)

Incident No.	Location (Slope Ref. No. if any)	Failure			Area Affected	Consequence	Plate No.
		Date (Time)	Type	Scale (m ³)			
HK 8/16	Opposite Fire Station, Ap Lei Chau Bridge Road, Ap Lei Chau	16/8 (12:55)	Soil/rock cut slope	Major (90)	Road	3 lanes of road closed	5 and 6
K 7/5	Opposite TVB, Lung Cheung Road (11NW-B/C137)	22/7 (12:30)	Soil cut slope	Major (140)	Road Pedestrian pavement	2 lanes of road closed	
K 7/11	Opposite Blocks 35 & 40, Sau Mau Ping Road, Sau Mau Ping (11NE-D/C4)	23/7 (12:45)	Soil/rock cut slope	Major (150)	Road Pedestrian pavement	4 lanes of road closed and 1 taxi damaged	
K 7/14	Opposite Kai Fai House Choi Wan Estate, New Clear Water Bay Road (11NE-A/C63)	25/7 (6:00)	Soil cut slope	Major (800)	Road Pedestrian pavement	2 lanes of road and pedestrian pavement closed	
K 7/19	Ka Woo Film Studio, 8 King Tung Street, Diamond Hill (11NE-A/C97)	26/7 (11:00)	Soil cut slope	Major (100)	Store hut	Store hut temporarily evacuated	
ME 6/2	Pak Tam Road near Uk Tau, Sai Kung (8NW-D/C3)	20/6 (4:30)	Soil cut slope	Major (80)	Road	1 lane of road closed	
ME 7/3	House no. 45, Sheung Sze Wan Village, Sai Kung	11/7 (1:00)	Retaining wall	Major (80)	Building lot	3 flats recommended closure	8

Table 10 - List of Major Incidents in Hong Kong Reported to GEO in 1994 (Sheet 3 of 5)

Incident No.	Location (Slope Ref. No. if any)	Failure			Area Affected	Consequence	Plate No.
		Date (Time)	Type	Scale (m ³)			
ME 7/4	Kei Ling Ha Lo Wai, Sai Sha Road, Sai Kung (8NW-C/C14)	22/7 (7:00)	Soil cut slope	Major (260)	Road	1 lane of road closed	9
ME 7/19	Shek Lin Road, Tai Po	22/7 (6:45)	Soil cut slope	Major (80)	Road Pedestrian pavement	Road and pedestrian pavement closed	
ME 7/27	Hopes Villa, Tai Mong Tsai Road, Sai Kung (8SW-A/C20)	24/7 (14:00)	Soil cut slope Natural slope	Major (1000)	Road	2 lanes of road closed	11
ME 7/31	Near Anderson Road Quarry, Anderson Road, Sai Kung (11NE-D/C164)	25/7	Soil/rock cut slope Rock fall	Major (80)	Road	2 lanes of road closed	12
ME 7/32	Near Pik Uk Tsuen, Clear Water Bay Road, Sai Kung (11NE-B/C144)	24/7	Soil cut slope	Major (60)	Road Pedestrian pavement Bus shelter	1 lane of road and pedestrian pavement closed	13
ME 8/4	Sam A Wan Pier, Sam A Wan	24/7	Natural slope	Major (55)	Footpath	Pedestrian pavement closed	
ME 8/22	Lot 227 in DD229, Ah Kung Wan Road, Sai Kung	16/8 (8:45)	Soil cut slope	Major (240)	Road Building lot Pedestrian pavement Building access	4 houses evacuated and 2 lanes of road closed	20
ME 8/24	Sai Sha Road near Long Keng, Sai Kung (8SW-A/C4)	16/8 (9:45)	Soil cut slope	Major (150)	Road	2 lanes of road closed	21

Table 10 - List of Major Incidents in Hong Kong Reported to GEO in 1994 (Sheet 4 of 5)

Incident No.	Location (Slope Ref. No. if any)	Failure			Area Affected	Consequence	Plate No.
		Date (Time)	Type	Scale (m ³)			
ME 8/28	Hut nos. 26-27, O Long Village, Sai Kung	16/8 (8:00-9:00)	Retaining wall	Major (50)	Squatter hut	2 huts temporarily evacuated	22
ME 8/32	Lin Ma Hang Road, Man Kam To	6-7/8	Natural slope	Major (100)	Road	1 lane of road closed	23
MW 7/10	Near Chun Shing Building, Kwai Fuk Road, Kwai Chung (7SW-C/C281)	22/7 (am)	Soil/rock cut slope	Major (>200)	Road	3 lanes of road blocked	14
MW 7/18	MS 14½, Castle Peak Road, Tsing Lung Tau	23/7 (7:00 and 15:30)	Soil/rock cut slope Natural slope	Major (20, 700)	Road Pedestrian pavement	1 person injured, 2 lanes of road and pedestrian pavement closed, 1 lorry damaged and 1 water pipe broken	15
MW 7/25	MS 6, South Lantau Road, Lantau Island (13NE-B/C9)	24/7 (19:00)	Soil/rock cut slope	Major (250-300)	Road Pedestrian pavement	2 lanes of road and pedestrian pavement closed	
MW 7/52	Ta Shui Wan, Sok Kwu Wan, South Lamma Island	24/7 (11:00)	Soil cut slope	Major (170)	Pedestrian pavement	Pedestrian pavement closed	
MW 7/63	Lion Rock Tunnel Road, Shatin (7SW-D/FR33)	26/7 (am)	Fill slope	Major (14, 100)	Road	1 lane of road closed	
MW 8/3	MS 14½, Castle Peak Road, Tsing Lung Tau	7/8 (11:45)	Soil cut slope Natural slope	Major (300)	Road	1 person killed, 17 persons injured and 2 lanes of road closed	24 and 25

Table 10 - List of Major Incidents in Hong Kong Reported to GEO in 1994 (Sheet 5 of 5)

Incident No.	Location (Slope Ref. No. if any)	Failure			Area Affected	Consequence	Plate No.
		Date (Time)	Type	Scale (m ³)			
MW 8/6	Near Border Check Point, Man Kam To	6/8 (19:00)	Soil cut slope	Major (150, 50)	Road	1 lane of road closed	26
MW 8/24	Kwu Tung Hang Tsuen, Sheung Shui	6/8 (16:00)	Natural slope	Major (200)	Squatter hut	30 huts permanently evacuated	
MW 8/48	Perown Barracks, So Kwun Wat, Tuen Mun	5/8	Soil cut slope	Major (150)	Barrack		
MW 8/50	Access road to Table Hill Service Reservoir, Sheung Shui	6-7/8	Soil cut slope Subsidence	Major (200)	Access road		27
MW 8/60	Maclehose Trail Stage 10, Tai Lam Chung Reservoir, Tai Lam Chung	Unknown	Natural slope	Major (500)	Country park	Footpath closed	28
MW 8/64	Shek Pik Catchwater 'F', Lantau Island	Unknown	Soil cut slope Natural slope	Major (>300)	Catchwater		

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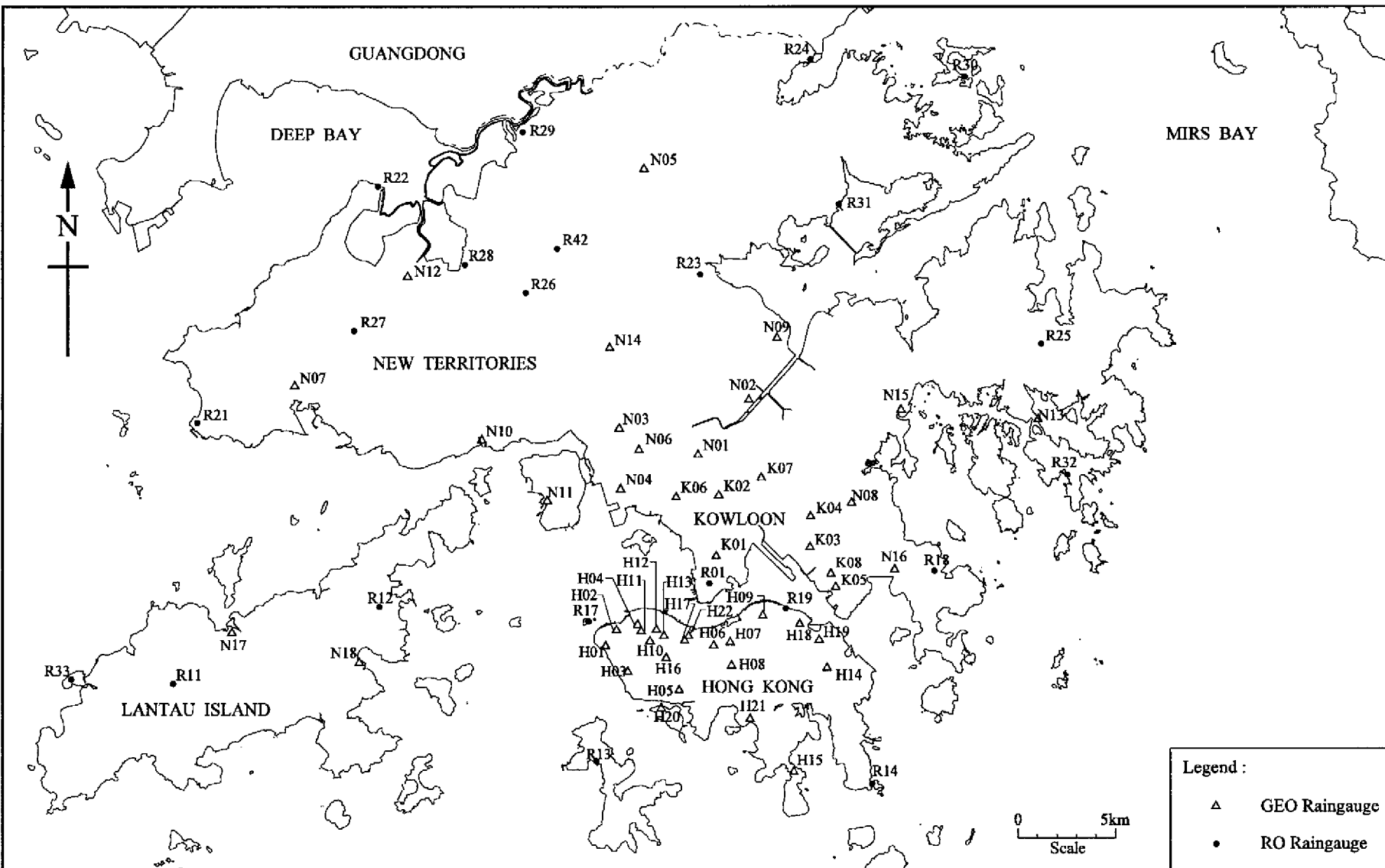


Figure 1 - Location of GEO and RO Automatic Raingauges

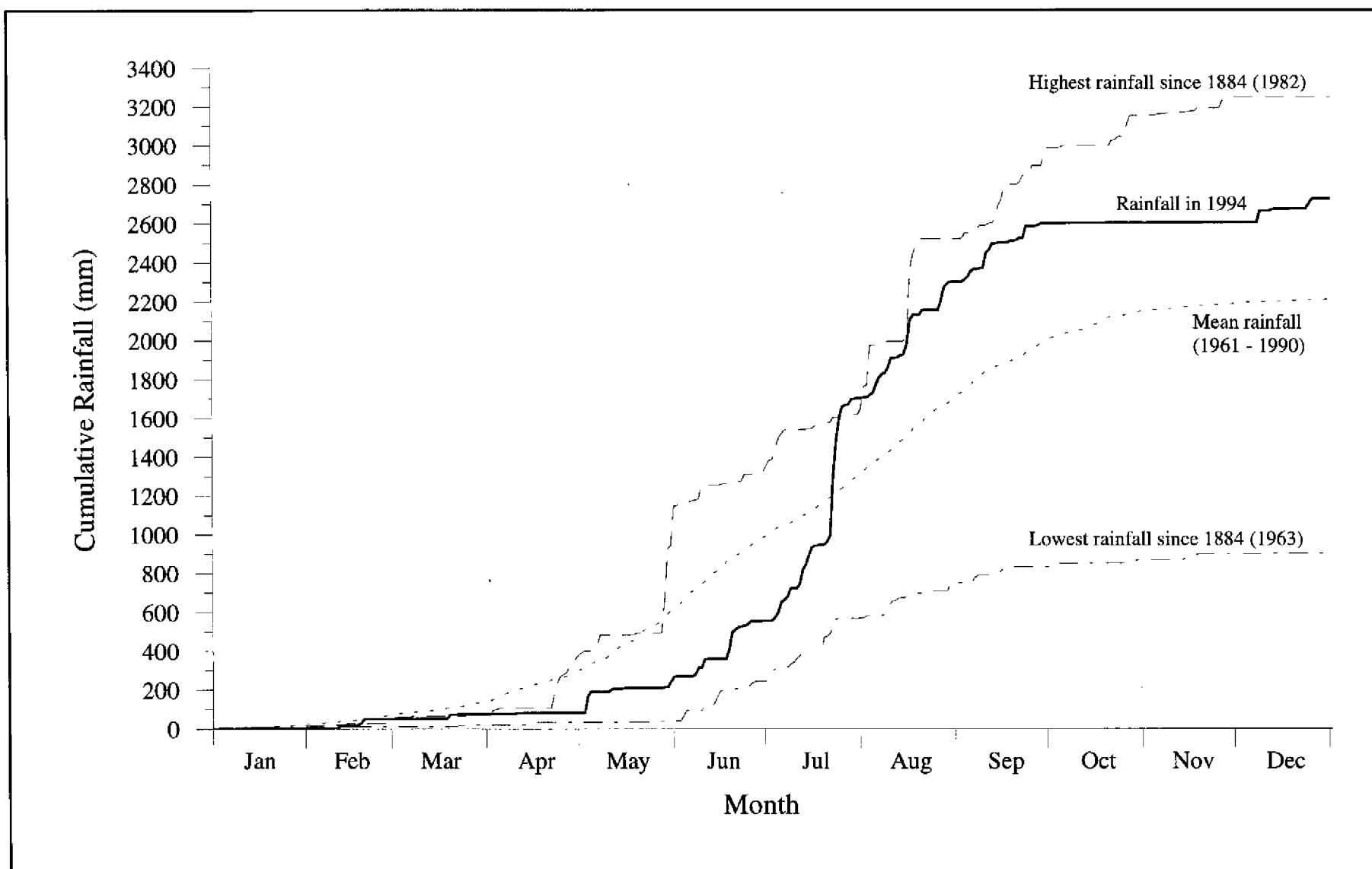


Figure 2 - Cumulative Rainfall for 1994 and Recorded Highest, Mean and Lowest Cumulative Rainfalls Since 1884

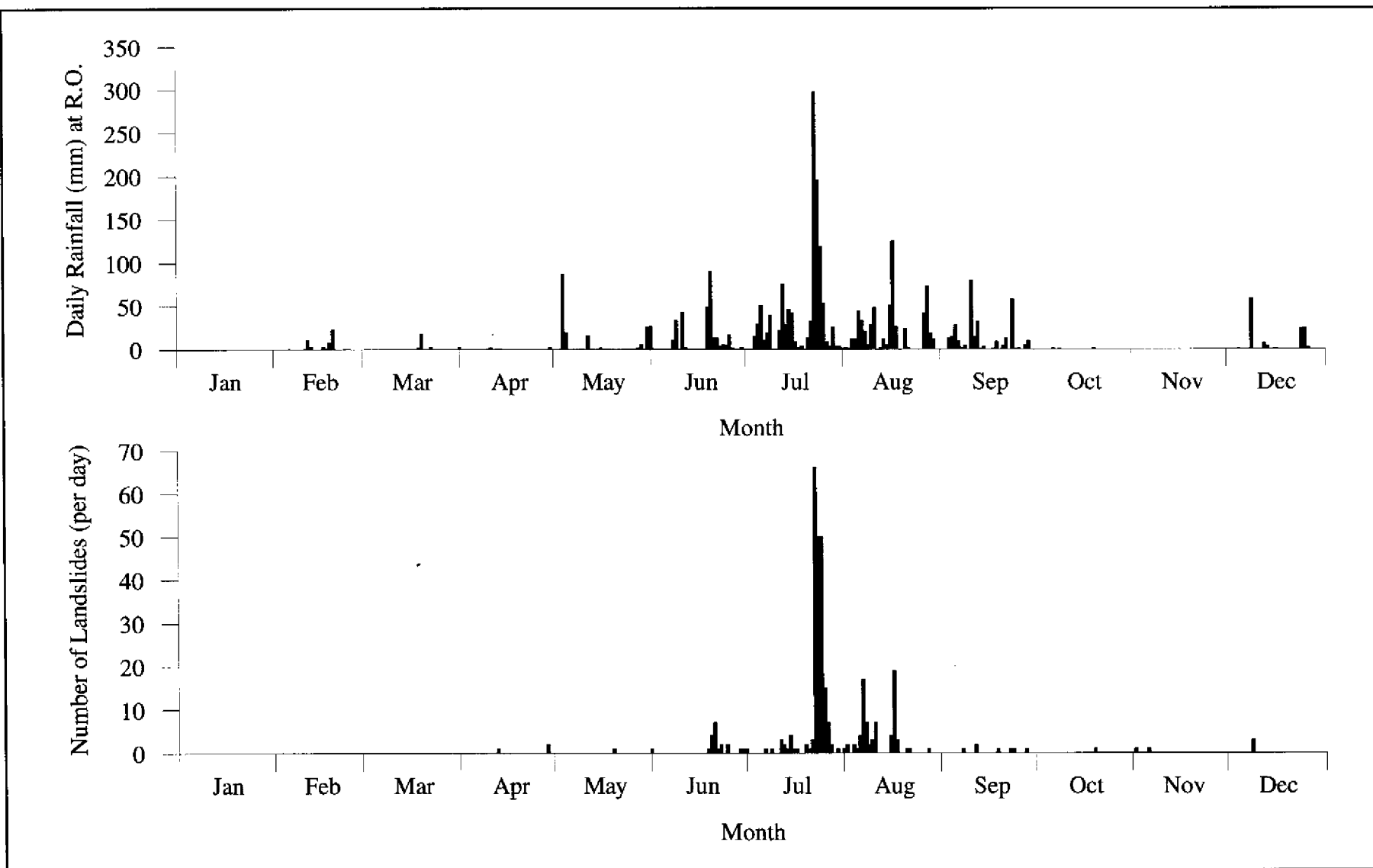


Figure 3 - Daily Rainfall and Distribution of Number of Landslides in 1994

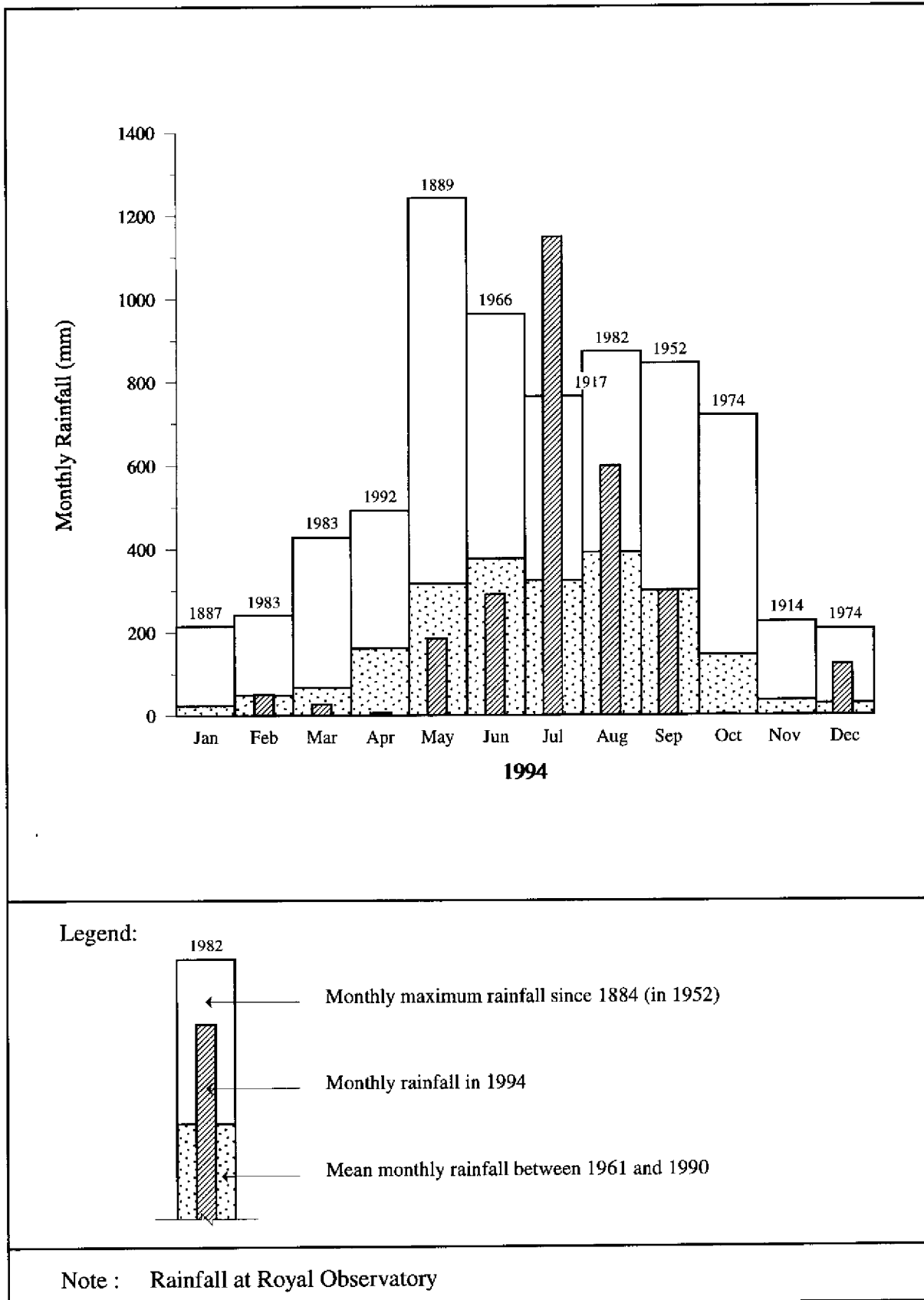


Figure 4 - Monthly Rainfalls in 1994 in Comparison with Recorded Maximum and Mean Monthly Rainfalls

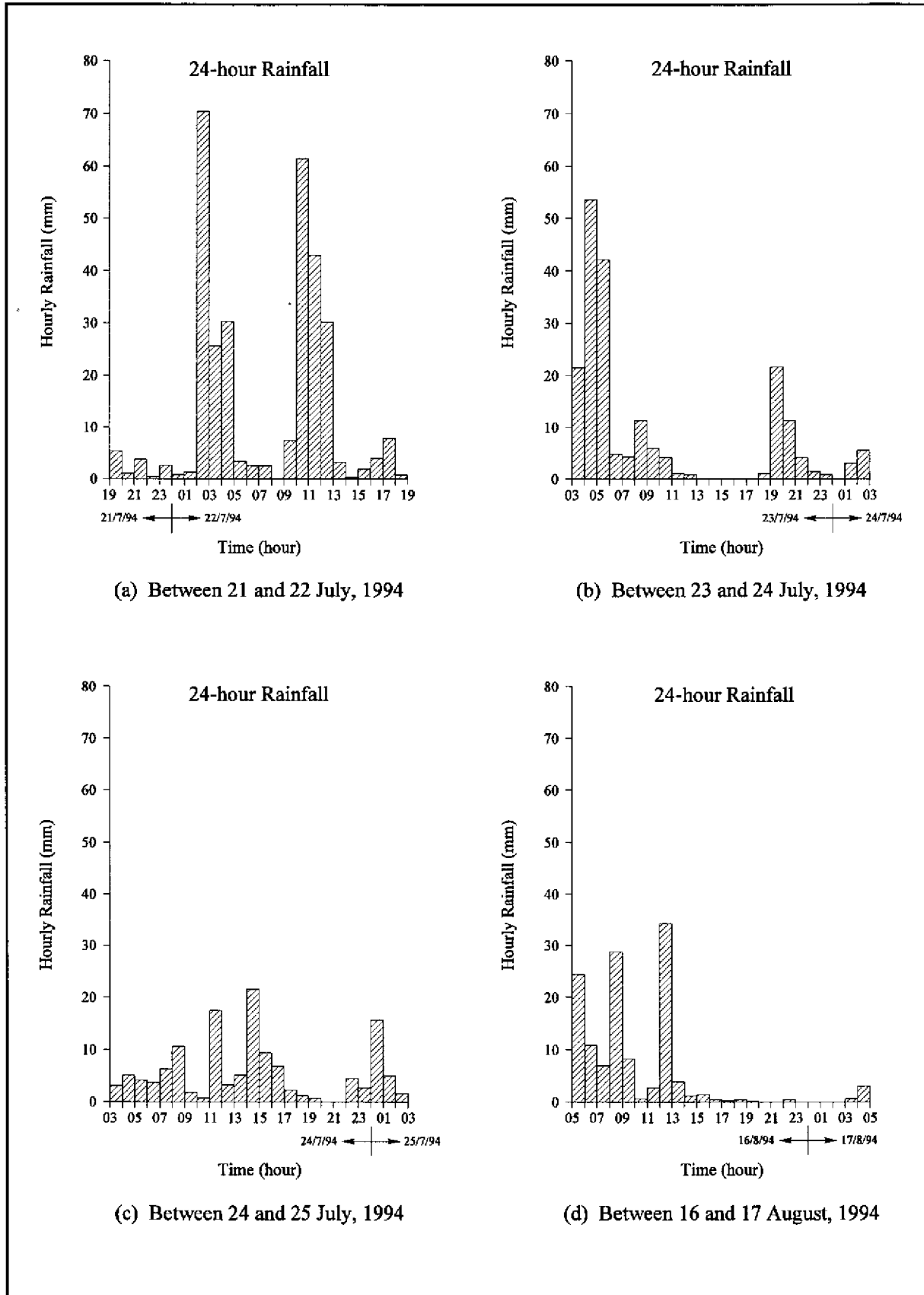


Figure 5 - Histogram of Hourly Rainfall at the Royal Observatory for the Four Highest 24-hour Rainfall in 1994

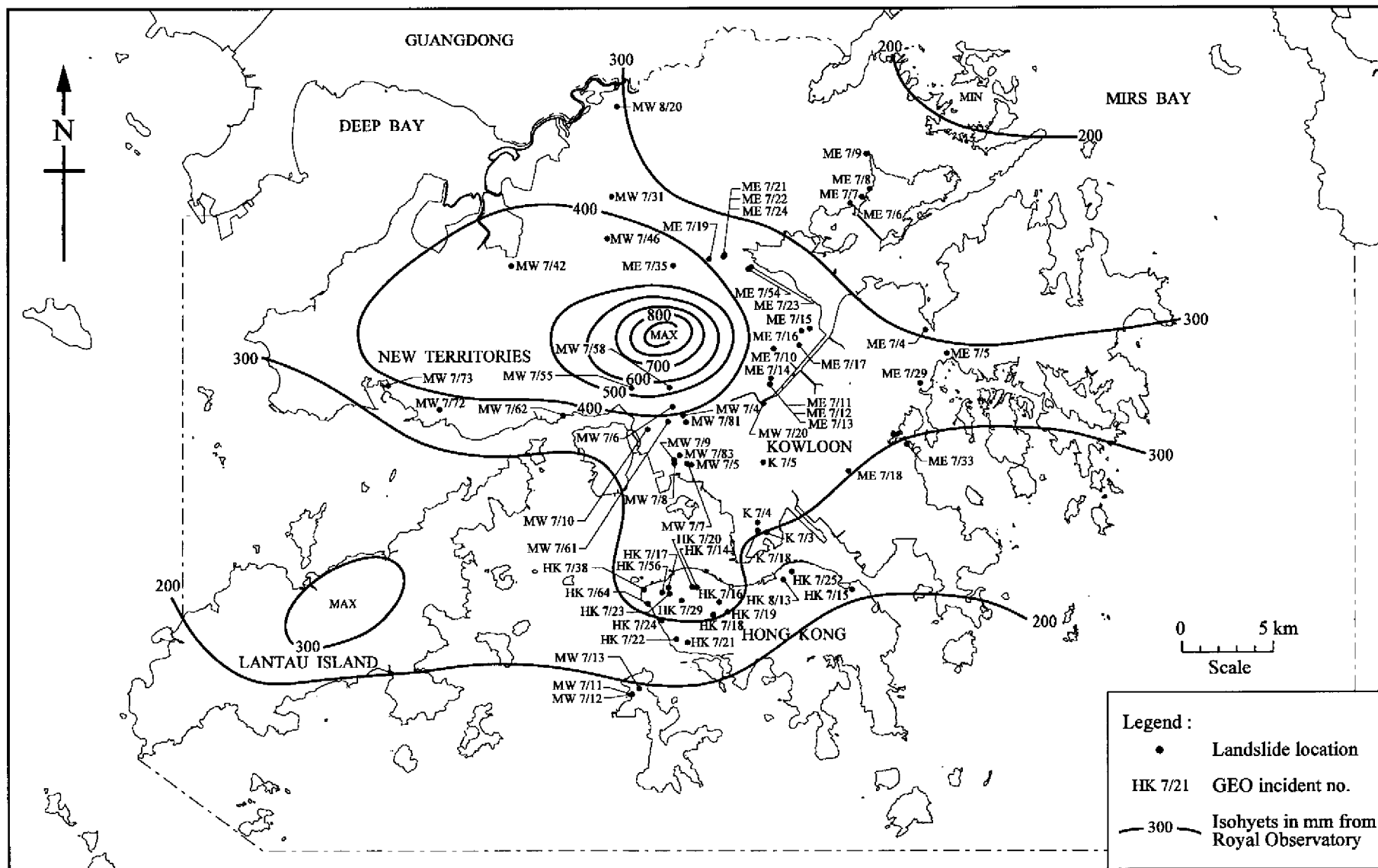


Figure 6 - 24-hour Rainfall Distribution Ending at 19:00 on 22 July 1994 and Locations of GEO Incidents

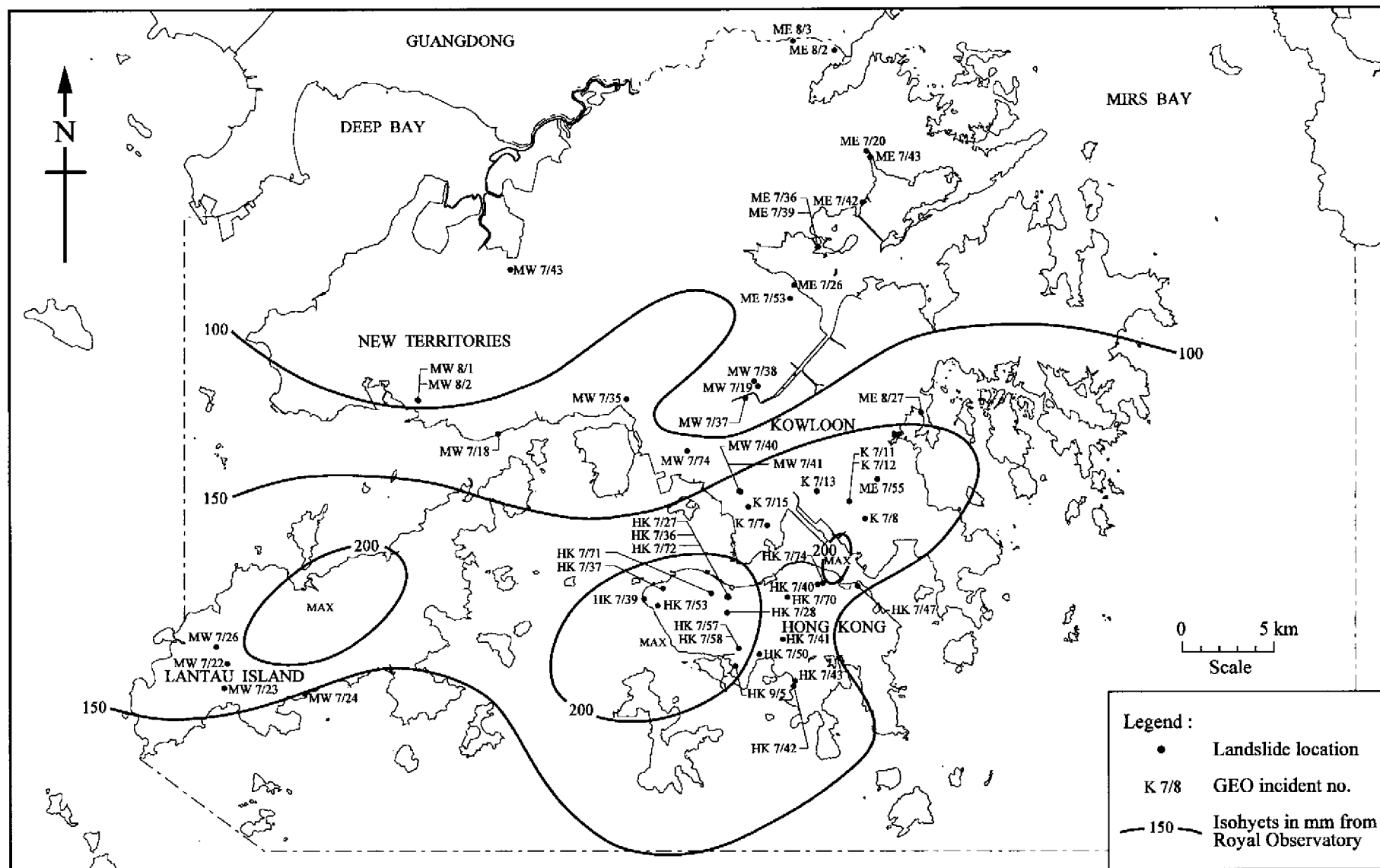


Figure 7 - 24-hour Rainfall Distribution Ending at 03:00 on 24 July 1994 and Locations of GEO Incidents

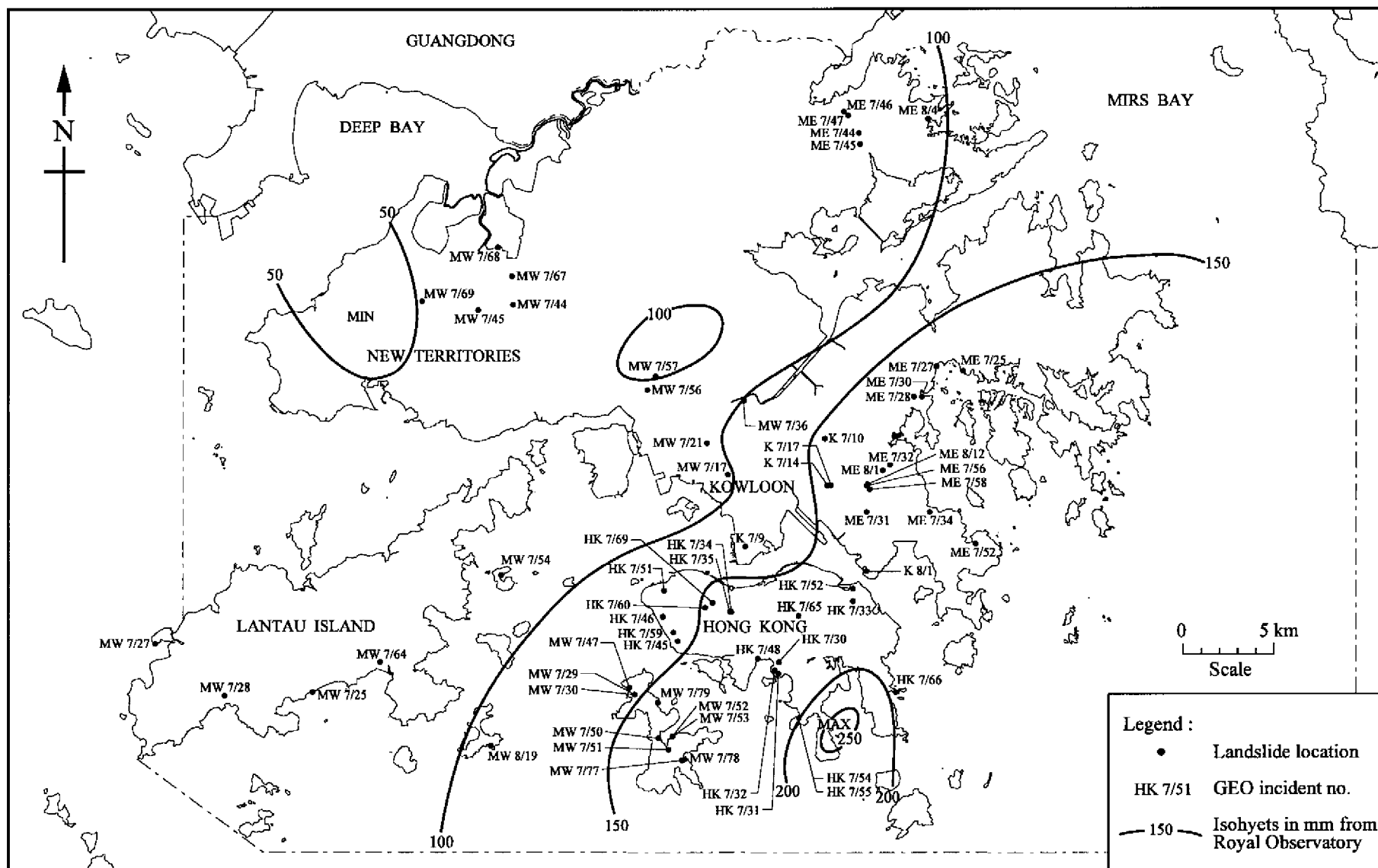


Figure 8 - 24-hour Rainfall Distribution Ending at 03:00 on 25 July 1994 and Locations of GEO Incidents

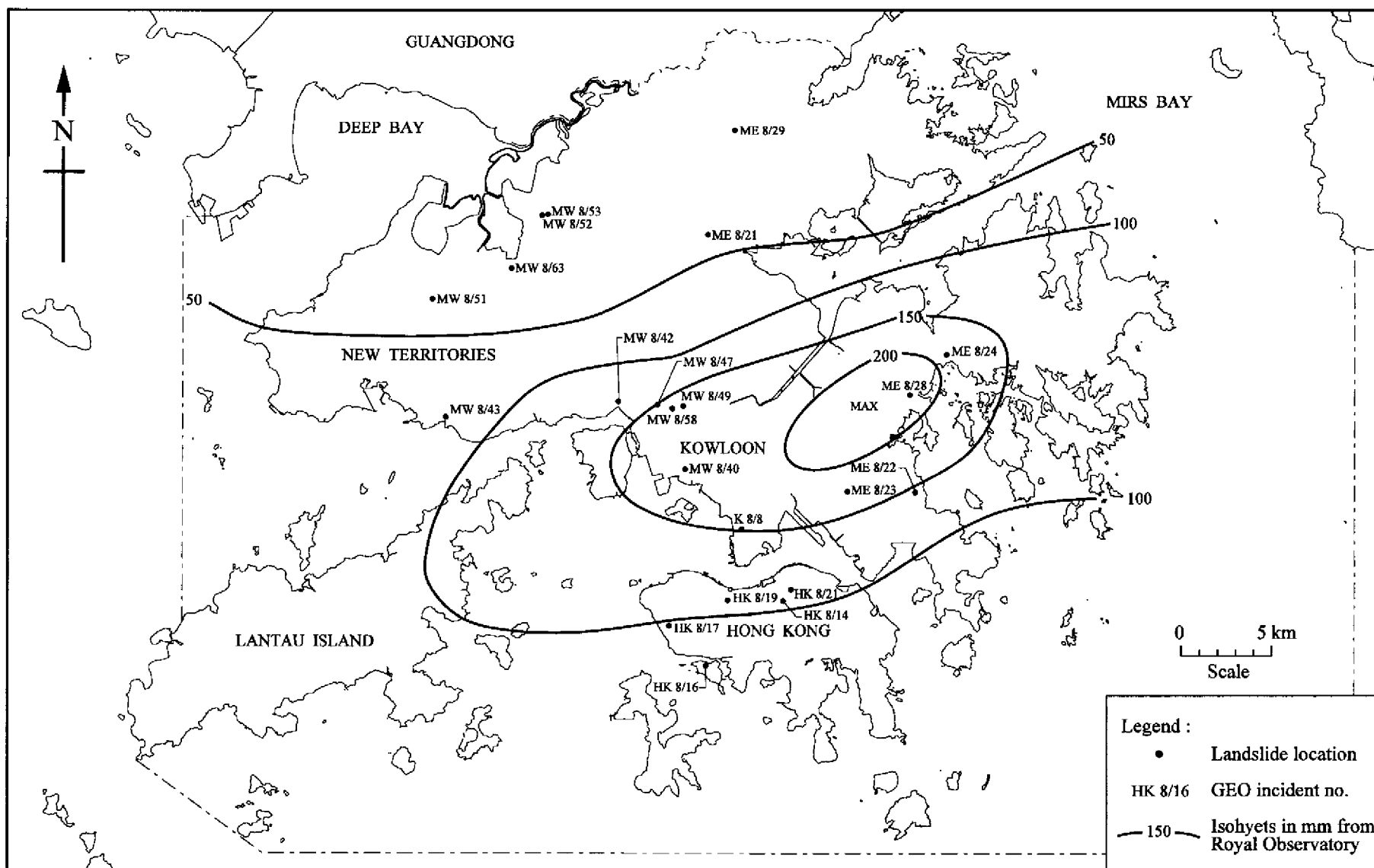


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Plate 1 : Negative No. SP9401803 Taken on : 22-2-94

Description : Ground subsidence (about 30 m³) resulting in the temporary evacuation of a building and the closure of a road.

Plate 1 - Wing Lok Street, Sheung Wan (Incident HK 2/1)



Plate 2 : Negative No. ME9450810 Taken on : 24-6-94

Description : Major failure of a soil cut slope (about 80 m³) resulting in the closure of one lane of a road.

Plate 2 - Pak Tam Road near Uk Tau, Sai Kung, Slope No. 8NW-D/C3
(Incident ME 6/2)



Plate 3 : Negative No. I9434822 Taken on : 19-8-94

Description : Major failure of a soil cut slope (about 200 m³) resulting in the evacuation of 6 flats.

Plate 3 - Island Garden, Chai Wan Road, Shau Kei Wan,
Slope No. 11SE-B/CR79 (Incident HK 7/33)



Plate 4 : Negative No. SP9416217 Taken on : 24-7-94

Description : Major failure of a masonry wall and a cut slope (about 1 000 m³).
Five dead, three injuries and two blocks were evacuated.

Plate 4 - Kwun Lung Lau, Kennedy Town, Wall No. 11SW-A/R309
(Incident HK 7/37)



Plate 5 : Negative No. SP9415317 Taken on : 23-7-94



Plate 6 : Negative No. SP9415306 Taken on : 23-7-94

Description : Major failure of a soil/rock cut slope (about 150 m³) damaging a taxi and leading to the closure of a road.

Plates 5 & 6 - Sau Mau Ping Road opposite Blocks 35 & 40, Sau Mau Ping,
Slope No. 11NE-D/C4 (Incident K 7/11)



Plate 7 : Negative No. SP9425324 Taken on : 25-7-94

Description : Major failure of a soil cut slope (about 800 m³) resulting in the closure of a road.

Plate 7 - New Clear Water Bay Road opposite Choi Wan Estate,
Slope No. 11NE-A/C63 (Incident K 7/14)



Plate 8 : Negative No. ME9457314 Taken on : 12-7-94

Description : Major failure of a retaining wall (about 80 m³) resulting in the evacuation of three flats.

Plate 8 - House No. 45, Sheung Sze Wan Village, Sai Kung (Incident ME 7/3)



Plate 9 : Negative No. ME9460003 Taken on : 24-7-94

Description : Major failure of a soil cut slope (about 260 m³) leading to the closure of a road.

Plate 9 - Sai Sha Road near Kei Ling Ha Lo Wai, Sai Kung,
Slope No. 8NW-C/C14 (Incident ME 7/4)



Plate 10 : Negative No. ME9460408 Taken on : 22-7-94

Description : Rock fall (15 m^3) from a cut slope blocking one lane of a road.

Plate 10 - Lai Ping Road near Chinese University, Shatin,
Slope No. 7NE-C/C78 (Incident ME 7/15)



Plate 11 : Negative No. ME9461203 Taken on : 25-7-94

Description : Major failure of a soil cut/natural slope (about 1 000 m³) resulting in the closure of a road.

Plate 11 - Tai Mong Tsai Road near Hopes Villa, Sai Kung,
Slope No. 8SW-A/C20 (Incident ME 7/27)



Plate 12 : Negative No. ME9460612 Taken on : 25-7-94

Description : Major failure of a soil/rock cut slope (about 80 m³) leading to the closure of a road.

Plate 12 - Anderson Road near Anderson Road Quarry, Sai Kung,
Slope No. 11NE-D/C164 (Incident ME 7/31)



Plate 13 : Negative No. ME9461617 Taken on : 26-7-94

Description : Major failure of a soil cut slope (about 60 m³) damaging a bus shelter and resulting in the closure of one lane of a road and a pedestrian pavement.

Plate 13 - Clear Water Bay Road near Pik Uk Tsuen, Sai Kung,
Slope No. 11NE-B/C144 (Incident ME 7/32)



Plate 14 : Negative No. MW9418400 Taken on : 22-7-94

Description : Major failure of a soil/rock cut slope (about 200 m³) blocking 4 lanes of a road.

Plate 14 - Kwai Fuk Road near Chun Shing Building, Kwai Chung,
Slope No. 7SW-C/C281 (Incident MW 7/10)



Plate 15 : Negative No. MW9418600 Taken on : 25-7-94

Description : Major failure of a soil/rock cut slope (about 250 to 300m³) resulting in the closure of two lanes of a road and a pedestrian pavement.

Plate 15 - Milestone 6, South Lantau Road, Lantau Island,
Slope No. 13NE-B/C9 (Incident MW 7/25)



Plate 16 : Negative No. MW9418616 Taken on : 25-7-94

Plate 17 :
Negative No. MW9418613
Taken on : 25-7-94

Description : Failure of a
natural slope (about 40 m³)
resulting in the evacuation
of a house.

Plates 16 & 17 - Structure
S/GPA1/31,
Luk Wo, Lantau Island,
(Incident MW 7/26)



Plate 18 :
Negative No. MW9419518
Taken on : 27-7-94

Description : Failure of a
cut slope (about 40 m³)
resulting in the evacuation
of one house and the blockage
of a road.



Plate 19 : Negative No. SP9419517 Taken on : 27-7-94

Plates 18 & 19 - No. 19 Sung Shan New Village, Yuen Long (Incident MW 7/44)



Plate 20 : Negative No. ME9468012 Taken on : 16-8-94

Description : Major failure of a soil cut slope (about 240 m³) resulting in the evacuation of 4 houses and the blockage of a road.

Plate 20 - Ah Kung Wan Road, Sai Kung (Incident ME 8/22)



Plate 21 : Negative No. ME9469400 Taken on : 17-8-94

Description : Major failure of a soil cut slope (about 200 m³) leading to the closure of a road.

Plate 21 - Sai Sha Road near Long Keng, Sai Kung, Slope No. 8SW-A/C4
(Incident ME 8/24)



Plate 22 : Negative No. ME9469121 Taken on : 17-8-94

Description : Major failure of a masonry retaining wall (about 50 m³) resulting in the temporary evacuation of 2 huts.

Plate 22 - O Long Village, Sai Kung (Incident ME 8/28)



Plate 23 : Negative No. ME9471308 Taken on : 23-8-94

Description : Major failure of a natural slope (about 100 m³) leading to the closure of one lane of a road.

Plate 23 - Lin Ma Hang Road, Man Kam To (Incident ME 8/32)



Plate 24 : Negative No. HQ9401109 Taken on : 8-8-94



Plate 25 : Negative No. SP9418204 Taken on : 8-8-94

Description : Major failure of a soil cut/natural slope (about 1 000 m³). One dead, 17 injuries and the blockage of a road.

Plates 24 & 25 - Milestone 14½, Castle Peak Road, Tsing Lung Tau
(Incident MW 8/3)



Plate 26: Negative No. MW9422817 Taken on : 9-8-94

Description : Major failure of a natural slope (about 200 m³) resulting in the permanent evacuation of 30 huts.

Plate 26 - Kwu Tung Hang Tsuen, Sheung Shui (Incident MW 8/24)



Plate 27 : Negative No. MW9425817 Taken on : 18-8-94

Description : Major failure of a soil cut slope (about 200 m³) affecting an access road.

Plate 27 - Table Hill Service Reservoir, Sheung Shui (Incident MW 8/50)



Plate 28 : Negative No. MW9429118 Taken on : 9-8-94

Description : Major failure of a soil cut slope (about 300 m³) blocking the catchwater.

Plate 28 - Shek Pik Catchwater 'F', Lantau Island (Incident MW 8/64)

APPENDIX A

RECORDS FROM GEO RAINGAUGES DURING
THE FOUR HEAVIEST 24-HOUR RAINSTORMS
OF 1994

APPENDIX A

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A4	Histograms of Hourly Rainfall Recorded by GEO Raingauges During 16 to 17 August 1994	94

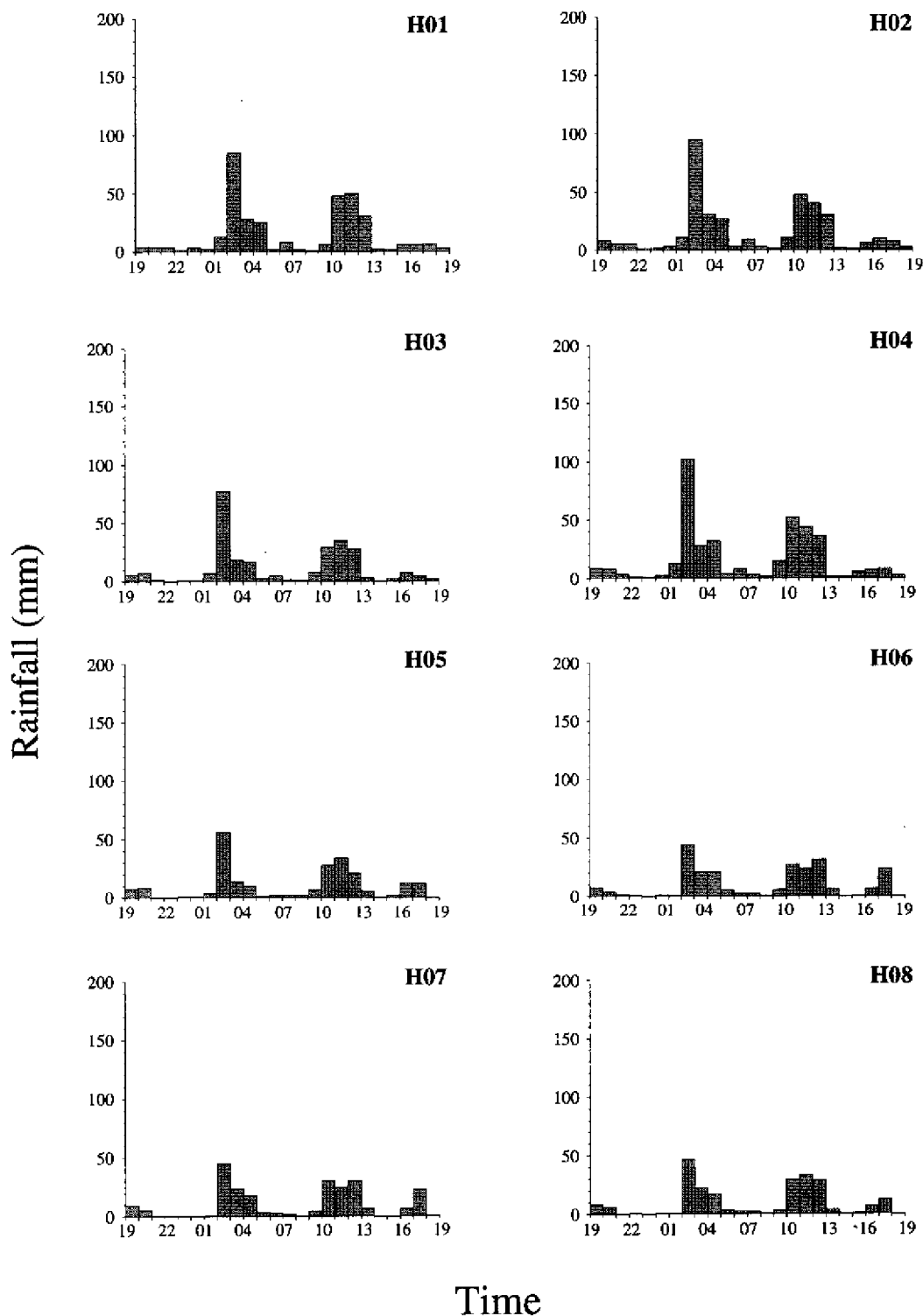


Figure A1 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 21 to 22 July, 1994 (Sheet 1 of 6)

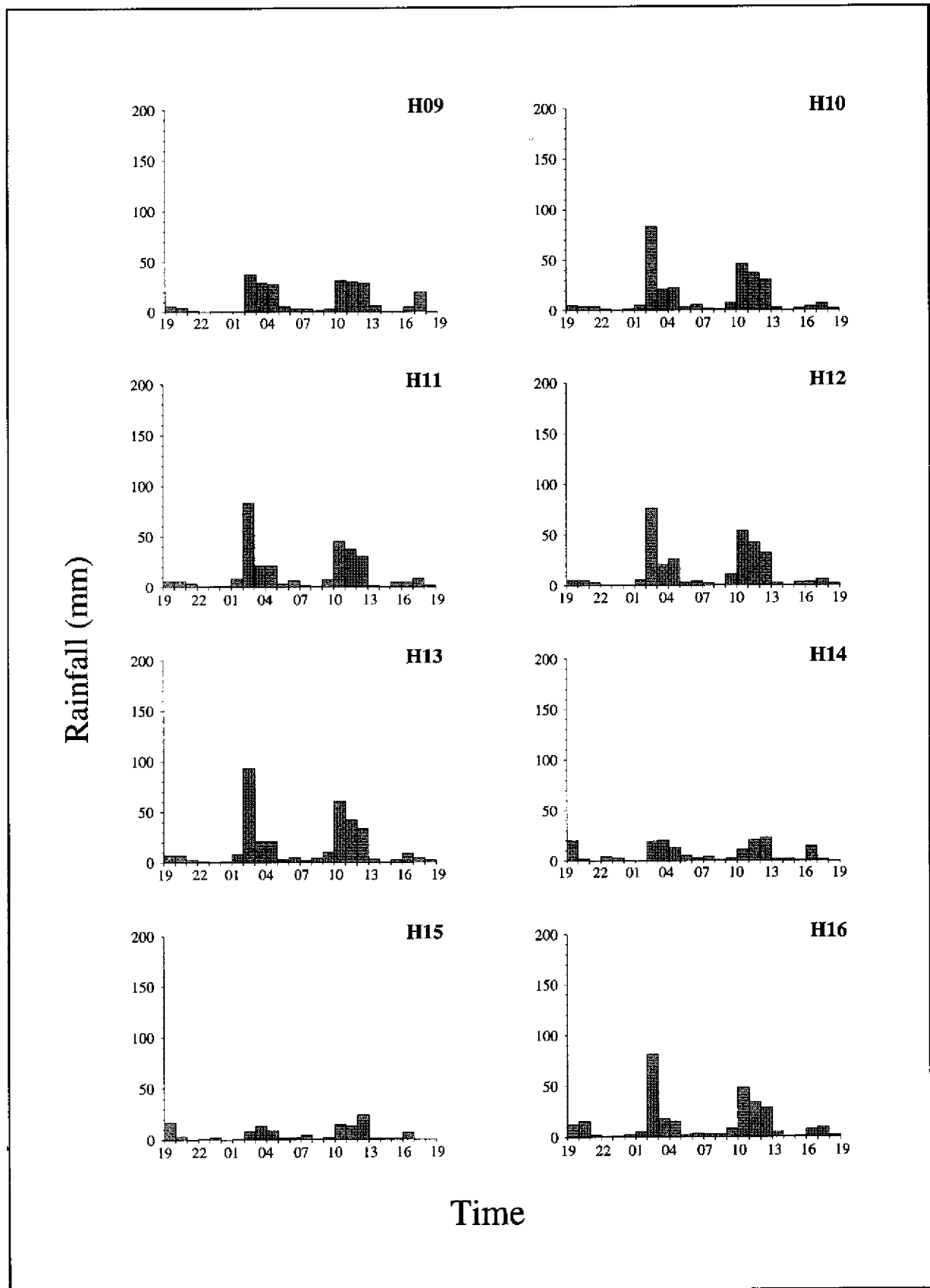


Figure A1 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 21 to 22 July, 1994 (Sheet 2 of 6)

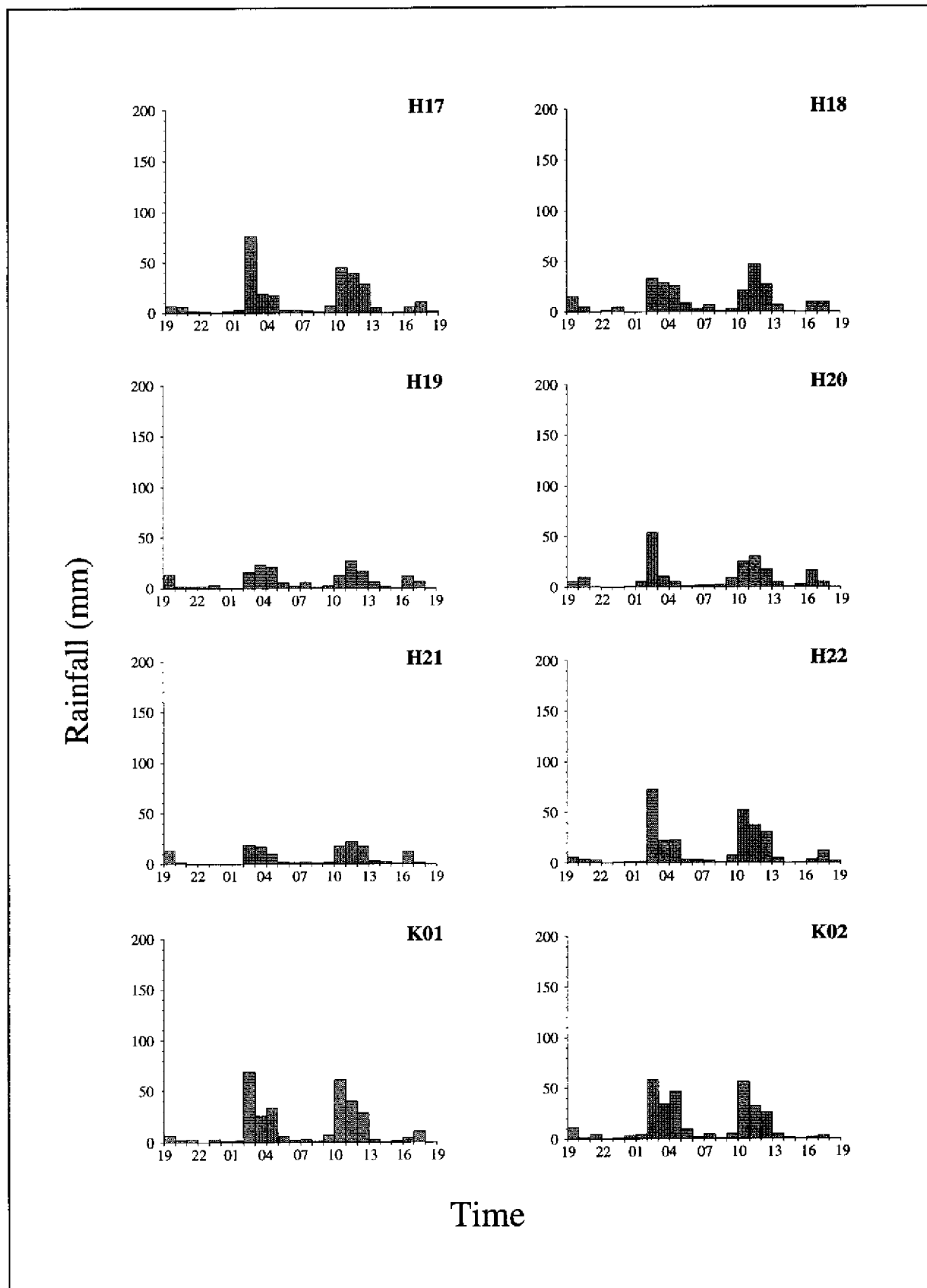


Figure A1 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 21 to 22 July, 1994 (Sheet 3 of 6)

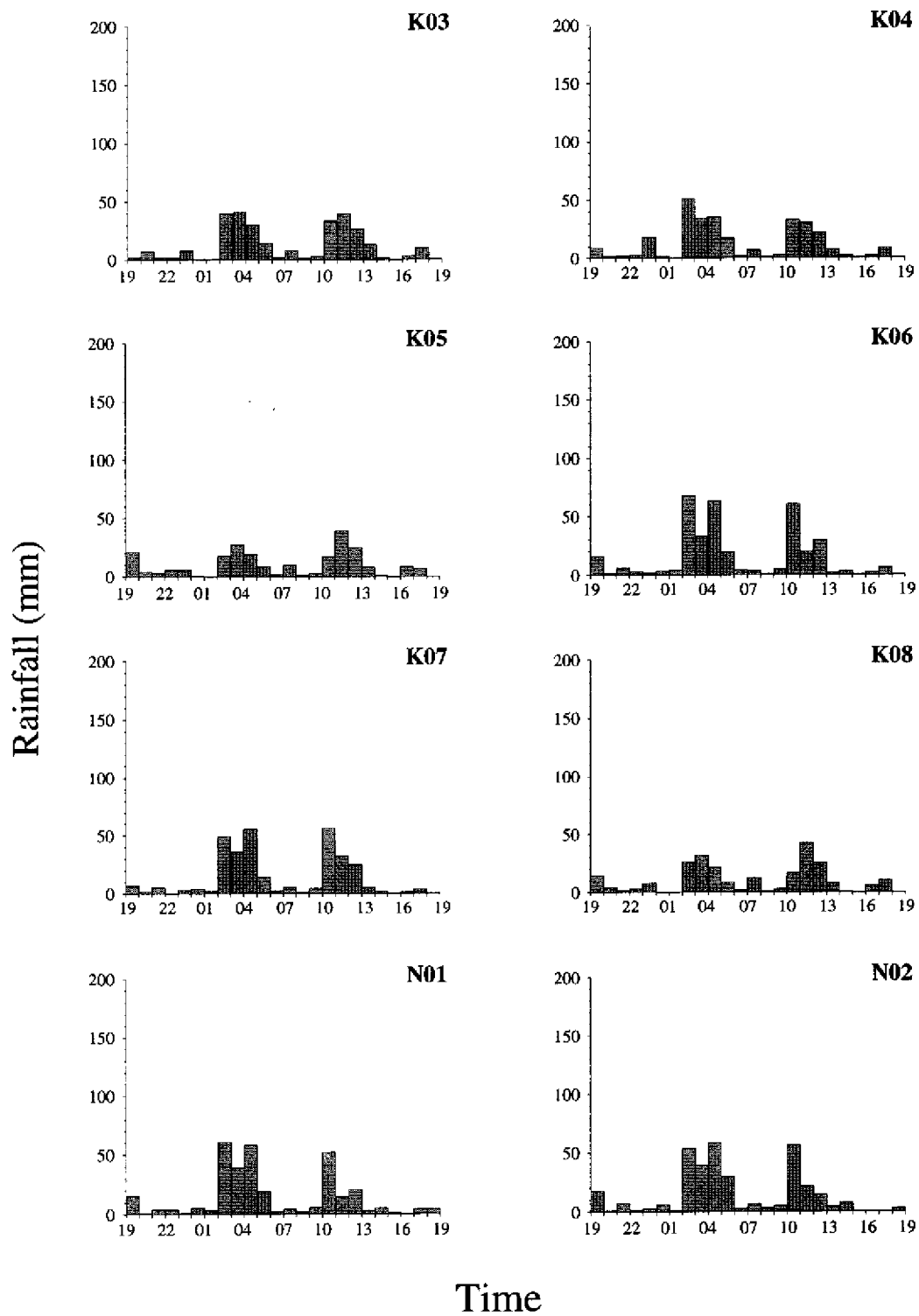


Figure A1 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 21 to 22 July, 1994 (Sheet 4 of 6)

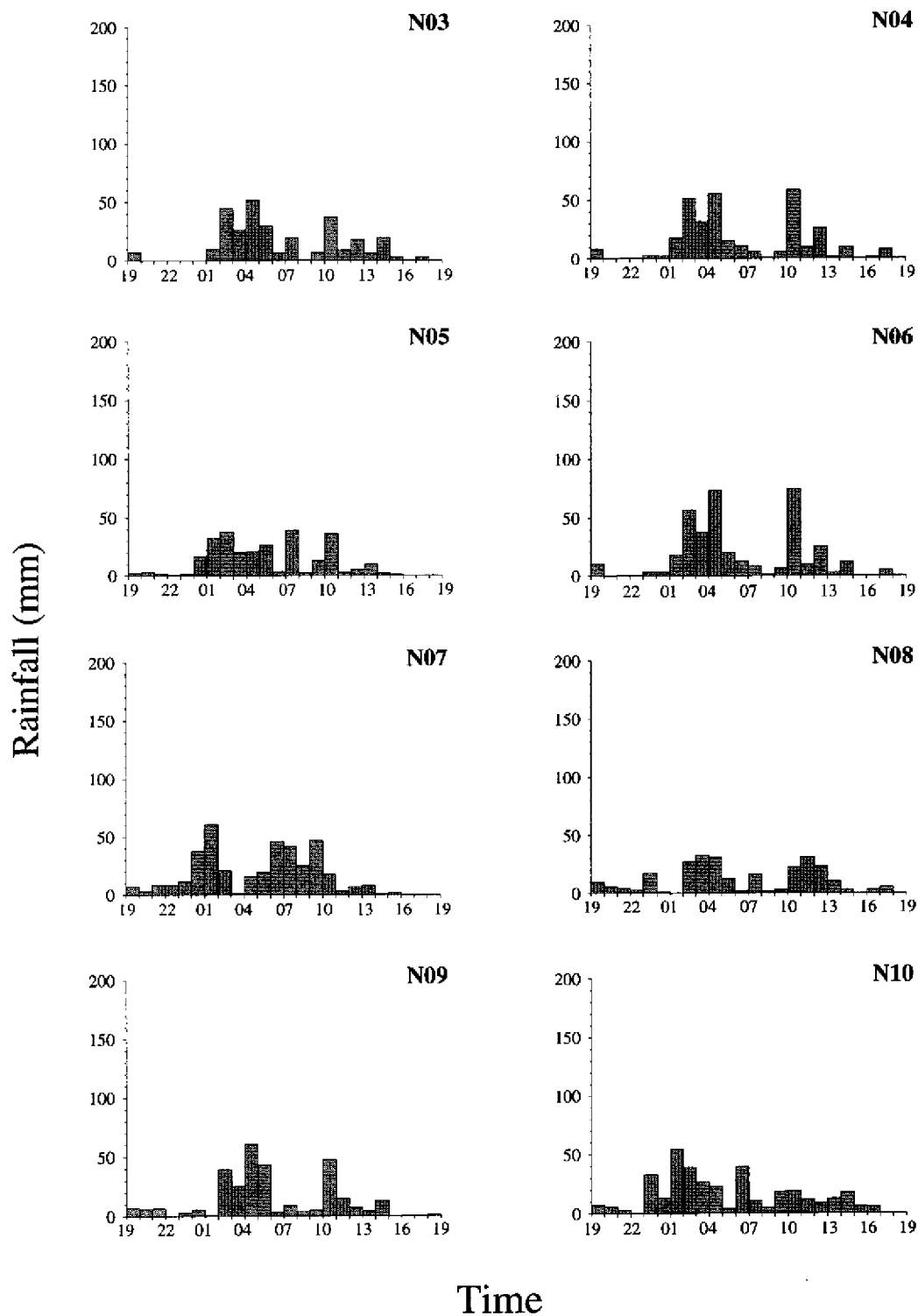


Figure A1 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 21 to 22 July, 1994 (Sheet 5 of 6)

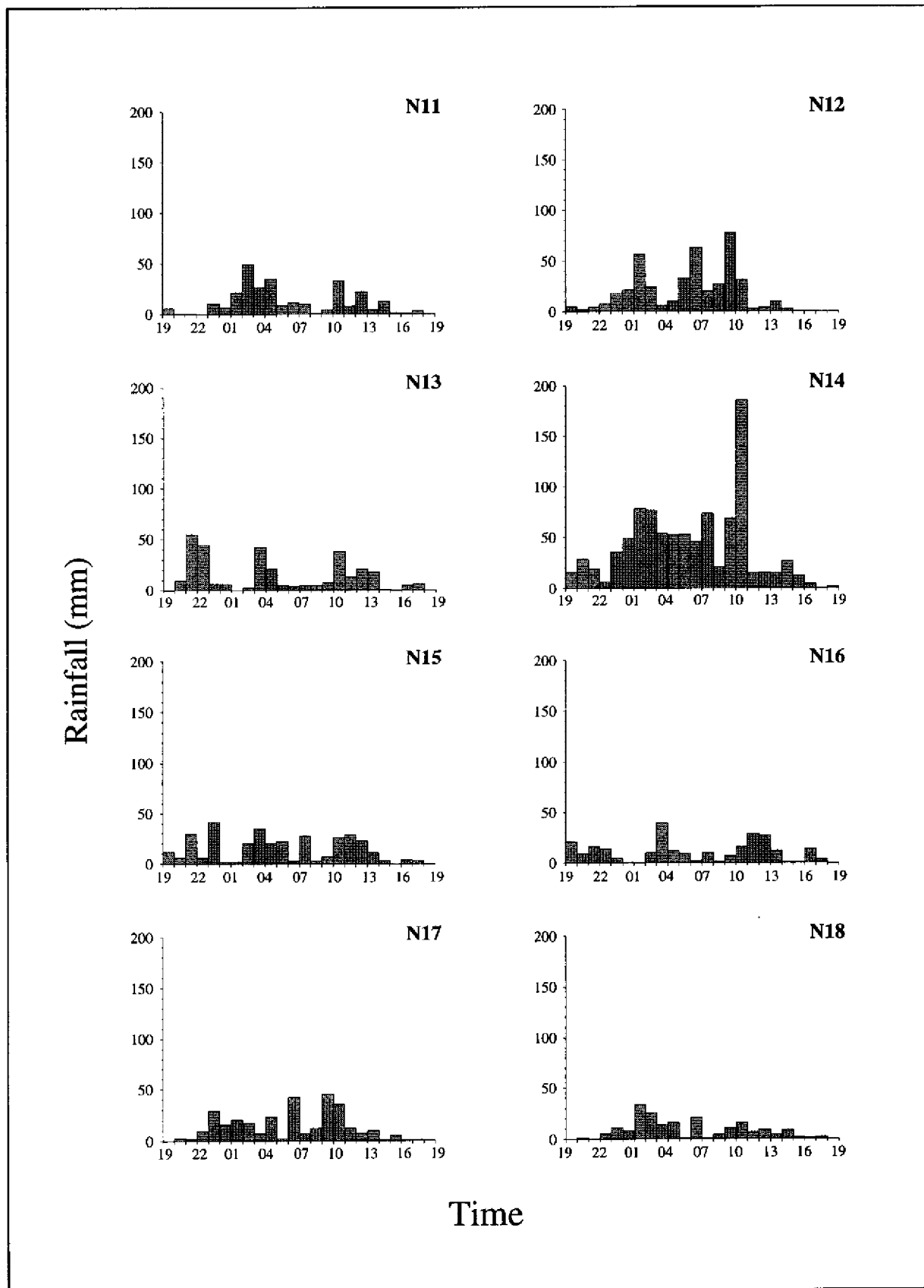


Figure A1 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 21 to 22 July, 1994 (Sheet 6 of 6)

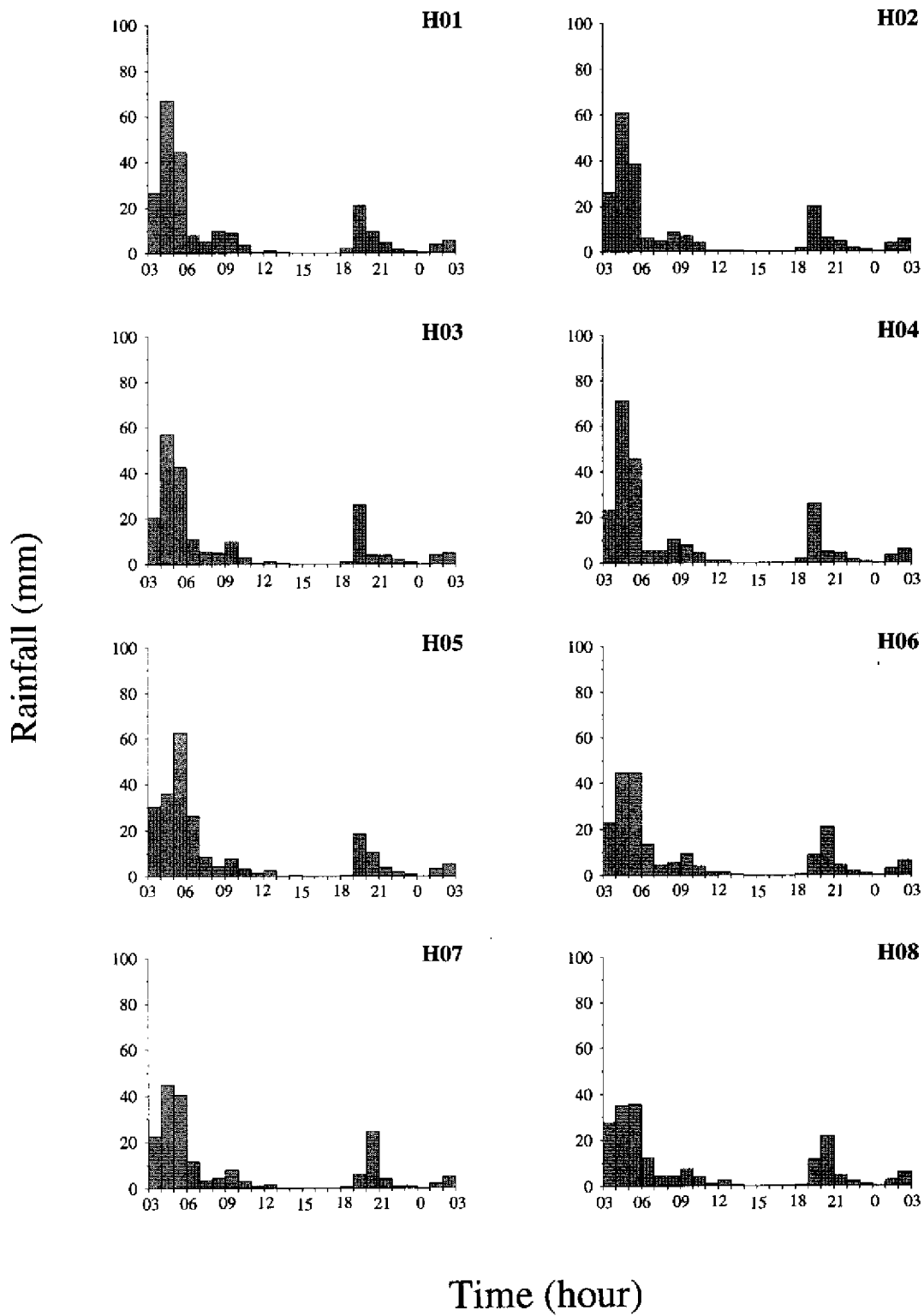


Figure A2 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 23 to 24 July, 1994 (Sheet 1 of 6)

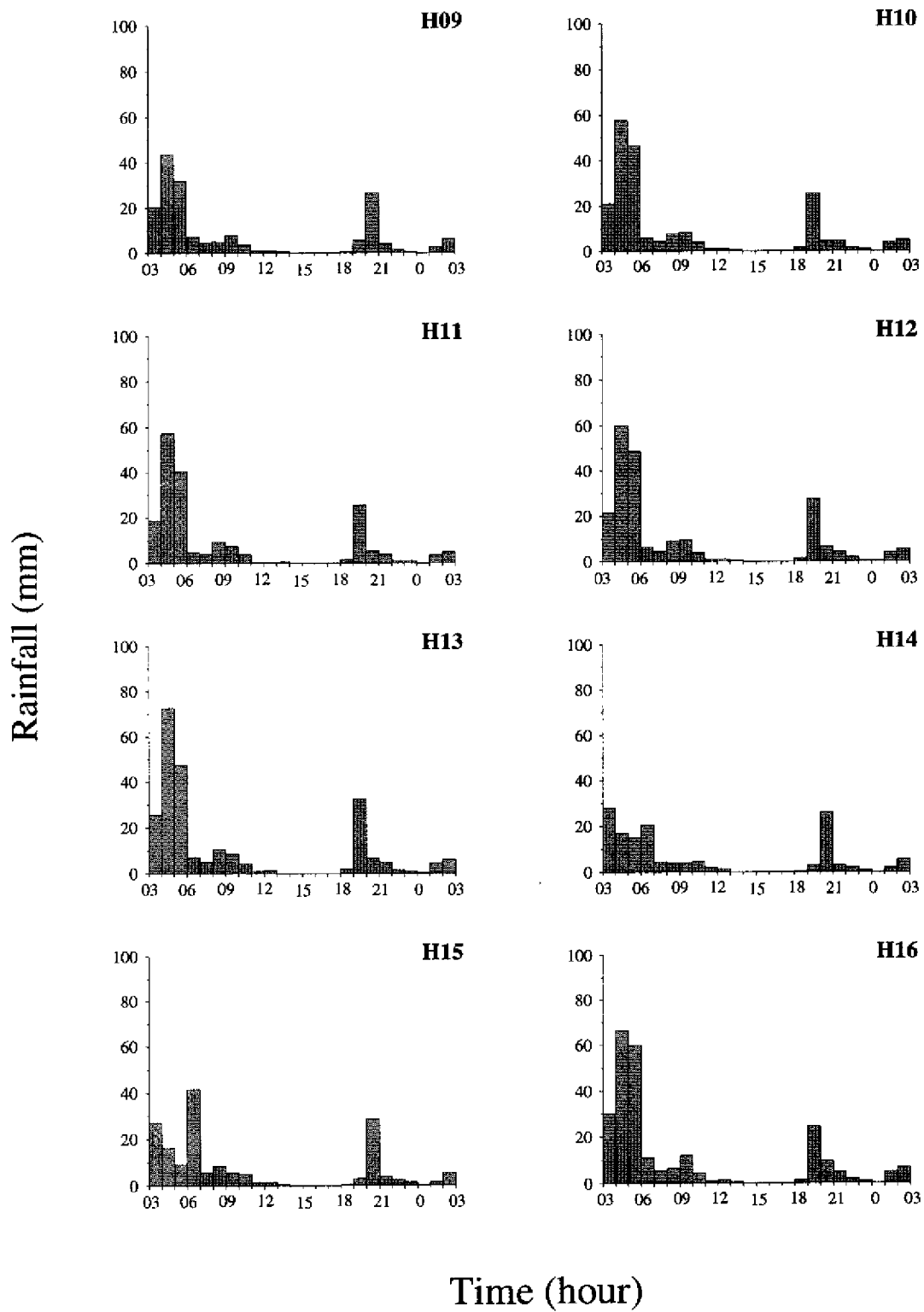


Figure A2 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 23 to 24 July, 1994 (Sheet 2 of 6)

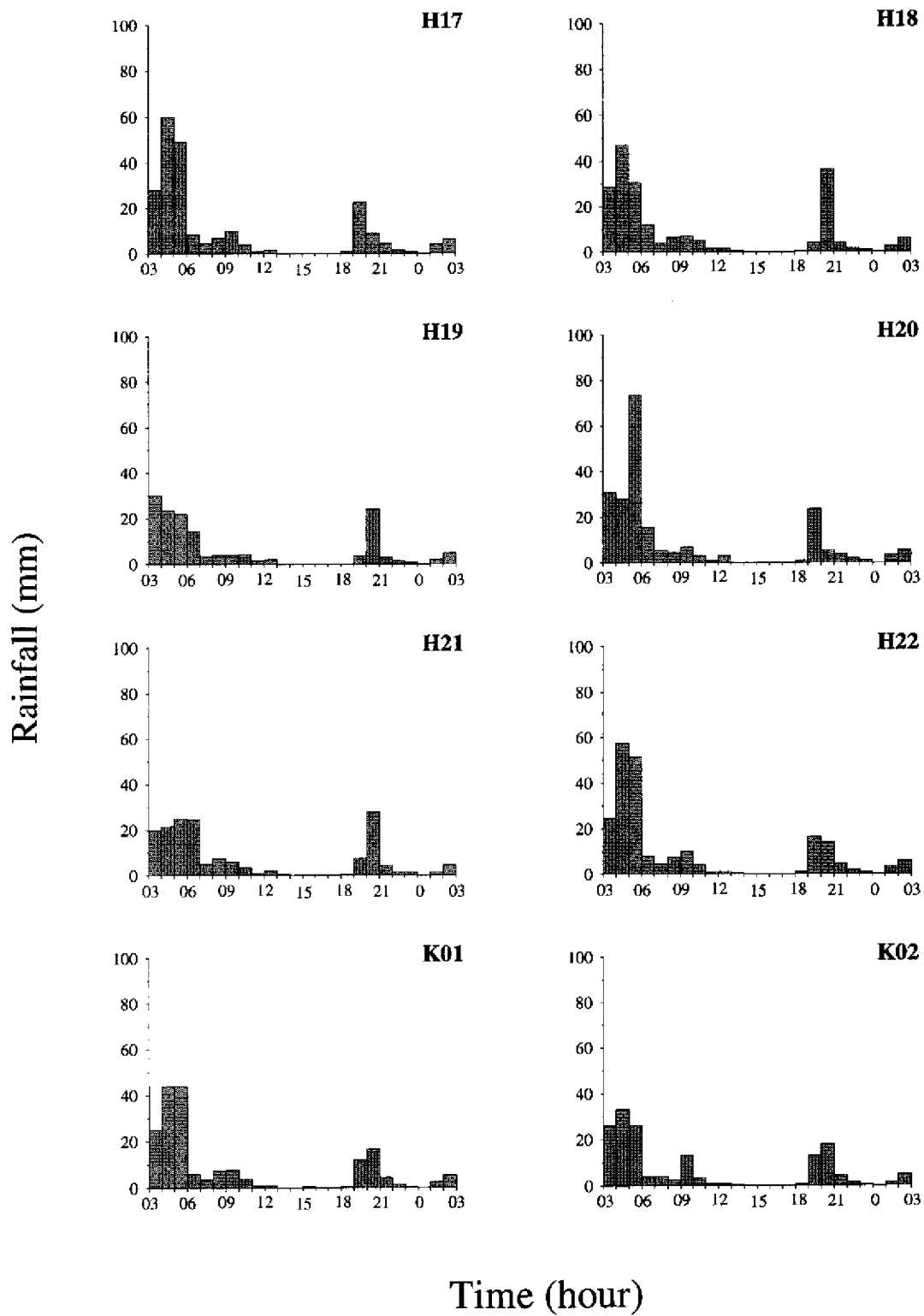


Figure A2 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 23 to 24 July, 1994 (Sheet 3 of 6)

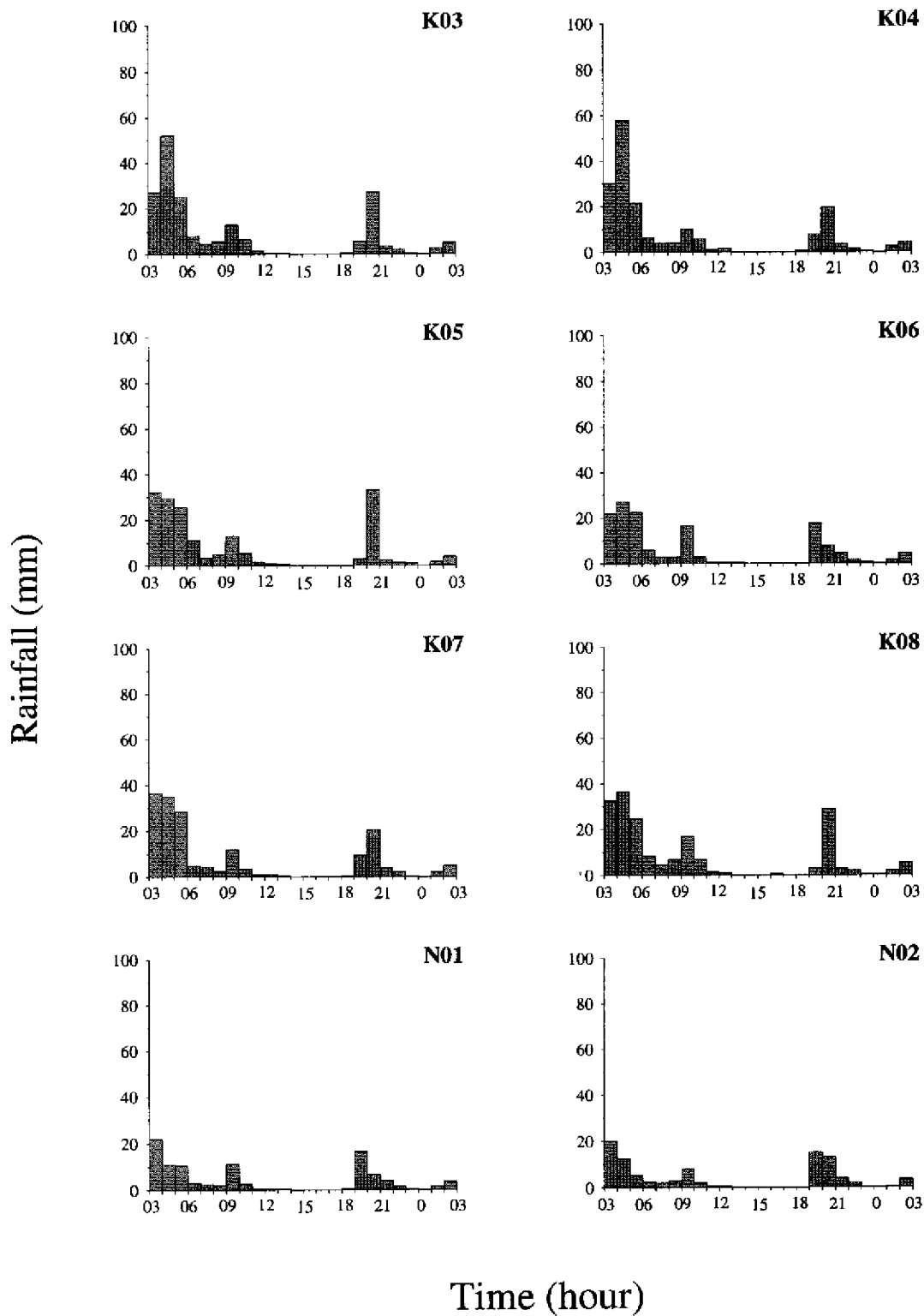


Figure A2 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 23 to 24 July, 1994 (Sheet 4 of 6)

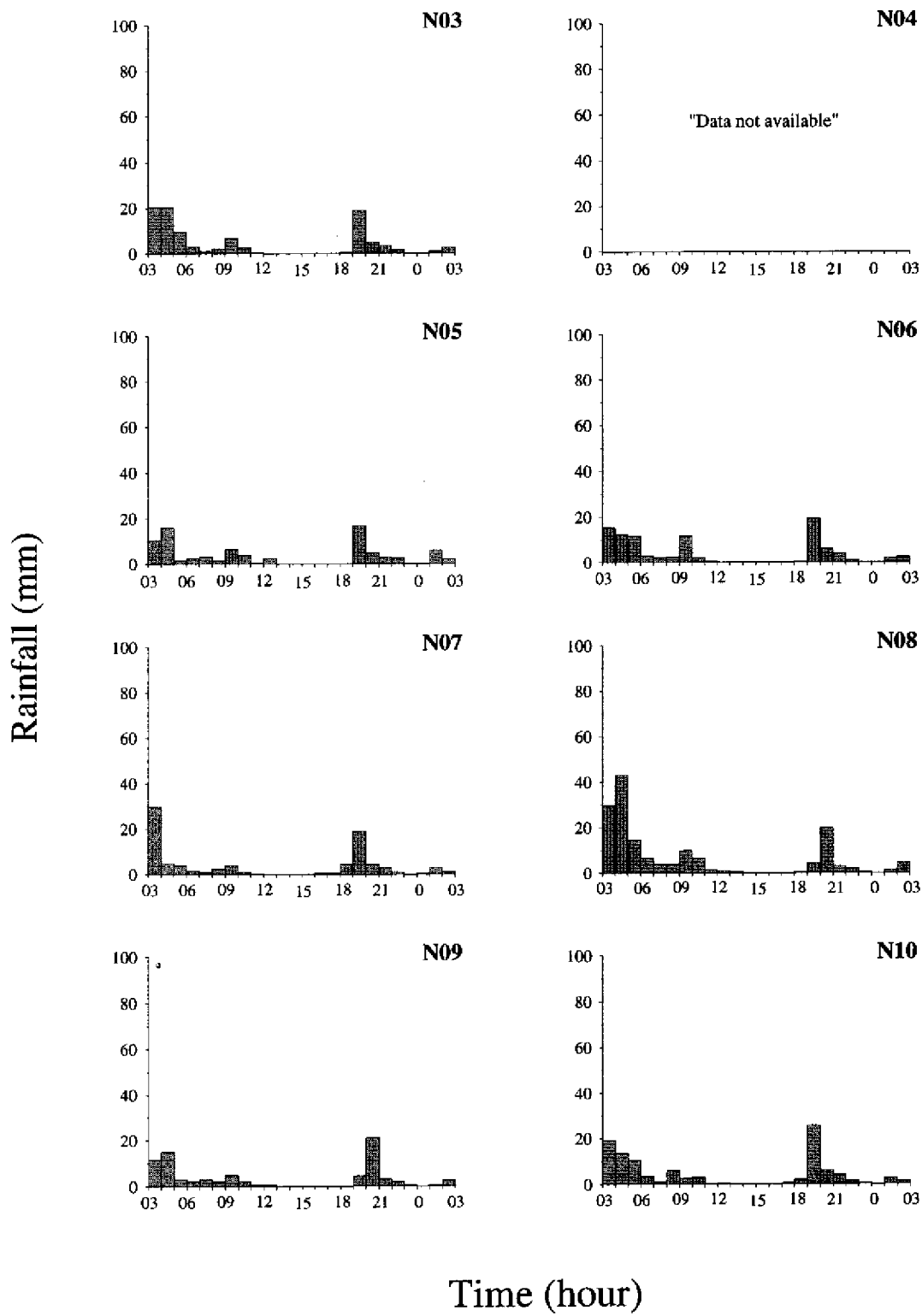


Figure A2 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 23 to 24 July, 1994 (Sheet 5 of 6)

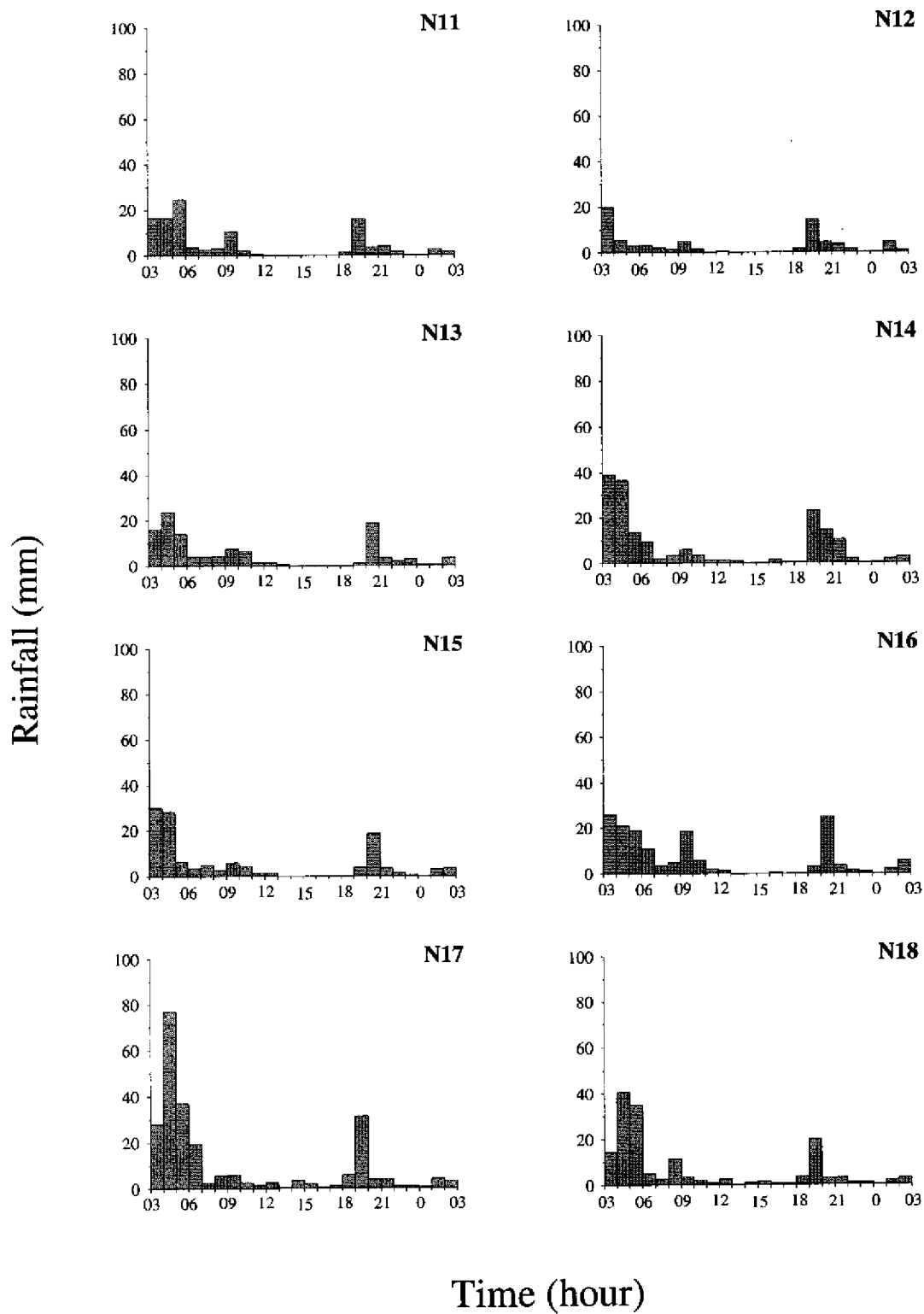


Figure A2 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 23 to 24 July, 1994 (Sheet 6 of 6)

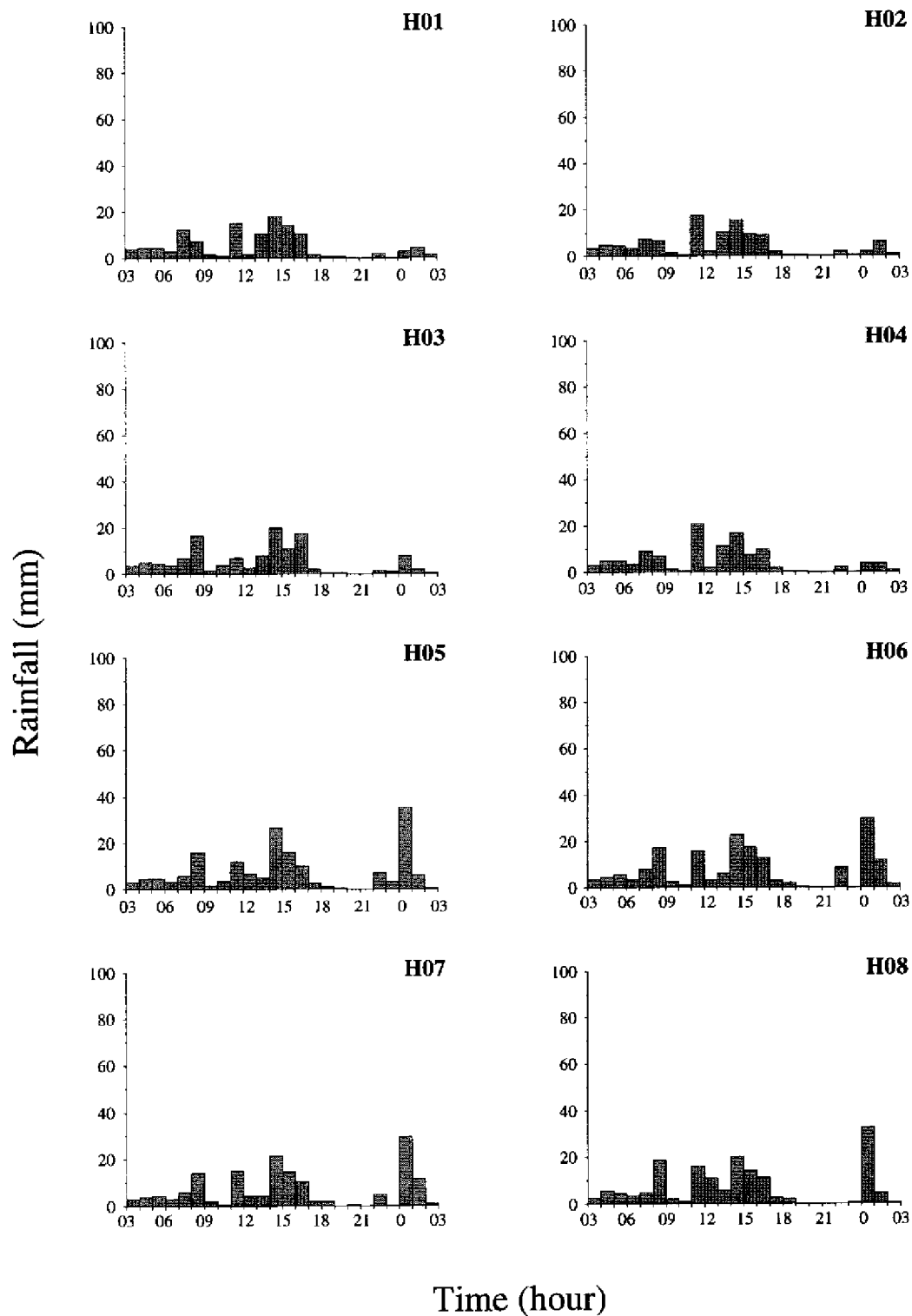


Figure A3 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 24 to 25 July, 1994 (Sheet 1 of 6)

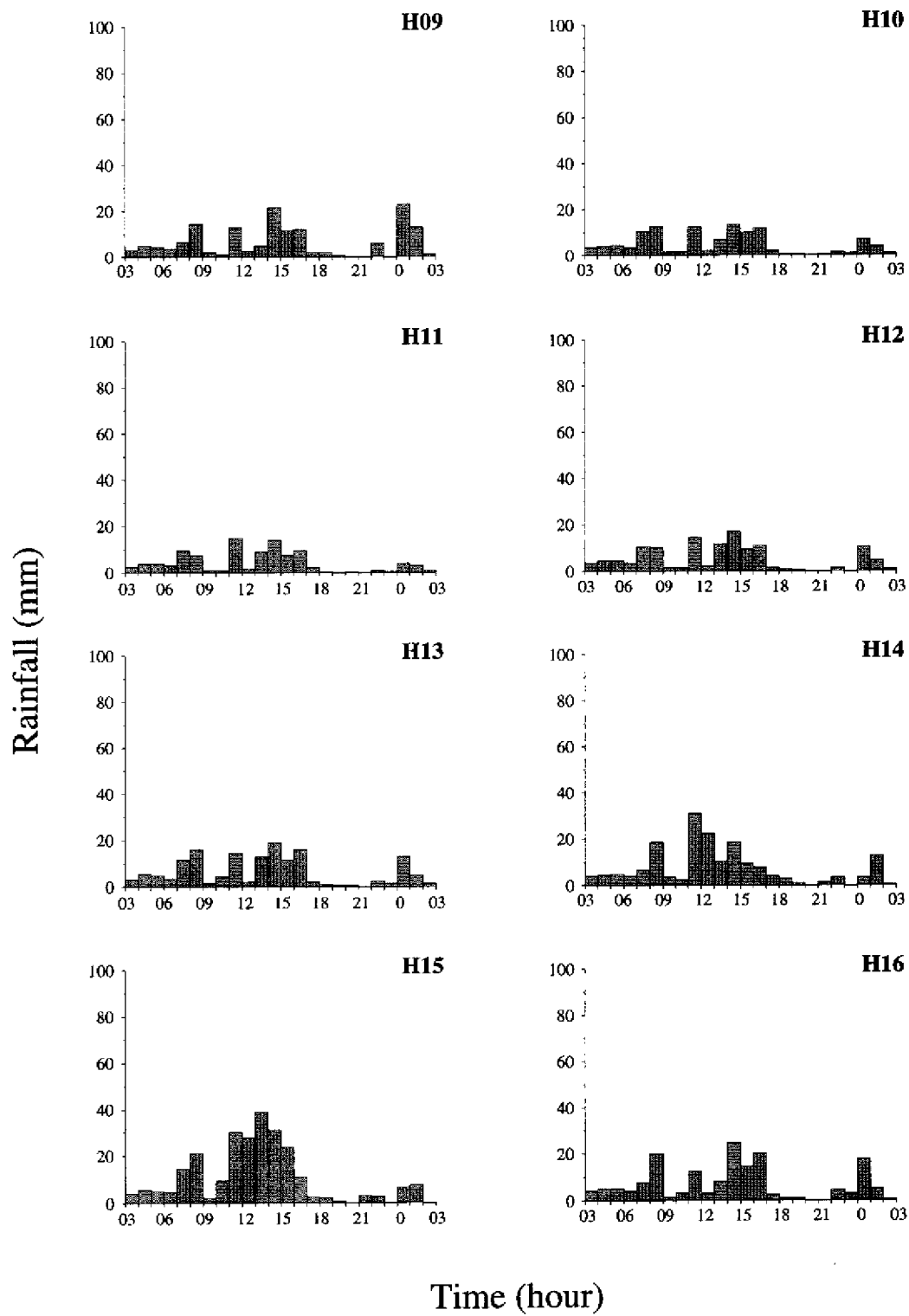


Figure A3 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 24 to 25 July, 1994 (Sheet 2 of 6)

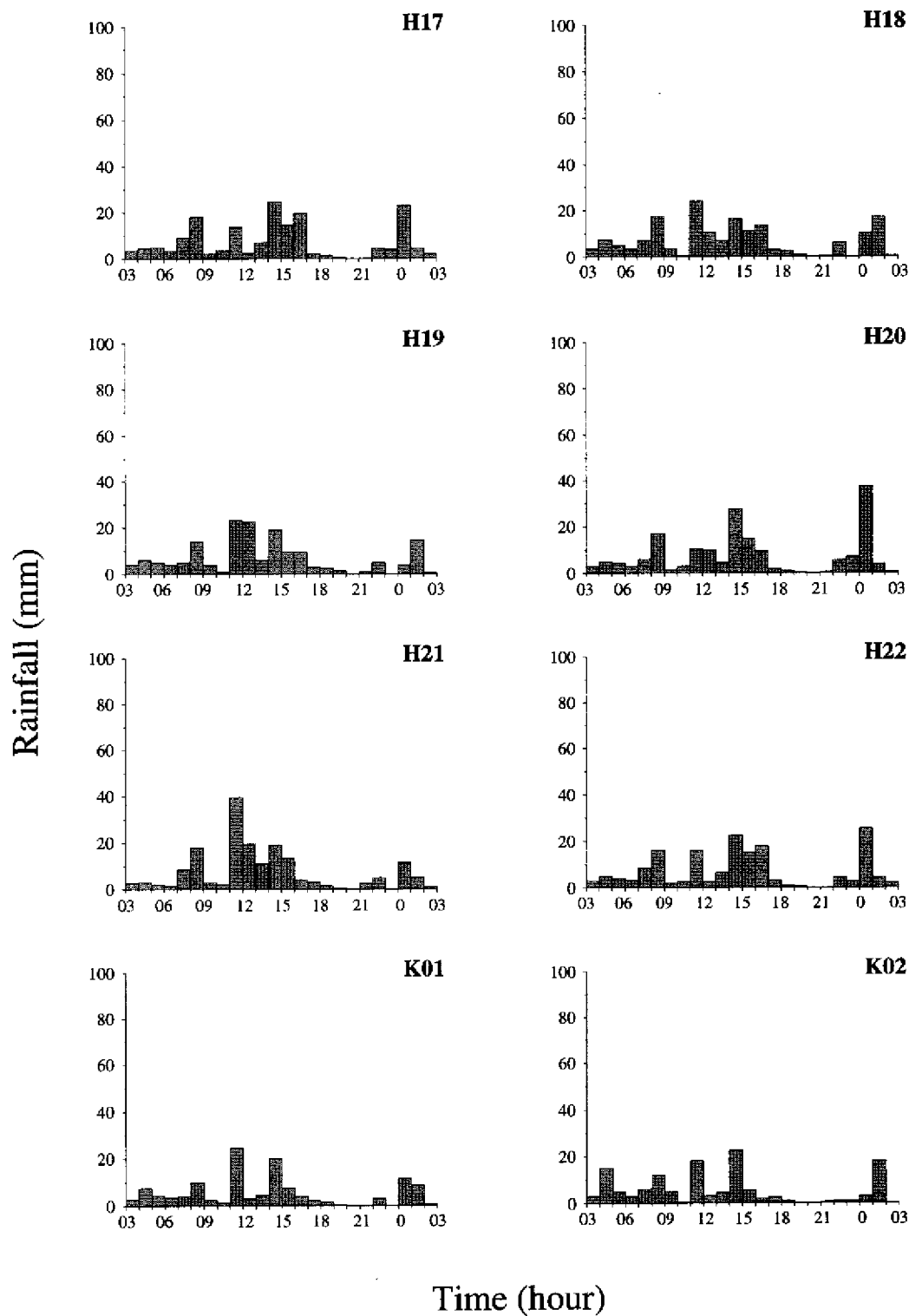


Figure A3 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 24 to 25 July, 1994 (Sheet 3 of 6)

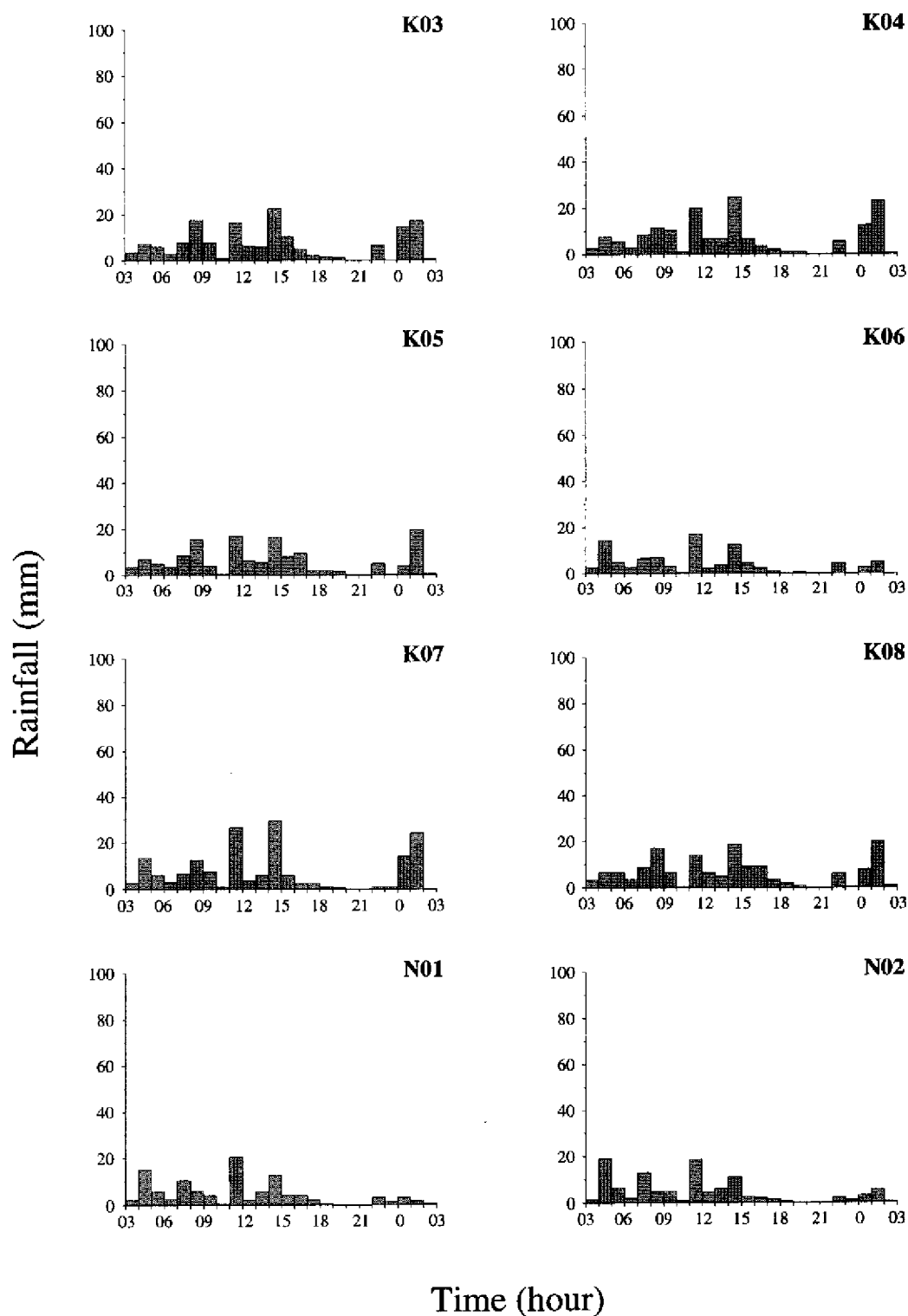


Figure A3 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 24 to 25 July, 1994 (Sheet 4 of 6)

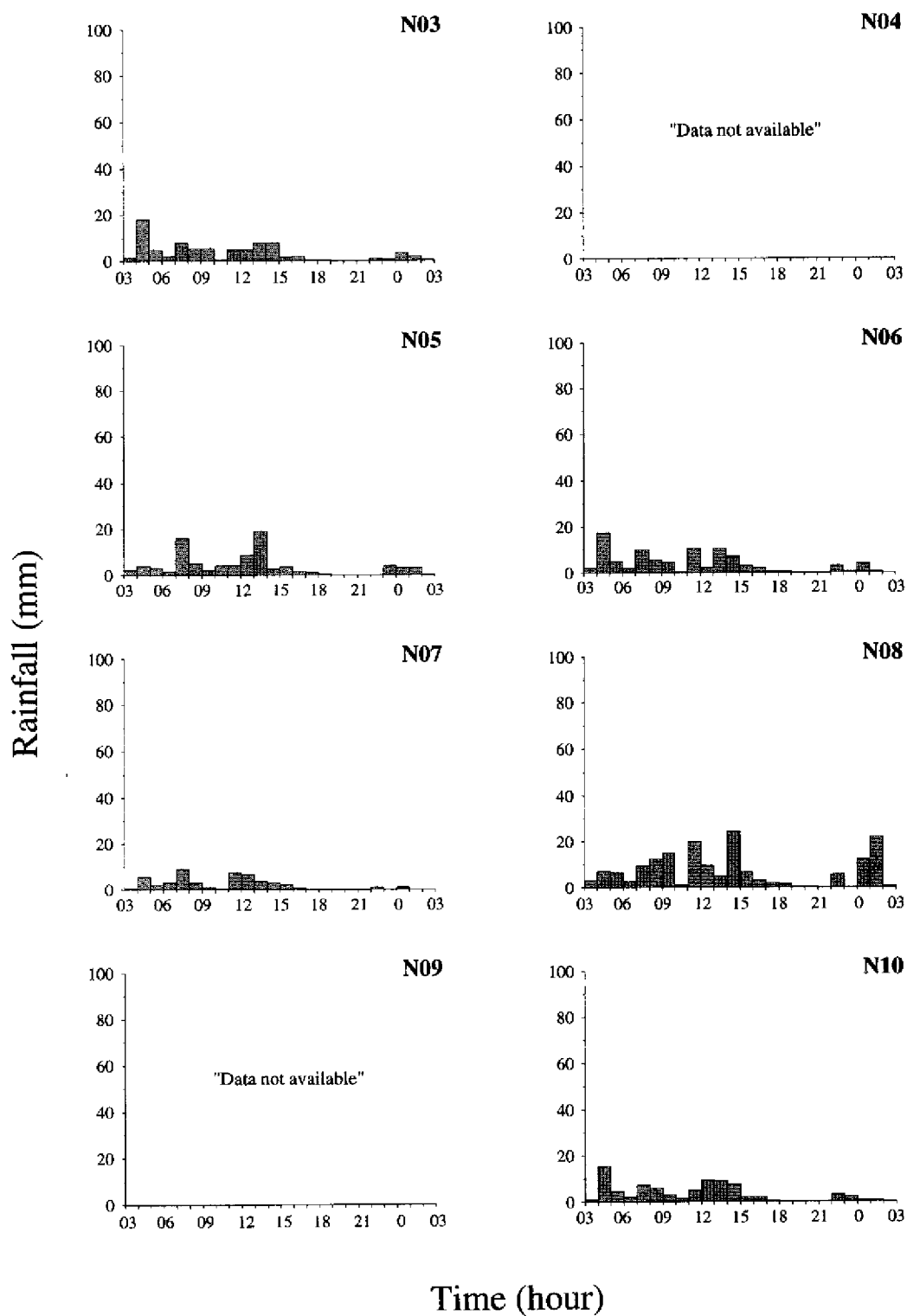


Figure A3 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 24 to 25 July, 1994 (Sheet 5 of 6)

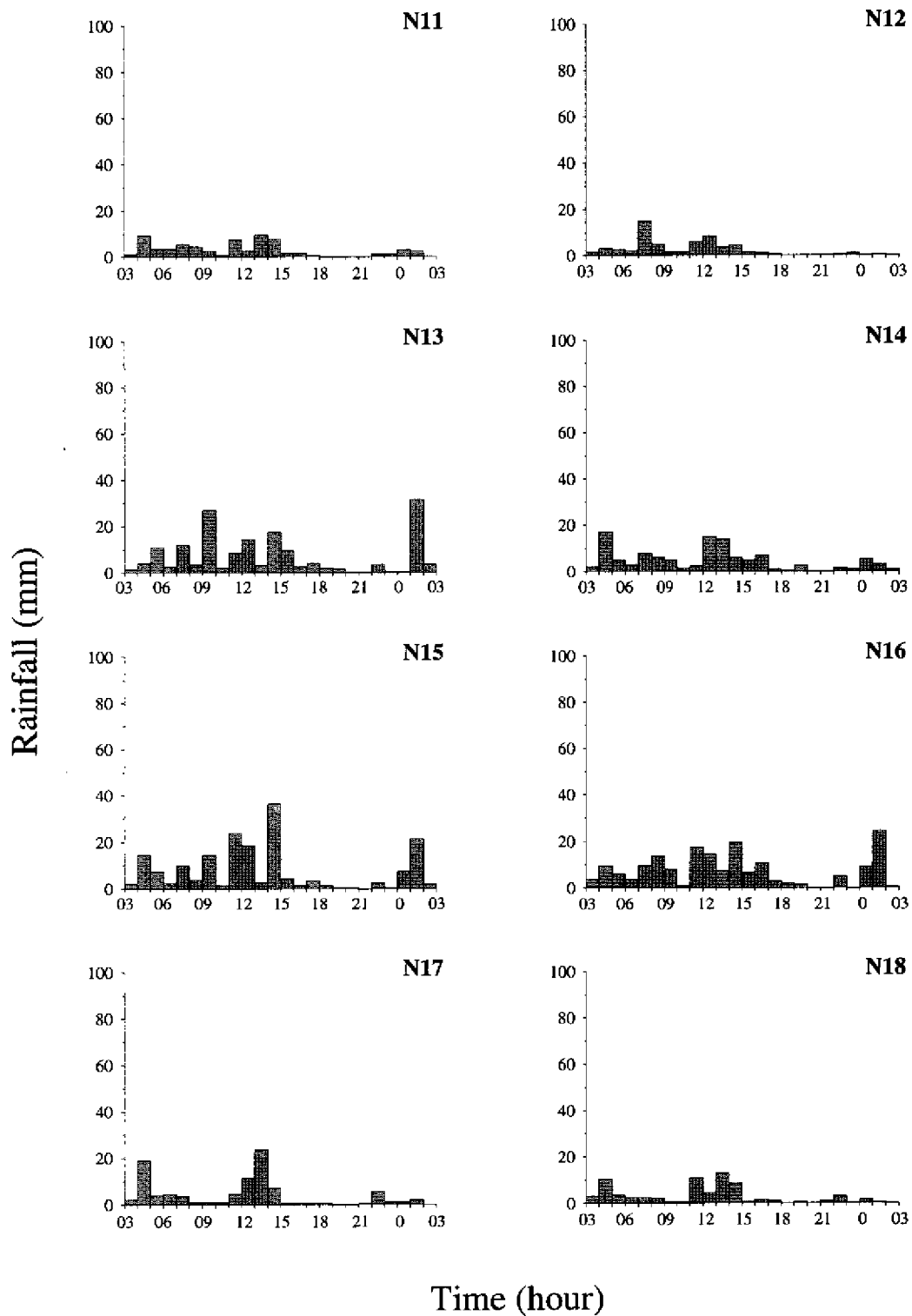


Figure A3 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 24 to 25 July, 1994 (Sheet 6 of 6)

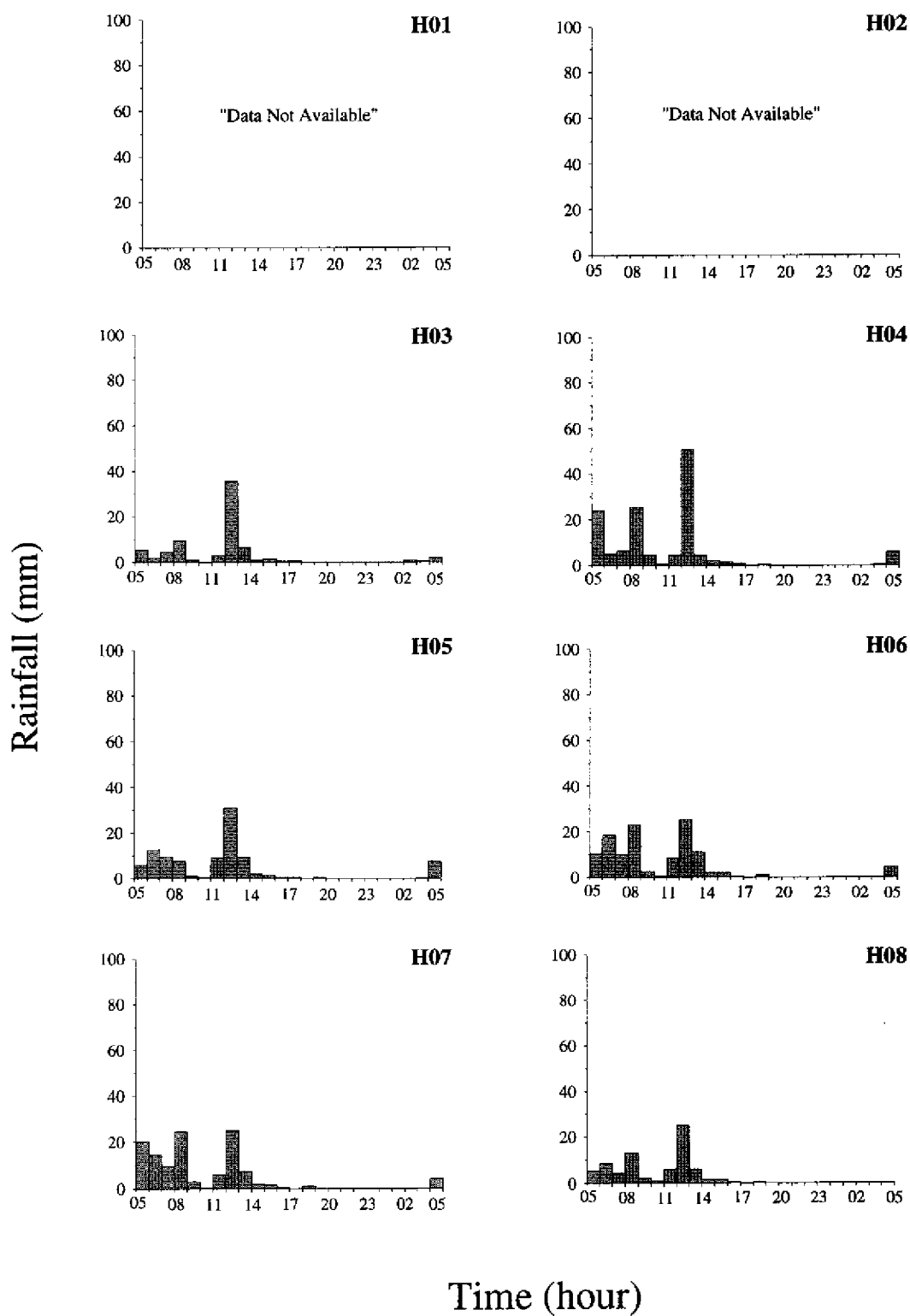


Figure A4 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 16 to 17 August, 1994 (Sheet 1 of 6)

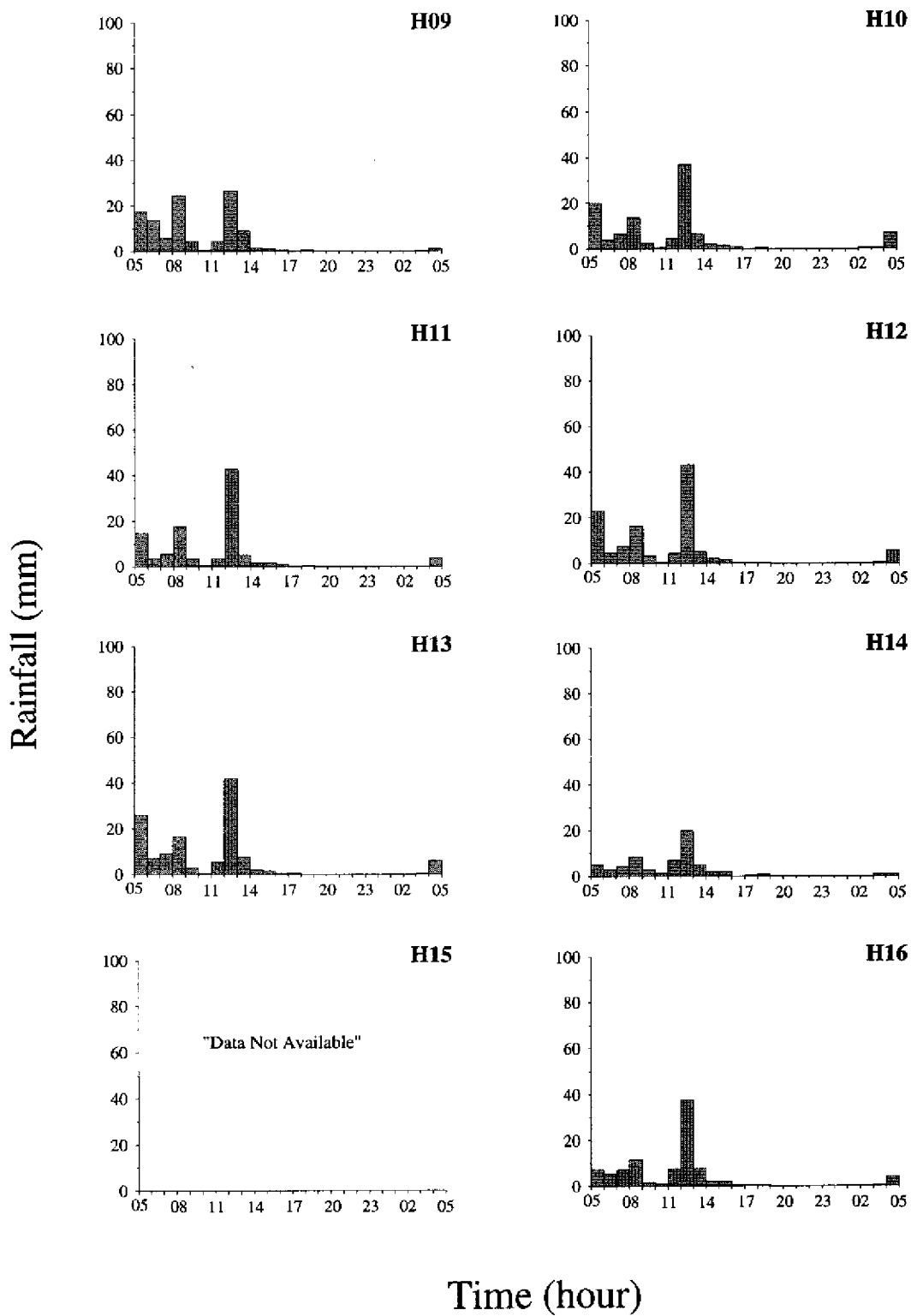


Figure A4 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 16 to 17 August, 1994 (Sheet 2 of 6)

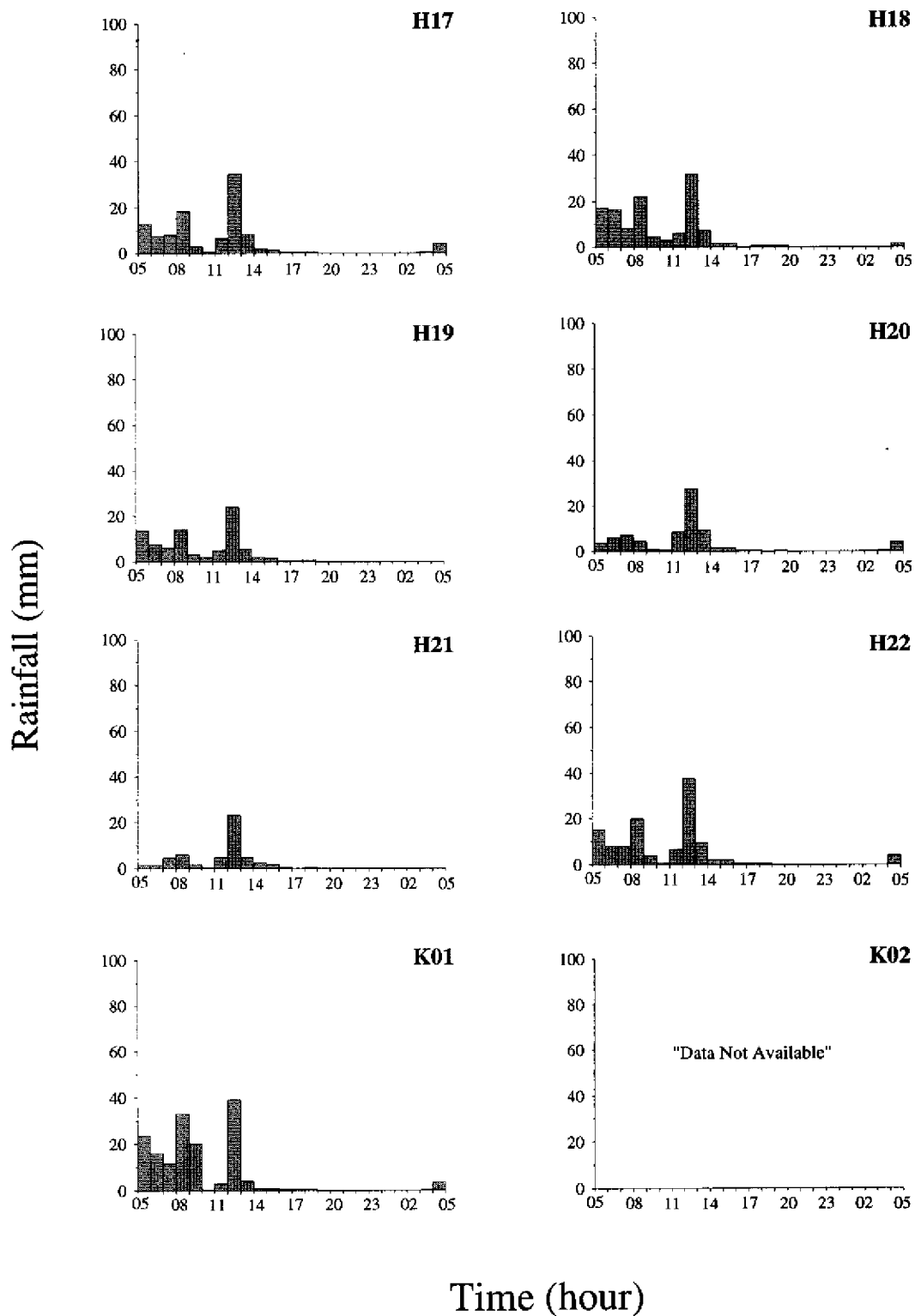


Figure A4 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 16 to 17 August, 1994 (Sheet 3 of 6)

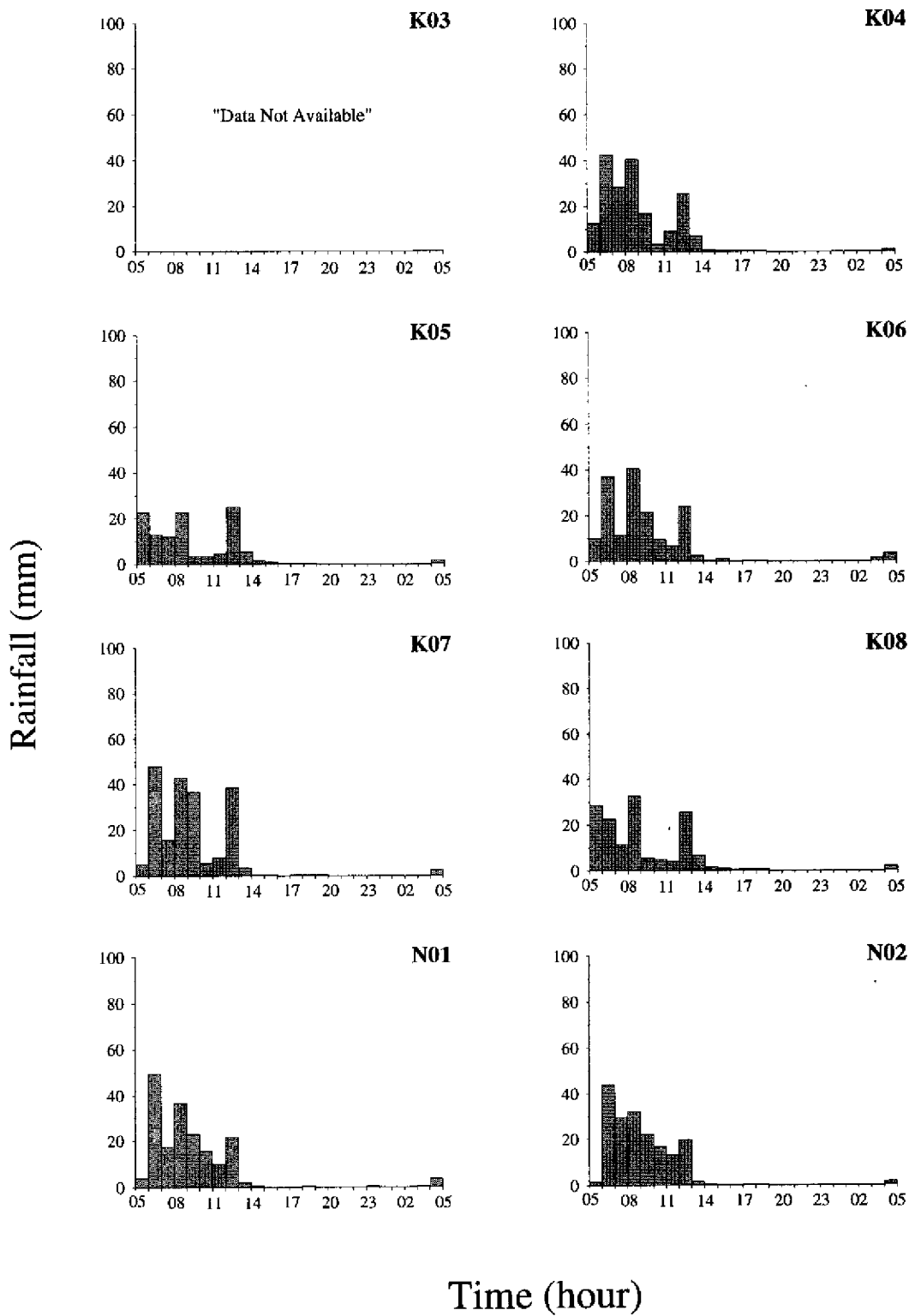


Figure A4 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 16 to 17 August, 1994 (Sheet 4 of 6)

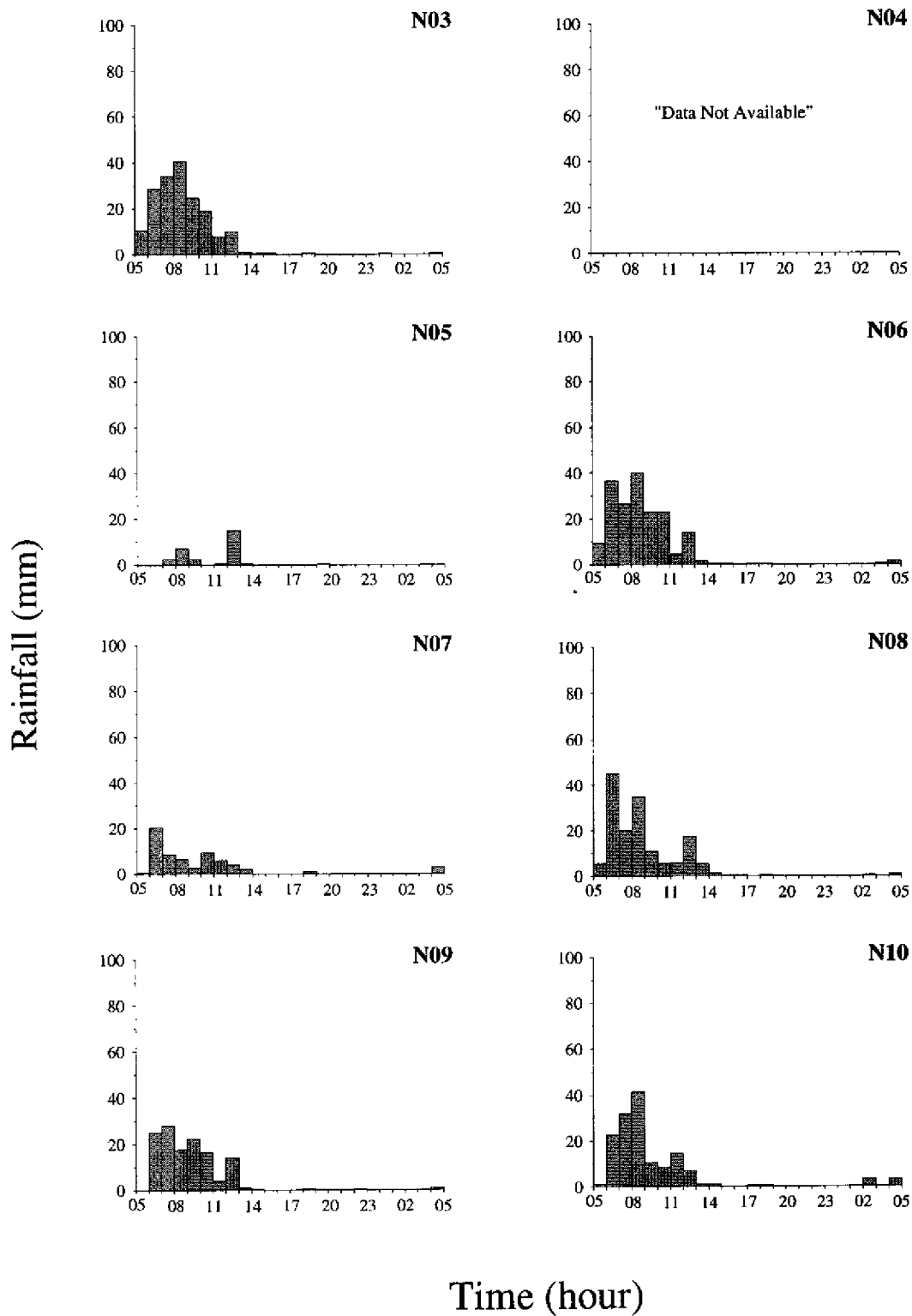


Figure A4 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 16 to 17 August, 1994 (Sheet 5 of 6)

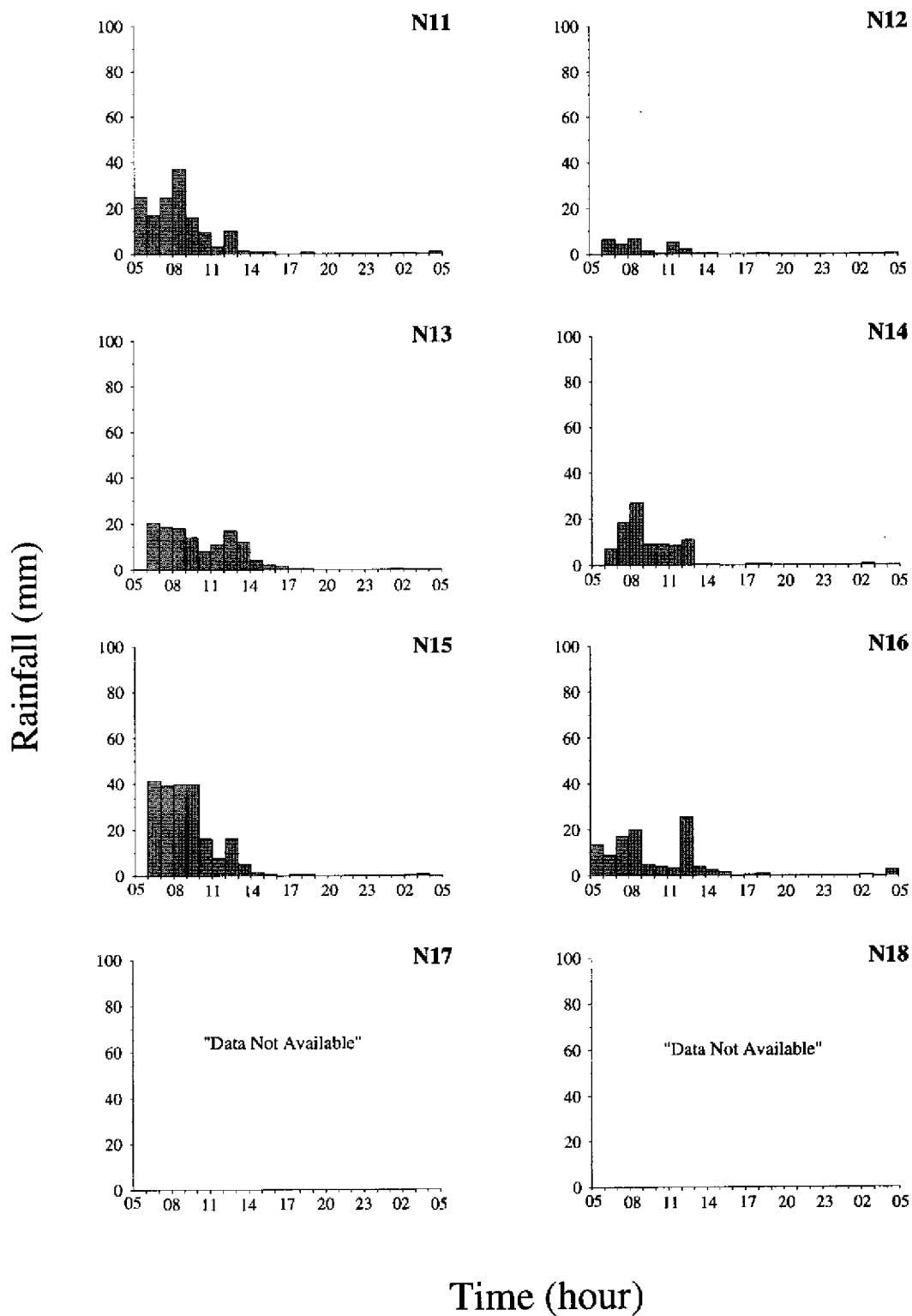


Figure A4 - Histograms of Hourly Rainfall Recorded by GEO Raingauges during 16 to 17 August, 1994 (Sheet 6 of 6)

APPENDIX B

**LIST OF INCIDENTS
REPORTED TO GEO**

APPENDIX B

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Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 1 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 1/1	Black's Link, Mount Cameron	14/1	HyD/HK	Unknown	Retaining wall	Minor (2)	Road	1/3 lane of road closed	
HK 2/1	235-237 Wing Lok Street, Sheung Wan	22/2	BD	22/2 (morning)	Subsidence	Minor (30)	Road Building lot Construction site Pedestrian pavement	Building temporarily evacuated and 2 lanes of road blocked	
HK 5/1	Opposite 11 Repulse Bay Road, Repulse Bay (11SE-D/F33)	20/5	HyD/HK	19/5 (11:00)	Fill slope	Major (65)	Road Pedestrian pavement	1 lane of road and pedestrian pavement closed	
HK 6/1	Cape Collinson Road near Correctional Institution, Chai Wan	20/6	HyD/HK	19/6 (23:00)	Soil/rock cut slope Natural slope	Major (200)	Road	1 lane of road closed	
HK 6/2	Near 9 Hospital Road, Sai Ying Pun (11SW-A/CR71)	23/6	HyD/HK	Unknown	Soil cut slope	Minor	Pedestrian pavement		
HK 7/1	9 Tai Tam Road, Stanley	8/7	HyD/HK	8/7 (morning)	Soil cut slope Tree fallen	Minor (3)	Road	1/3 lane of road closed	
HK 7/2	Opposite AIA Building, Stubbs Road, Wan Chai (11SW-B/C24)	12/7	GEO	12/7 (morning)	Soil cut slope	Minor (5)	Road Pedestrian pavement	1/3 lane of road and pedestrian pavement closed	
HK 7/3	Near the Fort, Chung Hom Kok Road, Chung Hom Kok (15NE-C/C75)	12/7	Police	11/7 (midnight)	Rock fall	Minor (2)	Road	1/2 lane of road closed	

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 2 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/4	Between slope 11SW-B/C136 & Kennedy Road, Admiralty	12/7	DSD	Unknown	Natural slope	Minor (15-20)	Road	1/3 lane of road closed	
HK 7/5	113 Tai Hang Road, Tai Hang	13/7	Police	13/7	Soil/rock cut slope	Minor (0.2)	Road	1 lane of road blocked	
HK 7/6	Junction of Tai Hang Road and Broadwood Road, Jardine's Lookout	13/7	HyD/HK	12/7	Natural slope	Minor (2)	Road		
HK 7/7	West of 30 Po Shan Road, Mid-levels	15/7	BD	14/7 (18:00)	Rock fall	Minor (0.5)	Road	1 lane of road blocked	
HK 7/8	92 Aberdeen Main Road, Aberdeen (11SW-D/CR78)	15/7	Police	15/7 (10:00)	Rock fall	Minor (0.5)	Open space		
HK 7/9	A Kung Ngam Village Road, Shaukeiwan (11SE-B/C101)	15/7	HyD/HK	14/7 (midnight)	Rock fall	Minor (3)		1 lorry damaged	
HK 7/10	Lai Sing Court, 13-15 Tai Hang Road, Tai Hang (11SE-A/C130)	16/7	Police	16/7	Rock fall	Minor (0.5)	Carpark		
HK 7/11	Near 42 opposite 41 Sassoon Road, Pokfulam	19/7	HyD/HK	19/7 (6:30)	Fill slope	Minor (16)	Road	2 lanes of road closed	

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 3 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/12	Below 30 Severn Road, Mount Gough	15/7	FSD	15/7 (1:00)	Collapse of concrete parapet	N/A	Road		Collapse of concrete parapet, not a geotechnical problem
HK 7/13	Petrol station adjoining 888 King's Road, Quarry Bay (11SE-A/C82)	21/7	Public	19/7	Soil/rock cut slope	Minor (0.1)	Open space		
HK 7/14	Access leading to 37 Conduit Road, Mid-levels	22/7	HyD/HK	22/7 (am)	Boulder fall	Minor (20)	Road	2 lanes of road closed	
HK 7/15	Opposite Shan Pin Terrace, A Kung Ngam Road, Shaukeiwan (11SE-B/C89)	22/7	HyD/HK	22/7 (1:00)	Natural slope Soil/rock cut slope	Minor (6)	Road	1 car damaged, 2 lanes of road and pedestrian pavement closed	
HK 7/16	Magazine Gap Road near May Road, The Peak	22/7	HyD/HK	22/7 (10:40)	Rock fall	Minor (15-20)	Road	1 lane of road closed	
HK 7/17	Opposite HKU Sports Centre, 82 Pokfulam Road, Sai Wan (11SW-A/C139)	22/7	HyD/HK	22/7 (am)	Soil cut slope	Minor (15)	Road Pedestrian pavement	2 lanes of road closed	
HK 7/18	22-24 Gough Hill Road, Mount Gough	22/7	Police	22/7 (8:00)	Soil cut slope	Minor (40)	Building lot Open space		
HK 7/19	1 Barker Road, The Peak	22/7	Police	22/7	Soil cut slope	Minor (10)	Road	1 lane of road blocked	

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 4 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/20	Access road to Realty Gardens, 41 Conduit Road, Mid-levels (11SW-A/CR162)	22/7	Public	22/7 (13:00)	Soil cut slope	Minor (30)	Road Building access	1 lane of road and pedestrian pavement closed	
HK 7/21	Kai Lung Wan Village, Kai Lung Wan	22/7	HD	22/7	Boulder fall	Minor (0.2)	Squatter hut	2 huts permanently evacuated	
HK 7/22	Victoria Road, Wah Fu (11SW-C/C132)	22/7	HyD/HK	22/7 (am)	Soil cut slope	Minor (5)	Road	1 lane of road closed	
HK 7/23	88A-B Pokfulam Road, Kennedy Town (11SW-A/C322)	22/7	Police	22/7	Soil cut slope	Minor (5)	Carpark	Water supply interrupted	
HK 7/24	41 Sassoon Road, Pokfulam (11SW-C/CR161)	22/7	HyD/HK	22/7 (am)	Soil cut slope	Minor (1)	Road		
HK 7/25	Kiangsu Chekiang College, 30 Ching Wah Street, North Point (11SE-A/CR168)	22/7	Police	22/7 (12:30)	Soil cut slope	Minor (15)	Playground		
HK 7/26									
HK 7/27	Kennedy Road, West of junction of Borrett Road, Admiralty	23/7	Police	23/7 (morning)	Soil cut slope	Minor (5)	Road	1 lane of road blocked	This incident no. was not used

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 5 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/28	Peak Road Petrol Station near Barker Road, The Peak (11SW-D/CR277)	23/7	HyD/HK	23/7 (7:00-8:00)	Natural slope Soil cut slope	Minor (20)	Petrol station		
HK 7/29	34B Lugard Road, The Peak	23/7	HyD/HK	22/7 (7:00)	Soil cut slope	Minor (10)	Footpath		
HK 7/30	45 Repulse Bay Road, Repulse Bay (15NE-A/C22)	24/7	Police	24/7 (12:00)	Soil cut slope	Minor (2)	Road	1 lane of road closed	
HK 7/31	73 Repulse Bay Road, Repulse Bay (15NE-A/C34)	24/7	FSD	24/7 (12:30)	Soil/rock cut slope	Minor (10)	Road Construction site	1 lane of road closed	
HK 7/32	Below 63 Repulse Bay Road, Repulse Bay (15NE-A/C30)	24/7	HyD/HK	24/7 (14:30)	Soil/rock cut slope	Minor (40)	Road	2 lanes of road closed	
HK 7/33	Behind Island Garden, Chai Wan Road, Shaukeiwan (11SE-B/CR79)	24/7	Police	24/7 (16:15)	Soil cut slope	Major (200)	Building lot Pedestrian pavement School	6 flats evacuated	
HK 7/34	Junction of Peak Road and Magazine Gap Road, Magazine Gap (11SW-D/CR295)	24/7	Police	24/7 (19:00)	Fill slope	Minor (3)	Road	1/3 lane of road closed	
HK 7/35	Opposite 22 Magazine Gap Road, Magazine Gap (11SW-D/C296)	24/7	HyD/HK	24/7 (19:00)	Soil cut slope	Minor (2)	Road	1/3 lane of road closed	

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 6 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/36	42A Kennedy Road, Admiralty (11SW-B/C196)	23/7	HyD/HK	23/7 (7:00)	Soil cut slope	Minor (9)	Road	1 lane of road closed	
HK 7/37	Kwun Lung Lau Estate, Kennedy Town (11SW-A/R309)	23/7	FSD	23/7 (20:53)	Retaining wall	Major (1000)	Building lot Building access	5 persons killed, 3 persons injured and 2 blocks evacuated	
HK 7/38	Below Kung Man Estate, 302-304 Victoria Road, Kennedy Town (11SW-A/C287)	23/7	HyD/HK	22/7 (midnight)	Soil cut slope	Minor (2)	Pedestrian pavement		
HK 7/39	Victoria Road near Mount Davis Road, Mount Davis (11SW-A/C294)	23/7	HyD/HK	23/7	Soil cut slope	Minor (5)	Pedestrian pavement	Pedestrian pavement closed	
HK 7/40	Mount Parker Road, The Peak (11SE-A/C246)	23/7	HyD/HK	23/7	Soil cut slope	Minor (2)	Road		
HK 7/41	Repulse Bay Road, Wong Nai Chung Gap	23/7	HyD/HK	23/7 (morning)	Soil cut slope	Minor (2-3)	Road	1 lane of road blocked	
HK 7/42	South Bay Road, Repulse Bay (15NE-A/C95)	23/7	GEO	23/7 (morning)	Soil/rock cut slope	Minor (13)	Road	1 lane of road closed	
HK 7/43	Opposite 12 South Bay Road, Repulse Bay (15NE-A/C90)	23/7	Police	23/7 (7:00)	Rock fall	Minor (2)	Road	1 lane of road blocked	

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 7 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/44									This incident no. was not used
HK 7/45	Victoria Road, Wah Fu	25/7	HyD/HK	25/7 (am)	Subsidence	Minor (20)	Road Pedestrian pavement	1 lane of road and pedestrian pavement closed	
HK 7/46	Below Northcote College of Education, Sassoon Road, Pokfulam (11SW-C/CR108)	25/7	HyD/HK	25/7 (am)	Soil cut slope	Minor (5)			
HK 7/47	A Kung Ngam Village, Shaukeiwan (11SE-B/C93 & C116)	23/7	Police	23/7 (5:00)	Soil cut slope	Major (50)	Squatter hut	5 huts temporarily evacuated	
HK 7/48	55-57 Shouson Hill Road, Wong Chuk Hang (15NW-B/C48)	25/7	Police	25/7 (15:00)	Soil/rock cut slope	Major (60)	Road Building access	Road blocked	
HK 7/49	Harlech Road, High West (11SW-C/C306)	26/7	Police	25-26/7	Soil cut slope	Minor (20)	Road Country park	1 lane of road blocked	
HK 7/50	41 Shouson Hill Road, Shouson Hill	26/7	HyD/HK	23/7 (morning)	Natural slope	Minor (18)	Road Pedestrian pavement	1 lane of road closed	
HK 7/51	Behind Block A, Smithfield Terrace, Kennedy Town (11SW-A/C367)	24/7	Police	24/7	Soil cut slope	Minor (25)	Building lot	2 flats evacuated	

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 8 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/52	Near Shaukeiwan Government School, A Kung Ngam Road, Shaukeiwan (11SE-B/C90)	25/7	HyD/HK	24/7	Soil cut slope	Minor (3)	Pedestrian pavement	Pedestrian pavement closed	
HK 7/53	Behind Block 7, 12 Sandy Bay Road, Pokfulam (11SW-C/C187)	26/7	Police	23/7	Soil cut slope	Minor (5)			
HK 7/54	Towards Cheshire Home, Chung Hom Kok Road, Chung Hom Kok	25/7	Public	25/7 (5:15)	Natural slope Fill slope	Minor	Road	Road closed	
HK 7/55	Chung Hom Kok Road, Chung Hom Kok	26/7	HyD/HK	25/7 (morning)	Fill slope	Minor (40)		Retaining wall undermined	
HK 7/56	Mount Davis Path Squatter Area, Mount Davis (11SW-A/C315)	23/7	Police	22/7 (13:00)	Soil cut slope	Minor (15)	Squatter hut Access road	8 huts temporarily evacuated and access road closed	
HK 7/57	Che Choong Hong Industrial Building, 65 Wong Chuk Hang Road, Aberdeen (11SW-D/C631)	25/7	BD	23/7 (6:00)	Rock fall	Minor (15-25)	Staircases	Carpark and access closed	
HK 7/58	Che Choong Hong Industrial Building, 65 Wong Chuk Hang Road, Aberdeen (11SW-D/C91)	25/7	BD	23/7 (6:00)	Soil/rock cut slope Rock slope	Major (300-400)	Road Building access	Road blocked	

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 9 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/59	Victoria Road, Pokfulam	24/7	Police	24/7 (20:00)	Natural slope	Minor (40)	Road	Road closed	No failure
HK 7/60	Below 51 Barker Road, Old Peak Road, The Peak (11SW-C/C315)	26/7	HyD/HK	24/7	Soil/rock cut slope	Minor (5)			
HK 7/61	Bisney Road, Pokfulam (11SW-C/C168)	27/7	HyD/HK	26/7	Soil/rock cut slope	Minor (2)	Pedestrian pavement		
HK 7/62	Junction of Nam Fung Road and Deep Water Bay Road, Shouson Hill (11SW-D/C109)	27/7	HyD/HK	26/7	Soil/rock cut slope	Minor (5)	Pedestrian pavement	Pedestrian pavement closed	
HK 7/63	Opposite 10 Belmont Court, Kotewall Road, Mid-levels (11SW-A/R643)	27/7	Public	N/A	Bulged masonry wall	N/A			
HK 7/64	57 Mount Davis Road, Pokfulam	27/7	HyD/HK	22/7	Natural slope	Minor (2)	Pedestrian pavement	Pedestrian pavement closed	
HK 7/65	8 Plunkett's Road, Jardine's Corner (11SW-D/FR18)	25/7	Public	25/7	Subsidence	Minor	Pedestrian pavement	Pedestrian pavement closed	
HK 7/66	4 Shek O Headland, Shek O	28/7	Public	24/7	Soil/rock cut slope	Minor (0.5)	Open space		

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 10 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/67	7 Comfort Terrace, Fortress Hill (11SE-A/F61)	28/7	Public	Unknown	Fill slope	Minor (2)	Open space		
HK 7/68	Walking trail behind Block 13, Chi Fu Fa Yuen, Pokfulam	25/7	DO/S	Unknown	Rock fall	Minor (0.6)	Country park		
HK 7/69	Clovelly Path, The Peak	27/7	Public	25/7	Soil cut slope	Minor (0.5)	Road	¼ lane of road blocked	
HK 7/70	Lai Sing Court, 13-15 Tai Hang Road, Tai Hang (11SE-A/R52)	23/7	HyD/HK	23/7	Soil cut slope Retaining wall	Minor (2)	Pedestrian pavement		
HK 7/71	Footpath of Hong Kong Zoological and Botanical Gardens, Central	25/7	Arch SD	23/7 (am)	Soil cut slope Natural slope	Minor (1)	Pedestrian pavement	Pedestrian pavement closed	
HK 7/72	Between 42A & 42B Kennedy Road, Admiralty (11SW-B/CR155)	26/7	HyD/HK	23/7 (8:00)	Soil cut slope	Minor (5)	Building access		
HK 7/73	Magazine Gap Road near 3 May Road, The Peak	3/8	HyD/HK	31/7	Soil cut slope	Minor (10)	Staircases		
HK 7/74	Tai Ming House, 9 Greig Road, Quarry Bay (11SE-A/C190)	28/7	Public	23/7	Rock fall	Minor (<0.1)	Open space		
HK 7/75	Same incident as HK94/7/63								

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 11 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 7/76	Pioneer Court, 17 Ventris Road, Happy Valley (11SW-D/C193)	26/7	Public	26/7 (morning)	Soil cut slope	Minor (2)	Open space		
HK 8/1	Junction of Belcher's Street and Collinson Street, Sai Wan (11SW-A/C156)	6/8	Police	6/8 (23:15)	Soil/rock cut slope	Minor (1)	Pedestrian pavement	Pedestrian pavement closed	
HK 8/2	8 Aberdeen Main Road, Aberdeen	1/8	Public	1/8	Soil cut slope	Minor (0.5)	Open space		
HK 8/3	Hut nos. XH/22C/G6/126-127, Pokfulam Village, Pokfulam	5/8	Police	4/8	Rock fall	Minor (0.08)	Squatter hut	2 huts permanently evacuated	
HK 8/4	60 Bridges Street, Sheung Wan (11SW-A/R84)	4/8	Public	Unknown	Retaining wall	Minor			
HK 8/5	Junction of Bridges Street and Tank Lane, Sheung Wan (11SW-A/R65)	4/8	HyD/HK	Unknown	Collapse of parapet wall	N/A			Collapse of parapet wall, not a geotechnical problem
HK 8/6	Block E, Kwun Lung Lau, Kennedy Town	7/8	HyD/HK	Unknown	Soil cut slope	Minor (5)			
HK 8/7	Behind no. 54 Telegraph Bay Village, Pokfulam	8/8	DO/HKS	6/8	Natural slope	Minor (30)	Squatter hut	1 hut permanently evacuated	

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 12 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 8/8									This incident no. was not used
HK 8/9	Behind 80-85 Stanley Main Street, Stanley Market Road, Stanley	9/8	GEO	9/8 (am)	Soil cut slope	Minor (1-2)	Pedestrian pavement		
HK 8/10									This incident no. was not used
HK 8/11	Behind hut no. 105, A Kung Ngam Village, Shaukeiwan (11SE-B/C117)	10/8	Public	Unknown	Soil/rock cut slope	Minor (<1)	Squatter hut Open space		
HK 8/12	Below Villa Helvetia, Repulse Bay Road (15NE-A/C42)	10/8	GEO	Unknown	Soil/rock cut slope	Minor (5)	Road	1 lane of road closed	
HK 8/13	62 Tin Hau Temple Road, Building Contractor's Association School (11SE-A/CR101)	13/8	Police	22/7	Soil cut slope	Minor (1)	Playground		
HK 8/14	Opposite 50 Tai Hang Road, Tai Hang (11SE-A/C114)	16/8	Police	16/8	Soil cut slope	Minor (2)	Road	1 lane of road blocked	
HK 8/15	Sai Wan Estate, Cadogan Street, Kennedy Town	26/7	HD	26/7	Soil cut slope	Minor (0.5)	Open space		

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 13 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 8/16	Opposite Fire Station, Ap Lei Chau Bridge Road, Ap Lei Chau	16/8	FSD	16/8 (12:55)	Soil/rock cut slope	Major (90)	Road	3 lanes of road closed	
HK 8/17	Opposite entrance of Lower Baguio, Victoria Road, Pokfulam (11SW-C/C153)	16/8	Police	16/8 (pm)	Soil/rock cut slope	Minor (1)	Road	1 lane of road closed	
HK 8/18	Same incident as HK94/7/76								
HK 8/19	Between Regent on the Park and Hong Kong Park, Admiralty (11SW-B/FR72)	18/8	Arch SD	16/8	Fill slope	Minor (20)	Building lot Open space		
HK 8/20	Near Grenville House, 1 Magazine Gap Road	20/8	HyD/HK	20/8 (17:00)	Natural slope	Minor (7)	Pedestrian pavement	Pedestrian pavement closed	
HK 8/21	Sir Cecil Ride Overlooking, Braemar Hill Road, Braemar Hill	17/8	HyD/HK	17/8	Soil cut slope	Minor (3)	Footpath		
HK 8/22	12 Belcher's Street, Kennedy Town (11SW-A/C155)	22/8	Public	21/8	Rock fall	Minor (0.025)	Open space		
HK 8/23	Near junction of Lin Shing Road and Cape Collinson Road, Chai Wan (11SE-D/C90)	29/8	HyD/ Report Centre	28-29/8	Soil/rock cut slope	Minor (2)	Road	½ lane of road blocked	

Table B1 - List of Incidents in Hong Kong Island Reported to GEO in 1994 (Sheet 14 of 14)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
HK 9/1	84 South Bay Road, South Bay (15NE-A/CR93)	11/9	Police	11/9 (7:00)	Soil cut slope	Minor (0.25)	Building lot		
HK 9/2	Hut nos. RH16A 218 & 219, Tai Tam Road near Girl Guide Venture House	14/9	Public	11/9	Fill slope	Minor (10)	Building access		
HK 9/3	Harlech Road, The Peak	18/9	Police	18/9 (morning)	Rock fall	Minor (1)	Pedestrian pavement	Pedestrian pavement closed	
HK 9/4	22C Barker Road, The Peak	23/9	Public	22/9	Soil cut slope	Minor (0.6)	Open space		
HK 9/5	HK Juvenile Care Centre, Nam Long Shan Road, Nam Long Shan	16/9	GEO	23/7	Soil cut slope	Minor (20)	Open space		
HK 10/1	Housing Department construction site, Shing On Street, Shaukeiwan	1/10	FSD	1/10 (14:30)	Collapse of false works	N/A			Collapse of false works, not a geotechnical problem
HK 10/2	Shouson Hill Road West, Shouson Hill	6/10	GEO	Unknown	Rock fall	Minor (5)	Road	1 lane of road blocked	
HK 10/3	Adjacent 36 Island Road, Repulse Bay	21/10	Public	End July	Retaining wall Fill slope	Minor (7)			
HK 12/1	Viking Villas, 70 Tin Hau Temple Road, North Point	16/12	Public	August	Fill slope	Minor (5)	Building lot		

Table B2 - List of Incidents in Kowloon Reported to GEO in 1994 (Sheet 1 of 6)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
K 3/1	Adjacent Ning Yuen Street site, San Po Kong	4/3	BOO	3-4/3 (midnight)	Subsidence	Minor (15)	Construction site Pedestrian pavement	Building temporarily evacuated and pedestrian pavement closed	
K 5/1	61D Tsuen Yuen Road East, Lei Yue Mun Village, Yau Tong	2/5	Public	28/4 (morning)	Soil cut slope	Minor (<2)	Squatter hut	1 hut temporarily evacuated	
K 6/1	East of King Ngai Court, Fung Shing Street, Fu Shan	21/6	HyD/K	Unknown	Natural slope	Minor (2)	Footpath		
K 7/1	Junction of Hong Ning Road and Wo Hong Path, Sau Mau Ping (11NE-C/CR63)	6/7	Police	6/7 (5:00)	Rock fall	Minor (<1)	Pedestrian pavement		
K 7/2	Junk Bay Road below Lam Tin Clinic, Tseng Kwan O (11NE-D/C75)	11/7	Public	Unknown	Soil cut slope	Minor (12)	Pedestrian pavement	Pedestrian pavement closed	
K 7/3	Ping Chi Street, Hung Hom (11NW-D/C83)	22/7	HyD/K	22/7 (5:26)	Soil/rock cut slope	Minor (10)	Road	Road closed	
K 7/4	Hau Man Street, Homantin (11NW-D/C90)	22/7	HyD/K	22/7 (13:30)	Rock fall	Minor (45)	Road	2 lanes of road closed	
K 7/5	Opposite TVB, Lung Cheung Road (11NW-B/C137)	22/7	HyD/K	22/7 (12:30)	Soil cut slope	Major (140)	Road Pedestrian pavement	2 lanes of road closed	

Table B2 - List of Incidents in Kowloon Reported to GEO in 1994 (Sheet 2 of 6)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
K 7/6	Northern side of Holy Family Canossian College, Lok Fu Park, Lok Fu (11NW-B/C173)	25/7	Arch SD	Unknown	Rock fall	Minor (30)	Park		
K 7/7	Behind Custom & Excise Service Married Quarters, Ko Shan Road (11NW-D/C79)	23/7	FSD	23/7 (9:00)	Rock fall	Minor (45)	Open space		
K 7/8	Sau Mau Ping Road near Hiu Kwong Street, Sau Mau Ping (11NE-D/C13)	25/7	HyD/K	23/7	Soil cut slope	Minor (6)	Open space		
K 7/9	St. Andrew's Church, Tsim Sha Tsui (11NW-D/CR161)	25/7	RO	24/7	Soil cut slope	Minor (3)	Carpark		
K 7/10	Fei Ngo Shan Road near Jat's Incline, Kowloon (7SE-C/C42)	25/7	HyD/K	25/7 (9:00)	Soil cut slope Subsidence	Minor (3-5)	Road	Road closed	
K 7/11	Opposite Blocks 35 & 40, Sau Mau Ping Road, Sau Mau Ping (11NE-D/C4)	23/7	HyD/K	23/7 (12:45)	Soil/rock cut slope	Major (150)	Road Pedestrian pavement	4 lanes of road closed and 1 taxi damaged	

Table B2 - List of Incidents in Kowloon Reported to GEO in 1994 (Sheet 3 of 6)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
K 7/12	Garden at corner of Sau Mau Ping Road and Shun On Road, Sau Mau Ping (11NE-D/C32)	23/7	HyD/K	23/7 (9:30)	Soil/rock cut slope	Minor (40)	Park		
K 7/13	Kwun Tong Road near St. Joseph's School at Choi Shek Lane (11NE-A/C35)	24/7	FSD	24/7	Soil/rock cut slope	Minor (40)	Road	2 lanes of road and pedestrian pavement closed	
K 7/14	Opposite Kai Fai House Choi Wan Estate, New Clear Water Bay Road (11NE-A/C63)	25/7	Police	25/7 (6:00)	Soil cut slope	Major (800)	Road Pedestrian pavement	2 lanes of road and pedestrian pavement closed	
K 7/15	Access road to Diocesan Boy's School, Mong Kok (11NW-D/FR147)	25/7	Arch SD	23/7	Fill slope	Minor (45)	Road	Access road blocked	
K 7/16	Hut no. X120, Che Tang Tsuen, Lee Yue Mun	27/7	DO/KT	22/7 (midnight)	Fallen tree	N/A	Footpath		Fallen tree, not a geotechnical problem
K 7/17	New Clear Water Bay Road, Choi Wan	27/7	HyD/K	25/7 (8:00)	Soil cut slope	Minor (25)	Pedestrian pavement		
K 7/18	Oi Sen Path, Homantin (11NW-D/C101)	23/7	HyD/K	22/7	Soil/rock cut slope	Minor (8)	Pedestrian pavement		

Table B2 - List of Incidents in Kowloon Reported to GEO in 1994 (Sheet 4 of 6)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
K 7/19	Ka Woo Film Studio, 8 King Tung Street, Diamond Hill (11NE-A/C97)	26/7	Police	26/7 (11:00)	Soil cut slope	Major (100)	Store hut	Store hut temporarily evacuated	
K 8/1	House no. 34, Tsuen Yue Road, Lei Yue Mun Village (11SE-B/C108)	29/7	Public	24/7 (morning)	Rock fall	Minor (20)	Open space		
K 8/2	40-44 Hiu Kwong Street, Sau Mau Ping (11NE-D/C44)	6/8	BD	Unknown	Soil/rock cut slope	Minor (0.5)	Building lot		
K 8/3	Lei Yue Mun Road near Yau Tong Road, Yau Tong (11NE-D/C118)	6/8	HyD/K	Unknown	Rock fall	Minor (2)	Pedestrian pavement	Pedestrian pavement closed	
K 8/4	Near Lighthouse, Lei Yue Mun Village, Lei Yue Mun (11SE-B/C114)	8/8	USD	Unknown	Rock fall	Minor (<1)	Open space		
K 8/5	Greenfield Terrace, Princess Margaret Road, Homantin	8/8	BD	N/A	Fencing wall cracked	N/A	Pedestrian pavement		Fence wall cracked, not a geotechnical problem
K 8/6	Radio Television HKTV House, 1A Broadcast Drive, Kowloon Tong (11NW-B/F16)	10/8	Arch SD	Unknown	Fill slope	Minor (15)			

Table B2 - List of Incidents in Kowloon Reported to GEO in 1994 (Sheet 5 of 6)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
K 8/7	Opposite Diamond Hill Crematorium, Po Kong Village Road, Diamond Hill (11NE-A/C15)	11/8	HyD/K	10/8 (pm)	Soil/rock cut slope	Minor (3)	Pedestrian pavement		
K 8/8	Behind Salvation Army, Wing Sing Lane, Yau Ma Tei (11NW-D/N2)	16/8	Public	16/8 (morning)	Soil cut slope	Minor (5)	Open space		
K 8/9	Hut nos. USD/NSM/85-87, Nam Shan Mei Village, Nam Shan Mei	28/7	HD	Early July	Soil cut slope	Minor (5)	Squatter hut	2 huts permanently evacuated	
K 8/10	Hut no. XKE/12/E/G1/193, Chee Tang Village, Lei Yue Mun	17/8	Public	15/8	Soil cut slope	Minor (2)	Squatter hut	1 hut permanently evacuated	
K 8/11	Factory at west of Anderson Road near Clear Water Bay Road	16/8	GEO	Unknown	Fill slope	Minor (5)	Squatter hut	1 hut temporarily evacuated	
K 8/12	Opposite Kiu Wai Mansion, Shun Yung Street, Hung Hom	27/8	HyD/ Emergency	Unknown	Soil cut slope	Minor	Road Pedestrian pavement		
K 9/1	Graves nos. 11, 31 & 32, Diamond Hill Urn Cemetery, Diamond Hill	2/9	Arch SD	July	Soil cut slope Retaining wall	Minor (10)	Graves		

Table B2 - List of Incidents in Kowloon Reported to GEO in 1994 (Sheet 6 of 6)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m³)			
K 12/1	Good Hope School, Clearwater Bay Road (11NE-A/C56)	12/12	HyD/K	8/12 (afternoon)	Soil cut slope	Minor (8)	Pedestrian pavement		

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 1 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 1/1	Tap Mun, Tap Mun Chau	8/1	Police	N/A	Cracked retaining wall	N/A			No failure
ME 1/2	Hut no. RTP/TH 888-892, Tong Hang, Fanling	21/1	GEO	Late 1993	Soil cut slope	Minor (5)	Squatter hut Open space	8 huts temporarily evacuated	
ME 3/1	Hut nos. RTP/MSH/501-503 & 5H, Mui Shue Hang, Tai Po	4/3	DO/TP	February	Soil cut slope	Minor (2)	Squatter hut Footpath	10 huts permanently evacuated	
ME 3/2	Footpath between Lo Wai and Sheung Him Tong, Fanling	14/3	DO/N	Unknown	Soil cut slope	Minor (2)	Footpath		
ME 4/1	68 Hiram's Highway, Sai Kung	12/4	Public	12/4	Fill slope Soil cut slope	Minor (10)	Pig shed		
ME 4/2	Sha Kok Mei, Sai Kung	12/4	DO/SK	Unknown	Natural slope	Minor (5)	Open space		
ME 4/3	Hut no. RTP/TPT/A574, Ying Pun Ha Tsuen, Tai Po Tau	19/4	GEO	Unknown	Soil cut slope	Minor (0.5)	Squatter hut	2 huts permanently evacuated	
ME 4/4	ASD construction site, Razor Hill Road, Razor Hill	29/4	HD	28/4 (21:00)	Retaining wall	20 m long sheet-piles	Road Construction site		
ME 4/5	No. 228, Pai Tau Village, Shatin	6/5	GEO	Unknown	Soil cut slope	Minor (0.5)	Open space		

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 2 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 5/1	Tap Mun (4SE-C/R2)	6/5	DO/TP	Unknown	Tree fallen	N/A	Open space		Tree fallen, not a geotechnical problem
ME 5/2	Ko Lau Wan (8NE-A/N1)	10/5	DO/TP	Unknown	Soil cut slope	Minor (< 5)	Building lot		
ME 6/1									
ME 6/2	Pak Tam Road near Uk Tau, Sai Kung (8NW-D/C3)	20/6	HyD/NT	20/6 (4:30)	Soil cut slope	Major (80)	Road	1 lane of road closed	This incident no. was not used
ME 6/3	Footpath in Kau Lung Hang Kiu Tau, Tai Po	21/6	DO/TP, HyD/NT	19-20/6	Natural slope	Minor (6)	Footpath		
ME 6/4	No. 22A, Hoi Ha Village, Hoi Ha	20/6	Public	19/6 (21:00)	Retaining wall	Minor (8)	Footpath		
ME 6/5	Bride's Pool Road, Tai Po	21/6	HyD/NT	Unknown	Soil cut slope	Minor (10)	Open space		
ME 6/6	Nos. 15-17, Nam Chung Lo Uk, Sha Tau Kok	22/6	DO/N	20/6 (morning)	Soil cut slope	Minor (40)	Building lot	3 houses temporarily evacuated	
ME 6/7	Bride's Pool Road, Tai Po	23/6	HyD/NT	Unknown	Soil cut slope	Minor (5)	Open space		
ME 6/8	No. 82, Pak Shek Wo Village, Clear Water Bay Road, Sai Kung	21/6	GEO	20/6	Fill slope Soil cut slope	Minor (10)	Squatter hut	2 huts permanently evacuated and 2 huts temporarily evacuated	

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 3 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 6/9	Nos. 729B & C, Tan Cheung, Sai Kung	22/6	Public	19/6 (23:00)	Rock fall	Minor (<0.5)	Building access		
ME 6/10	Sai Sha Road near O Tau, Sai Kung (8SW-A/C2)	20/6	HyD/NT	19/6 (20:00)	Soil cut slope	Minor (35)			
ME 6/11	Access road to Outward Bound School, Sai Kung	24/6	HyD/NT	18/6 (22:00)	Soil cut slope	Minor (20)			
ME 6/12	Access road to DD253 Lots 1130-1131, Pak Shek Wo, Sai Kung (11NE-B/C117)	28/6	DO/SK	24/6	Soil cut slope	Minor (1)	Access road		
ME 6/13	Lot 232, Air House, Clear Water Bay Road, Sai Kung	28/6	Public	22/6	Soil cut slope	Minor (2)	Building lot		
ME 6/14	Lot 208, MS 9½, Clear Water Bay Road, Sai Kung (12NW-C/C66)	22/6	Public	22-29/6	Soil cut slope	Minor (0.1)	Building lot		
ME 7/1	Lot 1833 in DD221, Tan Cheung Road, Sai Kung	4/7	DO/SK	30/6 (22:00)	Soil cut slope	Minor (2)	Carpark		
ME 7/2	Lot 342 in DD253, Tseng Lan Shue, Sai Kung	5/7	DLO/SK	Unknown	Retaining wall Rubble wall	Minor (2.5)	Building lot		
ME 7/3	House no. 45, Sheung Sze Wan Village, Sai Kung	12/7	Police	11/7 (1:00)	Retaining wall	Major (80)	Building lot	3 flats recommended closure	

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 4 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 7/4	Kei Ling Ha Lo Wai, Sai Sha Road, Sai Kung (8NW-C/C14)	22/7	HyD/NT	22/7 (7:00)	Soil cut slope	Major (260)	Road	1 lane of road closed	Two failures
ME 7/5	Near Long Keng, Sai Sha Road (8SW-A/C3)	22/7	GEO	22/7	Soil cut slope	Minor	Road	1 lane of road closed	
ME 7/6	No. 57C, Lung Mei Village, Tai Po	22/7	BD	22/7 (8:00)	Soil cut slope	Minor (15)	Building lot	1 flat temporarily evacuated	
ME 7/7	Near Ngau Au, Bride's Pool Road, Tai Po (3SE-D/C4)	22/7	HyD/NT	22/7	Soil cut slope	Minor (3)	Pedestrian pavement Open space		
ME 7/8	Bride's Pool Road, Tai Po (3SE-D/C8)	22/7	HyD/NT	22/7	Soil cut slope	Minor (4)	Pedestrian pavement Open space		
ME 7/9	Bride's Pool Road, Tai Po (3SE-B/C3)	22/7	HyD/NT	22/7	Soil/rock cut slope	Minor (30)	Road	1 lane of road closed	
ME 7/10	Kwai Tei San Chuen Road, Fo Tan, Shatin	22/7	Police	22/7 (8:30)	Soil cut slope	Minor (10)	Carpark Country park	Pedestrian pavement closed	
ME 7/11	No. 224, Pai Tau Tsuen, Shatin	22/7	DLO/ST	22/7	Soil cut slope	Minor (0.6)	Building lot		
ME 7/12	No. 222, Pai Tau Tsuen, Shatin	22/7	GEO	22/7	Soil cut slope	Minor (0.5)	Building lot		

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 5 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 7/13	No. 223, Pai Tau Tsuen, Shatin	22/7	GEO	22/7	Soil cut slope	Minor (5)	Building lot		
ME 7/14	No. 47, Ha Lung Chung, Shatin	25/7	DO/ST	22/7 (12:00)	Soil cut slope	Minor (0.4)	Squatter hut	1 hut permanently evacuated	
ME 7/15	Near Chinese University, Lai Ping Road, Shatin (7NE-C/C78)	22/7	HyD/NT	22/7	Rock fall	Minor (15)	Road	1 lane of road blocked	
ME 7/16	Yung Ping Path, Kau To Village, Shatin	25/7	DO/ST	22/7	Soil cut slope	Minor (15)	Access road		
ME 7/17	No. 109, Lok Lo Ha, Shatin	22/7	Public	22/7	Soil cut slope	Minor (1)	Building lot		
ME 7/18	Fei Ngo Shan Road	22/7	HyD/NT	22/7 (7:30)	Soil cut slope	Minor (4-5)	Road		
ME 7/19	Shek Lin Road, Tai Po	22/7	HyD/NT	22/7 (6:45)	Soil cut slope	Major (80)	Road Pedestrian pavement	Road and pedestrian pavement closed	
ME 7/20	Bride's Pool Road between Chung Mei and Bride's Pool (3SE-B/C4)	23/7	HyD/NT	23/7 (morning)	Boulder fall	Minor (40)	Road	2 lanes of road closed	
ME 7/21	7 Kam Shan Terrace, Kam Shan, Tai Po (7NW-B/CR27)	22/7	GEO	22/7 (3:30)	Fill slope	Minor (20)	Building lot	1 flat evacuated	

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 6 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ²)			
ME 7/22	Greenwich Garden, Kam Shan, Tai Po (7NW-B/CR26)	22/7	GEO	22/7 (4:30)	Soil cut slope	Minor (20)	Building lot		
ME 7/23	Access road to Ha Wong Yi Au, Tai Po	22/7	HyD/NT	22/7 (morning)	Soil cut slope	Minor (1)			
ME 7/24	6 Kam Shan Terrace, Kam Shan, Tai Po	22/7	Public	22/7 (8:00)	Natural slope	Minor (10)	Warehouse		
ME 7/25	Opposite Lot 248, Tso Wo Hang, Tai Mong Tsai Road (8SW-A/C11)	25/7	HyD/NT	24/7 (24:00)	Soil cut slope Natural slope	Minor (45)	Road	1 lane of road closed	
ME 7/26	Tsiu Hang, Tai Po Road	23/7	Police	23/7 (13:00)	Retaining wall Soil cut slope	Minor (3)	Squatter hut	1 hut temporarily evacuated	
ME 7/27	Hopes Villa, Tai Mong Tsai Road, Sai Kung (8SW-A/C20)	25/7	HyD/NT	24/7 (14:00)	Soil cut slope Natural slope	Major (1000)	Road	2 lanes of road closed	
ME 7/28	Hiram's Highway near Hong Kin Road, Sai Kung	25/7	HyD/NT	24/7 (13:55)	Soil cut slope	Minor (42)	Road	1 lane of road closed	
ME 7/29	Tan Cheung Road, Sai Kung	22/7	DO/SK	22/7 (7:30-10:00)	Soil cut slope	Minor (28)	Carpark Open space		
ME 7/30	7-13 Ling Yin Terrace, Tui Min Hoi, Sai Kung	25/7	DO/SK	24/7 (14:05)	Soil cut slope	Minor (40)	Squatter hut Backyard	4 huts temporarily evacuated	

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 7 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 7/31	Near Anderson Road Quarry, Anderson Road, Sai Kung (11NE-D/C164)	25/7	Police	25/7	Soil/rock cut slope Rock fall	Major (80)	Road	2 lanes of road closed	
ME 7/32	Near Pik Uk Tsuen, Clear Water Bay Road, Sai Kung (11NE-B/C144)	25/7	HyD/NT	24/7	Soil cut slope	Major (60)	Road Pedestrian pavement Bus shelter	1 lane of road and pedestrian pavement closed	
ME 7/33	House no. 168, Nam Wai, Sai Kung	25/7	Public	22/7 (15:50)	Soil cut slope	Minor (3)			
ME 7/34	House no. B6, Bayside Villas, 1 Pik Sha Road, Sai Kung (12NW-C/CR30)	25/7	Public	24/7	Rock fall	Minor (4)	Open space		
ME 7/35	House nos. 26 & 27, Tai Om Village, Tai Po	26/7	DO/TP	22/7 (10:30)	Soil cut slope	Minor (3.5)	Building lot	1 flat evacuated	
ME 7/36	No. 189, Sam Mun Tsai Ha Village, Yim Tin Tsai, Tai Po	23/7	Public	23/7 (9:00-10:00)	Soil cut slope	Minor (10)	Workshop		
ME 7/37	Footpath beside streamcourse, Tai Chung Hau, Sai Kung	25/7	Public	Unknown	Natural slope	Minor (25)	Footpath		
ME 7/38	Access road to Mok Tse Che, Sai Kung	25/7	DO/SK	Unknown	Soil cut slope	Minor (0.5)	Access road		

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 8 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ²)			
ME 7/39	Nos. 144-153, Sam Mun Tsai New Village, Tai Po (7NE-A/C27)	23/7	Police	23/7 (4:00)	Soil cut slope	Minor (40)	Building access	5 houses temporarily evacuated	This incident no. was not used
ME 7/40	House no. 8B, Wo Mei Village, Sai Kung	27/7	GEO	Unknown	Natural slope	Minor (5)	Road Open space		
ME 7/41									
ME 7/42	Ting Kok Road, Tai Po (3SE-D/C1)	23/7	HyD/NT	23/7 (6:00)	Soil cut slope	Minor (18)	Road	1 lane of road closed	
ME 7/43	Bride's Pool Road near San Tau Yiu, Tai Po (3SE-B/F2)	26/7	HyD/NT	23/7	Soil cut slope	Minor (14)	Open space		
ME 7/44	Junction of Bride's Pool Road and Wu Kau Tang Road, Tai Po	26/7	HyD/NT	24/7	Soil cut slope	Minor (2)	Open space		
ME 7/45	Bride's Pool Road near Sam Tam Lo, Tai Po (3SE-B/C6)	26/7	HyD/NT	24/7	Soil cut slope	Minor (2)	Open space		
ME 7/46	Bride's Pool Road near Luk Keng	26/7	HyD/NT	24/7	Natural slope	Minor (11)	Open space		
ME 7/47	Bride's Pool Road, Luk Keng (3NE-D/C1)	24/7	HyD/NT	24/7	Soil cut slope	Minor (1.5)	Open space		

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 9 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 7/48	School, Ma On Shan Upper Village, Ma On Shan	25/7	DO/ST	Unknown	Soil cut slope	Minor (5-10)	Footpath		
ME 7/49	Bride's Pool Road near Bride's Pool, Tai Po	14/7	HyD/NT	14/7	Rock fall	Minor (6)	Carpark		
ME 7/50	Hut nos. 487-491, Anderson Road/Po Lam Road, Tseung Kwan O	27/7	HyD/K	27/7	Soil cut slope	Minor (30)	Road	Road closed	
ME 7/51	No. 26, Sheung Yeung, Clear Water Bay Road, Sai Kung (12NW-C/C17)	25/7	Police	20/7	Soil cut slope	Minor (0.2)	Open space		
ME 7/52	Lung Ha Wan Road, Sai Kung	27/7	GEO	24/7	Soil cut slope	Minor (15)	Road	1 lane of road blocked	
ME 7/53	Access road to Cheung Shue Tau, Tai Po Kau	27/7	DO/TP	23/7	Natural slope	Minor (5)	Access road		
ME 7/54	House no. 63, Ha Wong Yi Au Village, Tai Po	29/7	DO/TP	21/7 (night)	Soil cut slope	Minor (0.1)			
ME 7/55	House no. 81K, Lot 1168 in DD253, Pak Shek Wo Village, Sai Kung	24/7	DO/SK	23/7 (night)	Soil cut slope	Minor (1)	Footpath		
ME 7/56	No. 2, Sam Long Village, Sai Kung	24/7	DO/SK	24/7	Soil cut slope	Minor (6)	Pigsty		

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 10 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m³)			
ME 7/57	No. 12D, Sam Long Village, Sai Kung	29/7	DLO/SK	11/7	Soil cut slope	Minor (0.2)	Pedestrian pavement		
ME 7/58	Near no. 12, Sam Long Village, Sai Kung	29/7	DLO/SK	24/7	Soil cut slope	Minor (8)	Pedestrian pavement		
ME 8/1	Clear Water Bay Road near Razor Hill Road, Sai Kung	1/8	HyD/NT	24/7	Fill slope	Minor (20)	Pedestrian pavement	Pedestrian pavement closed	
ME 8/2	Zone 268, Border Fence Road, Sha Tau Kok	28/7	HyD/NT	23/7	Soil cut slope	Minor (10)	Open space		
ME 8/3	Zone 243, Border Fence Road, San Kwai Tin	28/7	HyD/NT	23/7	Natural slope	Minor (20)	Open space		
ME 8/4	Sam A Wan Pier, Sam A Wan	29/7	DO/N	24/7	Natural slope	Major (55)	Footpath	Pedestrian pavement closed	
ME 8/5	House no. 65, Mang Kung Uk, Sai Kung (12NW-C/C83)	8/8	Public	Unknown	Soil cut slope	Minor (4)	Building lot Building access	1 house recommended closure	
ME 8/6	Access road to Kau Lung Hang Shan, Tai Po	6/8	Public	6/8 (2:30-5:30)	Soil/rock cut slope	Minor (10)	Access road	Road closed	
ME 8/7	House no. 244, Tai Po Tsai (11NE-B/FR50)	9/8	HyD/NT	N/A	Retaining wall moved	N/A			No failure
ME 8/8	No. 31, Ling Yan Terrace, Tui Min Hoi, Sai Kung	4/8	DO/SK	1/8 (10:00)	Soil cut slope	Minor (0.5)	Pedestrian pavement		

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 11 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ²)			
ME 8/9	Zone 254, Border Fence Road, Pak Kung Au	8/8	HyD/NT	5/8 (night)	Soil cut slope	Minor (5)			
ME 8/10	Zone 243, Border Fence Road, San Kwai Tin	8/8	HyD/NT	5/8 (night)	Soil cut slope	Minor (10)			
ME 8/11	Zone 229, Border Fence Road, Wang Lek	8/8	HyD/NT	5/8 (night)	Natural slope	Minor (6)			
ME 8/12	Streamcourse, Sam Long Village, Tseng Lan Shue, Sai Kung	11/8	DO/SK	25/7	Fill slope	Minor (10)	Streamcourse		
ME 8/13	No. 10, Sam Long Village, Tseng Lan Shue, Sai Kung	11/8	DO/SK	Unknown	Soil cut slope	Minor (0.2)			
ME 8/14	Road to Wu Kau Tang, Tai Po	12/8	HyD/NT	Unknown	Fill slope	Minor (45)	Open space		
ME 8/15	Bride's Pool Road near road to Wu Kau Tang, Tai Po	12/8	HyD/NT	Unknown	Soil cut slope	Minor (30)	Country park		
ME 8/16	Bride's Pool Road near road to Wu Kau Tang, Tai Po (3SE-B/FR15)	12/8	HyD/NT	Unknown	Fill slope	Minor (<10)	Road	1 lane of road closed	
ME 8/17	Bride's Pool Road near Chung Mei, Tai Po (3SE-B/F5)	12/8	HyD/NT	Unknown	Fill slope	Minor (<10)	Road	1 lane of road closed	

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 12 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 8/18	Footpath to village house opposite to Tai Po Mei, Tai Po Kau	6/8	Public	3/8	Natural slope	Minor (45)			
ME 8/19	Footpath to village adjacent Savanna Garden, Tai Po	8/8	HyD/K	8/8 (morning)	Natural slope	Minor (40)	Pedestrian pavement		
ME 8/20	No. 26, Yue Kok Village, Tai Po	10/8	Public	Unknown	Soil cut slope	Minor (1)	Building lot		
ME 8/21	2 Fourth Street, Hong Lok Yuen, Tai Po	15/8	Public	16/8 (Unknown)	Natural slope	Minor (15)			
ME 8/22	Lot 227 in DD229, Ah Kung Wan Road, Sai Kung	16/8	FSD	16/8 (8:45)	Soil cut slope	Major (240)	Road Building lot Pedestrian pavement Building access	4 houses evacuated and 2 lanes of road closed	
ME 8/23	Anderson Road, south of Clear Water Bay Road, Sai Kung (11NE-B/C71)	16/8	HyD/NT	16/8 (9:00)	Soil cut slope	Minor (20)	Squatter hut Road	1 hut temporarily evacuated and 2 lanes of road closed	
ME 8/24	Sai Sha Road near Long Keng, Sai Kung (8SW-A/C4)	16/8	HyD/NT	16/8 (9:45)	Soil cut slope	Major (150)	Road	2 lanes of road closed	
ME 8/25	Beside subway at Clear Water Bay Road near Tseng Lan Shue	17/8	HyD/NT	Unknown	Soil cut slope	Minor (4)	Open space		

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 13 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 8/26	Clear Water Bay Road, opposite Ah Kung Wan Road, Sai Kung	17/8	HyD/NT	Unknown	Soil/rock cut slope	Minor (4)	Pedestrian pavement		
ME 8/27	Marina Club, Tsiu Hang Hau, Sai Kung	16/8	GEO	23/7	Retaining wall Natural slope	Minor (45)	Carpark		
ME 8/28	Hut nos. 26-27, O Long Village, Sai Kung	17/8	DO/SK	16/8 (8:00-9:00)	Retaining wall	Major (50)	Squatter hut	2 huts temporarily evacuated	
ME 8/29	Village house near Ko Po, Fanling	18/8	DO/N	17/8 (14:00-15:00)	Natural slope	Minor (1.5)	Squatter hut	1 hut permanently evacuated	
ME 8/30	Lot 1940, Fei Ngo Shan Road, Sai Kung	16/8	GEO	Unknown	Natural slope	Minor (40)	Open space		
ME 8/31	Luk Keng Road near Nam Chung Lei Uk, Tai Po	18/8	HyD/NT	Unknown	Natural slope	Minor (30)	Open space		
ME 8/32	Lin Ma Hang Road, Man Kam To	10/8	HyD/NT	6-7/8	Natural slope	Major (100)	Road	1 lane of road closed	
ME 9/1	River bank of Ng Tung Ho	26/8	Public	10/8	Natural slope	Minor (8)			
ME 9/2	No. 166, Che Keng Tuk, Sai Kung	1/9	DO/SK	27-29/8	Soil cut slope	Minor (0.5)	Backyard		

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 14 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 9/3	Access road to Chinese Permanent Cemetery facing Lei Yue Mun	19/8	Public	Unknown	Soil cut slope	Minor (0.5)			
ME 9/4	Access road to Chinese Permanent Cemetery facing Tseung Kwan O (11SE-B/C105)	19/8	Public	Unknown	Soil cut slope	Minor (0.5)			
ME 9/5	Tai Po Road - Tai Po Kau, Tsung Tsai Yuen (7NW-D/C1)	7/9	HyD/NT	7/9 (4:45)	Rock fall	Minor (3)	Road Pedestrian pavement	1 lane of road and pedestrian pavement closed	
ME 9/6	Bus stop at Ting Kok Road near Sam Mun Tsai Road, Tai Po (7NE-A/C8)	5/9	HyD/NT	Unknown	Soil/rock cut slope	Minor (40)	Open space Bus stop		
ME 9/7	No. 1, Hung Uk Tsuen, Mang Kung Uk, Sai Kung	19/9	Police	Unknown	Soil cut slope Natural slope	Minor (< 1)			
ME 9/8	River bank in front of temple, Lai Chi Wo Village, Lai Chi Wo	18/9	DO/N	Unknown	Soil cut slope	Minor (10)	Footpath		
ME 9/9	Footpath to Sam A Tsuen from Lai Chi Wo Village, Lai Chi Wo	18/9	DO/N	Unknown	Soil cut slope	Minor (10)	Footpath		
ME 9/10	Opposite no. 169, Lai Chi Wo Village, Lai Chi Wo	18/9	DO/N	Unknown	Natural slope	Minor (30)	Squatter hut Building lot	3 houses and 1 hut temporarily evacuated	

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 15 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
ME 9/11	Zone 201, Border Fence Road near Pak Fu Shan, Sheung Shui	14/9	HyD/NT	August	Subsidence	Minor (10)	Road		
ME 9/12	Pik Uk Tsuen Road, Sai Kung	28/9	DO/SK	24-25/9	Natural slope Fill slope	Minor (1)	Access road		
ME 10/1	Hiram's Highway, Sai Kung (11NE-B/C28)	30/9	HyD/NT	Unknown	Soil/rock cut slope	Minor (3)	Open space		
ME 11/1	Near 60B Heng Keng Shek Road, Sai Kung	1/11	Public	1/11 (16:00)	Retaining wall	Minor (2)	Squatter hut Access road		
ME 11/2	Near Zone 260, Border Fence Road, Sha Tau Kok	29/9	HyD/NT	August	Rock fall	Minor (0.8)			
ME 11/3	Near Zone 247, Border Fence Road, Sha Tau Kok	29/9	HyD/NT	August	Soil cut slope	Minor (2.3)			
ME 11/4	Near Zone 234, Border Fence Road, Sha Tau Kok	29/9	HyD/NT	August	Soil cut slope	Minor (1.5)			
ME 11/5	Near Zone 233, Border Fence Road, Sha Tau Kok	29/9	HyD/NT	August	Rock slope	Minor (0.1)			
ME 12/1	Near Yue Kok, Ting Kok Road	30/11	HyD/NT	August	Soil cut slope	Minor (2)	Open space		
ME 12/2	Bride's Pool Road near Chung Mei, Tai Po (3SE-B/C2)	30/11	HyD/NT	Unknown	Soil cut slope	Minor (20)			

Table B3 - List of Incidents in Eastern New Territories Reported to GEO in 1994 (Sheet 16 of 16)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m³)			
ME 12/3	Hut nos. HC/76/761-772, Ngau Fung Tong Village, Kau Tsin Uk, Sai Kung	9/12	DO/SK	8/12 (15:00)	Soil cut slope	Minor (5)	Squatter hut	1 hut temporarily evacuated	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 1 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 1/1	Near Mount Pleasure at Shatin Heights Road, Shatin	14/1	DO/ST	Unknown	Rock fall	Minor (<0.5)	Road		
MW 1/2	Near Happy View House at Shatin Heights Road, Shatin	14/1	DO/ST	Unknown	Soil cut slope	Minor (<1)	Road		
MW 2/1	Opposite Mobile Petrol Station, Tai Po Road, Shatin	23/2	HyD/NT	Unknown	Natural slope	Minor (10)	Country park		
MW 5/1	Behind Buddhist Chi Hong Kindergarten, Shatin	31/5	Public	31/5 (am)	Soil cut slope	Minor (<0.5)	Building lot		
MW 6/1	Near 29 To Fung Shan Road, Shatin	20/6	DO/ST	20/6 (am)	Soil cut slope	Minor (<1)	Road		
MW 6/2	Near 27 To Fung Shan Road, Shatin	20/6	DO/ST	20/6 (am)	Soil cut slope	Minor (<1)	Pedestrian pavement		
MW 6/3	Near Mount Pleasure, 5-9 Shatin Heights Road, Shatin	21/6	HyD/NT	21/6 (am)	Soil cut slope	Minor (7)	Road Building lot	1 lane of road closed	
MW 6/4	Near Fu Kong Shan, South Lantau Road, Mui Wo, Lantau Island	21/6	HyD/NT	20/6 (17:00)	Soil cut slope Retaining wall	Minor (5)	Road Building lot	1 lane of road closed	
MW 6/5	Ma Po Ping Road, Lantau Island (13NE-A/C2)	21/6	HyD/NT	20/6 (17:00)	Soil/rock cut slope	Minor (2)			
MW 6/6	Tai Wor Chuen, Tsuen Wan	22/6	Public	22/6	Retaining wall	Minor (2)	Squatter hut	4 huts permanently evacuated	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 2 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 6/7	Behind no. 4, Shatin Tau New Village, Area 2, Shatin	29/6	Public	24/6 (23:00)	Soil cut slope	Minor (2)	Squatter hut	1 hut temporarily evacuated	
MW 7/1	Golden Hill Road, Shatin	6/7	HyD/NT	29/6	Natural slope	Minor (10)	Road	Road blocked	
MW 7/2	Golden Hill Road, Shatin	1/7	HyD/NT	28/6	Rock fall	Minor (2)	Streamcourse, culvert		
MW 7/3	No. 7, Waterworks 4.5 miles Quarters, Tai Po Road, Shatin	20/7	HD	14/7 (am)	Natural slope	Minor (6)	Squatter hut	3 huts permanently evacuated	
MW 7/4	Shek Yee Road, Kwai Chung (7SW-C/C163)	22/7	Public	22/7 (10:00)	Soil cut slope	Minor (20)	Carpark		
MW 7/5	Mui Kong Village, Butterfly Valley	22/7	Public	22/7 (4:30)	Soil cut slope	Minor (30)	Access road		
MW 7/6	290 Yau Ma Hom Road, Kwai Chung (7SW-C/C251)	22/7	Public	22/7 (9:00)	Soil cut slope	Minor	Open space		
MW 7/7	No. 187, Kau Wa Keng Sheung Tsuen, Tai Ching Cheung	22/7	DO/KT	22/7 (7:00)	Soil cut slope	Minor (<1)	Squatter hut		
MW 7/8	No. 5, Kau Wa Keng San Tsuen, Kwai Chung	22/7	DO/KT	22/7 (3:30)	Soil cut slope	Minor (15)	Building lot		

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 3 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 7/9	No. 69A, Kau Wa Keng San Tsuen, Kwai Chung	22/7	FSD	22/7 (5:00)	Soil cut slope	Minor (45)	Building lot	1 house evacuated	
MW 7/10	Near Chun Shing Building, Kwai Fuk Road, Kwai Chung (7SW-C/C281)	22/7	Police	22/7 (am)	Soil/rock cut slope	Major (>200)	Road	3 lanes of road blocked	
MW 7/11	No. 65, Po Wah Yuen, Lamma Island (14NE-B/C7)	22/7	DLO/IS	22/7 (morning)	Soil cut slope	Minor (20)	Building lot	3 flats evacuated	
MW 7/12	No. 58, Po Wah Yuen, Lamma Island (14NE-B/F1)	22/7	DO/IS	22/7	Soil cut slope	Minor (7)	Building lot		
MW 7/13	No. 132, Tai Ping Village, Lamma Island	23/7	DLO/IS	22/7	Retaining wall	Minor (4)	Building lot		
MW 7/14	Below no. 22, Hung Shing Ye, Lamma Island	23/7	HyD/NT	Unknown	Fill slope	Minor (4)	Building lot		
MW 7/15	House no. 32C, Cheung Hang Village, Shek Ling Pau, Shek Lei Tau	22/7	HyD/NT	22/7 (18:00)	Abandoned water tank fell	N/A			Abandoned water tank fell, not a geotechnical problem
MW 7/16	Greenview Terrace, Castle Peak Road, Tsuen Wan (6SE-D/C25)	22/7	HyD/NT	22/7 (13:15), 23/7 (7:00)	Soil cut slope Boulder fall	Minor (45, 40-50)	Road	2 lanes of road closed	Two failures

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 4 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 7/17	Near Driving Test Centre, Tai Po Road, Tai Wai	24/7	HyD/NT	24/7	Boulder fall	Minor (5)	Carpark		Two failures
MW 7/18	MS 14½, Castle Peak Road, Tsing Lung Tau	23/7	HyD/M	23/7 (7:00 and 15:30)	Soil/rock cut slope Natural slope	Major (20, 700)	Road Pedestrian pavement	1 person injured, 2 lanes of road and pedestrian pavement closed, 1 lorry damaged and 1 water pipe broken	
MW 7/19	Yau Oi Village, Tung Lo Wan Hill Road, Shatin	23/7	Police	23/7 (4:00)	Soil cut slope	Minor (30)	Squatter hut	4 huts permanently evacuated	
MW 7/20	Behind Buddhist Chi Hong Kindergarten, Sun Tin Village, Shatin	22/7	Public	22/7 (am)	Soil cut slope	Minor (5)	Backlane		
MW 7/21	Golden Hill Road, Shatin	25/7	HyD/NT	25/7	Soil cut slope	Minor (3)	Road		
MW 7/22	MS 10¼, South Lantau Road, Lantau Island	23/7	HyD/NT	23/7 (morning)	Natural slope	Minor (<10)	Road	2 lanes of road closed	
MW 7/23	MS 9¾, South Lantau Road, Lantau Island	23/7	HyD/NT	23/7	Rock fall	Minor (<10)	Open space		
MW 7/24	Tong Fuk, South Lantau Road, Lantau Island	23/7	HyD/NT	23/7	Natural slope	Minor	Pedestrian pavement		

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 5 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 7/25	MS 6, South Lantau Road, Lantau Island (13NE-B/C9)	24/7	DO/I	24/7 (19:00)	Soil/rock cut slope	Major (250-300)	Road Pedestrian pavement	2 lanes of road and pedestrian pavement closed	
MW 7/26	Structure no. S/GPA1/31 at Luk Wo, Lantau Island	25/7	DO/IS	23/7	Natural slope	Minor (40)	Building lot Pedestrian pavement	1 house closed	
MW 7/27	Near Tai O Police Station, Lantau Island	25/7	HyD/NT	24/7	Natural slope	Minor (30)	Pedestrian pavement	Pedestrian pavement closed	
MW 7/28	Wang Pui Road, Lantau Island	25/7	HyD/NT	24/7	Soil cut slope	Minor (20)	Road	1 lane of road blocked	
MW 7/29	No. 14, Yung Shue Long New Village, Lamma Island (14NE-B/C10)	24/7	Police	24/7 (morning)	Soil cut slope	Minor (45)	Building lot	1 house evacuated	
MW 7/30	No. 16, Yung Shue Long New Village, Lamma Island (14NE-B/C10)	24/7	Police	24/7 (morning)	Soil cut slope	Minor (45)	Building lot	2 flats evacuated	
MW 7/31	Hut nos. RTP/TK/F258-261, Tsiu Keng Peng Uk Village, Sheung Shui	25/7	HD	22/7	Soil cut slope	Minor (10)	River bank and agricultural land		
MW 7/32	No. 290, Mo Lo Shan Village, Tuen Mun	25/7	DO/TM	22-23/7	Soil cut slope	Minor (<2)	Squatter hut	1 hut permanently evacuated	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 6 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 7/33	Above Fu Yung Shan Road, Tsuen Wan	25/7	HyD/NT	Unknown	Natural slope	Minor (10-20)	Road	2 lanes of road and pedestrian pavement closed	
MW 7/34	Opposite Route Twisk Towngas Station, Route Twisk, Tsuen Wan (6SE-D/FR32)	26/7	DO/TW	Unknown	Fill slope	Minor (45)	Road Pedestrian pavement	1 lane of road and pedestrian pavement closed	
MW 7/35	Adjacent Kam Fung Garden, Castle Peak Road, Tsuen Wan (6SE-D/CR6)	26/7	DO/TW	23/7 (16:00)	Soil cut slope	Minor (25)	Pedestrian pavement		
MW 7/36	13 Fourth Street, Area 8, Heung Fan Liu, Shatin	26/7	HyD/NT	24/7 (am)	Soil cut slope	Minor (1)	Squatter hut	1 hut temporarily evacuated	
MW 7/37	1A Third Street, Area 8, Heung Fan Liu, Shatin	25/7	Public	23/7 (15:00)	Soil cut slope	Minor (< 1)	Squatter hut		
MW 7/38	No. 34, Yau Oi Tsuen, Shatin	27/7	HyD/NT	23/7 (am)	Soil cut slope	Minor (5)	Squatter hut	1 hut permanently evacuated	
MW 7/39	Below no. 21, Hung Shing Ye, Lamma Island	23/7	HyD/NT	Unknown	Fill slope	Minor (4)	Building lot		
MW 7/40	Tai Hang Tung Recreation Ground, Kowloon	26/7	USD	23/7 (am)	Natural slope	Minor (5)	Open space		
MW 7/41	Mission Hill, Tai Hang Tung	26/7	HyD/K	23/7 (am)	Natural slope	Minor (15)	Open space		

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 7 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 7/42	Opposite Block B, Au Tau Departmental Quarters, Yuen Long (6NE-A/C2)	24/7	Police	22/7 (night)	Soil/rock cut slope	Minor (14)	Open space		Three failures
MW 7/43	Block D, Au Tau Departmental Quarters, Yuen Long	24/7	Police	23/7 (night)	Soil/rock cut slope	Minor (10)			Two failures
MW 7/44	No. 19, Sung Shan New Village, Yuen Long	26/7	FSD	24/7	Soil cut slope Retaining wall	Minor (40)			
MW 7/45	Tai Tong Road near Chun Nam Yuen, Yuen Long (6NW-D/C1)	25/7	Police	25/7 (am)	Soil cut slope	Minor (4)	Road	1 house recommended closure and 1 lane of road blocked	
MW 7/46	Fire Services Department Training School, Fan Kam Road, Pat Heung (6NE-B/C5)	22/7	FSD	21/7 (midnight)	Soil/rock cut slope	Minor (2)	Open space	1 lane of road blocked	
MW 7/47	Footpath near no. 5, Ka Nam Village, Lamma Island	24/7	Police	24/7	Natural slope	Minor (40)	Pedestrian pavement	Pedestrian pavement closed	
MW 7/48	No. 2, Hung Shing Ye, Lamma Island	25/7	Police	Unknown	Soil cut slope	Minor (15)	Building lot Open space		
MW 7/49	Footpath near Hung Shing Ye Beach, Lamma Island	24/7	Police	Unknown	Natural slope	Minor (15)	Pedestrian pavement	Pedestrian pavement closed	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 8 of 20)

Incident No.	Location (Slope Ref. No. if any)	- Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 7/50	Nos. 51-52, Lo So Shing, South Lamma Island	25/7	DO/IS	24/7 (morning)	Soil cut slope	Minor (14)	Building lot		
MW 7/51	No. 15, Chung Mei Tsuen, South Lamma Island	25/7	DO/IS	24/7 (morning)	Soil cut slope	Minor (6)	Building lot		
MW 7/52	Ta Shui Wan, Sok Kwu Wan, South Lamma Island	24/7	Police	24/7 (11:00)	Soil cut slope	Major (170)	Pedestrian pavement	Pedestrian pavement closed	
MW 7/53	Tai Shui Wan, Sok Kwu Wan, South Lamma Island	24/7	Police	24/7 (23:30)	Soil cut slope	Minor (10)	Pedestrian pavement	Pedestrian pavement closed	
MW 7/54	Footpath at Wai Tsai Sixth Street, Peng Chau	25/7	DO/I	24/7 (morning)	Soil cut slope	Minor (1)	Pedestrian pavement		
MW 7/55	Kwong Pan Tin Village, Tsuen Wan	26/7	HD	22/7 (morning)	Soil/rock cut slope	Minor (2)	Squatter hut	2 huts permanently evacuated	
MW 7/56	Near no. RTW/4B/114, Tai Wo Tsuen, Tsuen Wan	26/7	DO/TW	25/7 (morning)	Soil cut slope	Minor (8)	Squatter hut		
MW 7/57	No. 16B, Sheung Kok Shan, Lo Wai, Tsuen Wan	26/7	DO/TW	24/7 (morning)	Natural slope	Minor (25)	Squatter hut	1 hut permanently evacuated	
MW 7/58	No. 40A, Wo Yi Hop, Tsuen Wan	22/7	Police	22/7 (morning)	Soil cut slope	Minor (5)	Squatter hut	2 huts permanently evacuated	
MW 7/59	Footpath near Wo Yi Hop Lane, Tsuen Wan	25/7	DO/TW	Unknown	Soil/rock cut slope	Minor (2-3)	Pedestrian pavement		
MW 7/60									This incident no. was not used

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 9 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m³)			
MW 7/61	Kwai Hing Road near MTR Station, Kwai Chung (7SW-C/C99)	22/7	Police	22/7	Soil cut slope	Minor (2)	Pedestrian pavement		
MW 7/62	Casam Beach, Castle Peak Road, Tsuen Wan	27/7	HyD/NT	22/7	Soil cut slope	Minor (10)	Pedestrian pavement	Pedestrian pavement closed	
MW 7/63	Lion Rock Tunnel Road, Shatin (7SW-D/FR33)	27/7	HyD/NT	26/7 (am)	Fill slope	Major (14, 100)	Road	1 lane of road closed	Two failures
MW 7/64	No. 38, Lo Uk Tsuen, Pui O, Lantau Island	27/7	DO/IS	24/7	Soil cut slope	Minor (<2)	Open space		
MW 7/65	Hut no. TM/TST/521, Tsing Shan Tsuen, Tuen Mun	27/7	DO/TM	22-23/7	Soil cut slope	Minor (2)	Open space		
MW 7/66	Footpath near Tsing Shan Monastery, Tuen Mun	27/7	DO/TM	22-23/7	Natural slope	Minor (15)	Footpath		
MW 7/67	DD116, Yau Shin Street, Shek Tong Tsuen, Yuen Long	25/7	DO/YL	24/7	Fill slope Retaining wall	Minor (4)	Squatter hut	1 hut permanently evacuated	
MW 7/68	Nos. 165 & 166A, Shan Pui, Yuen Long	25/7	DO/YL	24/7	Natural slope	Minor (7)	Building lot		
MW 7/69	Hut nos. YL/TKT/1300-1311, Tan Kwai Tsuen, Yuen Long	27/7	DO/YL	24/7 (pm)	Soil cut slope	Minor (3)	Squatter hut	12 huts permanently evacuated	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 10 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 7/70	Cheung Hang Village, Kwai Chung	27/7	Public	27/7	Natural slope	Minor (30)	Pedestrian pavement	Pedestrian pavement closed	
MW 7/71	15 Fourth Street, Area 8, Heung Fan Liu, Shatin	28/7	DO/ST	26/7 (am)	Soil cut slope	Minor (1)	Squatter hut	1 hut permanently evacuated	
MW 7/72	Lot 1001 & 1009 in DD381, Grandview Terrace, Siu Lam	25/7	Public	22/7 (midnight)	Fill slope	Minor (15)	Building lot		
MW 7/73	Sam Shing Temple, Tuen Mun (6SW-A/C16)	22/7	Police	21/7 (midnight)	Rock fall	Minor (10)	Squatter hut		
MW 7/74	No. 74/F, Cheung Hang Village, Kwai Chung	1/8	HD	23/7 (10:00)	Soil cut slope	Minor (5)	Squatter hut	8 huts permanently evacuated	
MW 7/75	Tan Kwai Tsuen Borrow Area, Tuen Mun	13/7	DO/TM	July	Fill slope	Minor (20)	Open space		
MW 7/76	Deep Bay Road, Lau Fau Shan, Yuen Long	1/8	HyD/NT	End July	Soil cut slope	Minor (25)	Road	½ lane of road blocked	
MW 7/77	No. 25, Tung O Village, South Lamma Island (15NW-C/CR12)	28/7	DO/IS	24/7 (morning)	Soil cut slope	Minor (5)	Building lot		
MW 7/78	Hut no. SKW/69/60D, Tung O Village, South Lamma Island	28/7	DO/IS	25/7 (morning)	Soil cut slope	Minor (3)	Squatter hut		

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 11 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 7/79	Footpath at Lo Tik Wan, Lamma Island	28/7	DO/IS	25/7 (morning)	Natural slope	Minor (7)	Pedestrian pavement	Pedestrian pavement closed	
MW 7/80	No. 24A, Nam Wan Shan Teng Tsuen, Peng Chau	25/7	Police	Unknown	Fill slope	Minor (4)	Pedestrian pavement		
MW 7/81	Lei Pui Street, Kwai Chung (7SW-C/C180)	3/8	HyD/NT	22/7	Soil/rock cut slope	Minor (10)	Road Pedestrian pavement	½ lane of road and pedestrian pavement closed	
MW 7/82	No. 11C, Four Row Stones, near Kat Hing Wai, Kam Tin, Yuen Long	29/7	Public	29/7	Natural slope	Minor (10)	Squatter hut Pedestrian pavement	2 huts permanently evacuated	
MW 7/83	No. 285, Pump Fong Sheung Tsuen, Kau Wah Keng	8/8	HD	22/7 (7:00)	Soil cut slope	Minor (10)	Squatter hut	9 huts permanently evacuated	
MW 8/1	Hut no. TM/SKW/A/238, So Kwun Wat Tsuen, So Kwun Wat	1/8	DO/TM	23/7	Soil cut slope	Minor (1-2)	Building lot		
MW 8/2	Hut no. TM/SKW/A/222, So Kwun Wat Tsuen, So Kwun Wat	1/8	DO/TM	23/7	Soil cut slope	Minor (5)	Squatter hut		
MW 8/3	MS 14½, Castle Peak Road, Tsing Lung Tau	7/8	Police	7/8 (11:45)	Soil cut slope Natural slope	Major (300)	Road	1 person killed, 17 persons injured and 2 lanes of road closed	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 12 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 8/4	Anglers' Beach, Castle Peak Road, Sham Tseng	7/8	HyD/NT & Police	7/8 (afternoon)	Subsidence	Minor (5-10)	Road Pedestrian pavement	1 lane of road and pedestrian pavement closed	Two failures
MW 8/5	MS 10, Castle Peak Road, Yau Kom Tau (6SE-D/C25)	7/8	HyD/NT & Police	7/8 (15:37)	Soil cut slope	Minor (20)	Road	2 lanes of road closed and 1 car damaged	
MW 8/6	Near Border Check Point, Man Kam To	7/8	HyD/NT	6/8 (19:00)	Soil cut slope	Major (150, 50)	Road	1 lane of road closed	
MW 8/7	Near Border Check Point, Man Kam To	7/8	HyD/NT	6/8	Soil cut slope	Minor (20)	Road	1 lane of road closed	
MW 8/8	Junction of Lo Wu Station Road and access to Sha Ling Village, Sha Ling	7/8	HyD/NT	6/8	Natural slope	Minor (40)	Road	1 lane of road closed	
MW 8/9	Access to Sha Ling Village, Sha Ling	7/8	HyD/NT	6/8	Natural slope	Minor (30)	Building access		
MW 8/10	Lo Wu Station Road, Lo Wu	7/8	HyD/NT	6/8	Natural slope	Minor (42)	Road Pedestrian pavement	1 lane of road and pedestrian pavement closed	
MW 8/11	Lo Wu Station Road, Lo Wu	7/8	HyD/NT	6/8	Soil cut slope	Minor (40)	Road	1 lane of road closed	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 13 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 8/12	Near MS 13½, Castle Peak Road, Tsing Lung Tau (6SE-C/C26)	8/8	Public	7/8	Soil cut slope	Minor (<1)	Pedestrian pavement	Pedestrian pavement closed	This incident no. was not used
MW 8/13									
MW 8/14	No. 222 in DD124, Tan Kwai Tsuen, Hung Shui Kiu, Yuen Long	8/8	Public	7/8	Subsidence	Minor	Squatter hut	1 hut permanently evacuated	Two failures
MW 8/15	No. 147, Tsing Lung Tau Sun Tsuen, Tsing Lung Tau	6/8	HyD/NT	6/8 (2:00)	Soil cut slope	Minor (20)	Building lot	3 houses evacuated	
MW 8/16	Access road to Wong Tei Hang near Man Kam To Check Point, Sha Ling	8/8	GEO	7/8	Soil cut slope	Minor (6)	Access road		
MW 8/17	Border Road near Ma Tso Lung	8/8	Police	7/8	Soil cut slope	Minor (15)	Road	1 lane of road blocked	
MW 8/18	Border Road near Ma Tso Lung and Liu Pok	8/8	Police	7/8	Soil cut slope	Minor (35)	Road	1 lane of road blocked	
MW 8/19	Footpath near no. 21, Don Bosco Road, Cheung Chau	25/7	Police	24/7 (am)	Natural slope	Minor (5)	Pedestrian pavement	Pedestrian pavement closed	
MW 8/20	Ma Tso Lung Shun Yee San Tsuen, Sheung Shui	27/7	DO/N	22/7	Fill slope	Minor (4)	Access road		

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 14 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 8/21	No. 9A, Block C, Ma Tso Lung Shun Yee San Tsuen, Sheung Shui	9/8	GEO	6/8	Retaining wall	Minor (1)	Open space		
MW 8/22	Hut nos. MCL1624-1625, Ma Tso Lung Shun Yee San Tsuen, Sheung Shui	9/8	GEO	6/8	Soil cut slope	Minor (1.5)	Squatter hut Open space	2 huts permanently evacuated	
MW 8/23	Ying Pun Tsuen, Sheung Shui	8/8	HD	22-23/7	Soil cut slope	Minor (7.5)	Pedestrian pavement		
MW 8/24	Kwu Tung Hang Tsuen, Sheung Shui	9/8	DO/N	6/8 (16:00)	Natural slope	Major (200)	Squatter hut	30 huts permanently evacuated	
MW 8/25	Castle Peak Road near Siu Lam Hospital, Siu Lam	10/8	HyD/NT	10/8 (6:00)	Soil cut slope	Minor (10)	Road	2 lanes of road closed	
MW 8/26	Access road to Marine Police Base, Siu Lam (6SW-D/C11)	10/8	HyD/NT	10/8 (6:00)	Soil cut slope	Minor (3)	Road	1/3 lane of road closed	
MW 8/27	Man Kam To below Police Post, Sheung Shui	10/8	HyD/NT	8/8	Soil cut slope Natural slope	Minor (10)			
MW 8/28	Same incident as ME94/8/32								
MW 8/29	Ting Kau Beach, MS 11, Castle Peak Road, Ting Kau (6SE-C/C1)	10/8	Police	10/8 (9:30)	Soil cut slope	Minor (10)	Road Pedestrian pavement	2 lanes of road and pedestrian pavement closed	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 15 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m³)			
MW 8/30	CH27.2, Tuen Mun Highway, Sam Shing Hui (6SW-C/C13)	10/8	HyD/NT	10/8 (13:30)	Rock fall	Minor (3)	Road	1 lane of road blocked	
MW 8/31	Tung Tai San Tsuen, Cheung Chau (14NW-D/C27)	9/8	FSD	7/8 (pm)	Soil cut slope	Minor (3)	Open space		
MW 8/32	No. 1, Fu Yung Shan, Tsuen Wan (7SW-C/C318)	10/8	BD & HD	9/8	Natural slope	Minor (2)	Pedestrian pavement		
MW 8/33	Hut no. RTW/1B/101, Pai Min Kok Sheung Tsuen, Sham Tseng	8/8	HD	6/8	Soil cut slope	Minor (5)	Squatter hut	1 hut permanently evacuated	
MW 8/34	Shek Tsai Po Street, Tai O, Lantau Island	10/8	HyD/NT	Unknown	Natural slope	Minor (10)	Pedestrian pavement Building access		
MW 8/35	Kwai Tai Road, Kwai Chung	10/8	HyD/NT	3/8	Soil cut slope	Minor (15-20)	Pedestrian pavement	Pedestrian pavement closed	
MW 8/36	30 Ting Kwai Fong Street, Peng Chau	9/8	DO/IS	9/8	Soil cut slope	Minor (3)	Building lot	1 house temporarily evacuated	
MW 8/37	Nos. 12-13, Fisherman's Village, Ma Wan	9/8	HD	6/8 (midnight)	Natural slope	Minor (40)	Open space		
MW 8/38	No. 47, Po Wah Yuen, Lamma Island	6/8	Public	Unknown	Soil cut slope	Minor (5)	Building lot Building access		

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 16 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 8/39	No. 5B, Lam Tin Village, Tsing Yi	15/8	HyD/NT	15/8 (17:00)	Soil cut slope	Minor (3)	Squatter hut	2 huts permanently evacuated	
MW 8/40	Near Chung Shan Terrace, Castle Peak Road, Kwai Chung (11NW-A/C65)	16/8	HyD/NT	16/8 (9:30)	Soil cut slope	Minor (20)	Road	1 lane of road closed	
MW 8/41	Fan Kam Road, Pat Heung	15/8	HyD/NT	15/8	Soil/rock cut slope	Minor (10)	Road Pedestrian pavement	1 lane of road and pedestrian pavement closed	
MW 8/42	On Yuk Road, Tsuen Wan	16/8	HyD/NT	16/8 (morning)	Soil cut slope	Minor (<5)			
MW 8/43	Between 1001 and 1009 Grandview Terrace, Castle Peak Road, Siu Lam	16/8	BD	16/8 (9:10)	Fill slope	Minor (10)	Building lot Building access		
MW 8/44	Hut no. RTW/4A/154, Fu Yung Shan, Tsuen Wan	16/8	Police	15/8 (pm)	Soil cut slope	Minor (2)	Squatter hut	1 hut permanently evacuated	
MW 8/45	Access road near San Uk Tsuen, Sheung Shui	15/8	DO/N	6-7/8	Soil cut slope	Minor (1)	Access road		
MW 8/46	Access road near San Uk Tsuen, Sheung Shui	15/8	DO/N	6-7/8	Natural slope	Minor (40)	Road	1 lane of road blocked	
MW 8/47	Shing Mun Road, Tsuen Wan (7SW-C/C295)	16/8	HyD/NT	16/8 (morning)	Soil cut slope	Minor (25)	Road	½ lane of road closed	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 17 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 8/48	Perown Barracks, So Kwun Wat, Tuen Mun	15/8	Arch SD	5/8	Soil cut slope	Major (150)	Barrack		
MW 8/49	Shek Yam Estate, Phase I construction site, Kwai Chung	17/8	HD	16/8 (morning)	Soil cut slope	Minor (2)			
MW 8/50	Access road to Table Hill Service Reservoir, Sheung Shui	16/8	WSD	6-7/8	Soil cut slope Subsidence	Major (200)	Access road		
MW 8/51	Access road to DD124, Tan Kwai Tsuen, Yuen Long	17/8	GEO	16/8 (am)	Soil/rock cut slope	Minor (15)	Access road		
MW 8/52	Chuk Yuen Tsuen Road, Ngau Tam Mei, Yuen Long	19/8	DO/YL	16/8 (am)	Soil cut slope	Minor (15)	Access road		
MW 8/53	Chuk Yuen Tsuen Road, Ngau Tam Mei, Yuen Long	19/8	DO/YL	16/8 (am)	Soil cut slope	Minor (45)	Road Access road	Access road closed	
MW 8/54	Hut nos. TM/TTC/1249-1250, Tseng Tau Tsuen Chung Tsuen, Tuen Mun	22/8	DO/TM	6-7/8	Soil cut slope	Minor (5)	Squatter hut	4 huts permanently evacuated	
MW 8/55	14A-D Chung Shan Terrace, Crawford Court, Kwai Chung (11NW-A/C77)	27/8	FSD	27/8 (12:00)	Soil cut slope Retaining wall	Minor (45-50)	Road	8 flats evacuated	

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 18 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m³)			
MW 8/56	Stonecutters Island	26/7	Arch SD	July	Soil/rock cut slope Natural slope	Minor (3)	Open space		
MW 8/57	Footpath near Tai Kwai Wan San Tsuen, Cheung Chau	30/8	GEO	Unknown	Soil cut slope	Minor (1)	Pedestrian pavement		
MW 8/58	House no. 294, Yau Ma Hom Resite Village, Kwai Chung (7SW-C/C251)	30/8	HyD/NT	16/8	Soil cut slope	Minor (<5)	Squatter hut Open space	1 hut permanently evacuated	
MW 8/59	Lot 392 in DD310, Upper Keung Shan, Luk Wu, Lantau Island	30/8	DO/IS	6/8	Soil cut slope	Minor (40)	Building lot Building access	Access closed	
MW 8/60	Maclehose Trail Stage 10, Tai Lam Chung Reservoir, Tai Lam Chung	24/8	AFD	Unknown	Natural slope	Major (500)	Country park	Footpath closed	
MW 8/61	Lot 314 in DD310, Wei San Yuen, Luk Wu, Lantau Island	1/9	DO/IS	6/8	Soil cut slope	Minor (<2)	Building access		
MW 8/62	Behind Block 2, Greenview Court, 648 Castle Peak Road, Tsuen Wan (6SE-D/F19)	27/8	HyD/ Emergency	N/A	Stockpiled soil	N/A			No failure

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 19 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 8/63	Block B, Au Tau Police Quarters, Yuen Long (6NE-A/C2)	5/9	Arch SD	17/8	Soil/rock cut slope	Minor (20)			
MW 8/64	Shek Pik Catchwater 'F', Lantau Island	7/9	WSD	Unknown	Soil cut slope Natural slope	Major (>300)	Catchwater		
MW 9/1	Adjacent footpath, Pak Tin, Shatin	8/9	GEO	Unknown	Soil cut slope	Minor (2)	Pedestrian pavement		
MW 9/2	Zone 122, Border Fence Road, Man Kam To	7/9	HyD/NT	August	Soil cut slope	Minor (8)	Open space		
MW 9/3	Zone 133, Border Fence Road, Man Kam To	8/9	HyD/NT	August	Subsidence	Minor (40)	Road		
MW 9/4	Lot 182 in DD1, Pak Ngan Heung, Mui Wo, Lantau Island	20/9	HyD/NT	Unknown	Soil cut slope	Minor (4)	Building access		
MW 9/5	Hing Shing Road, Kwai Chung	28/9	Arch SD	27/9 (12:00)	Soil cut slope Natural slope	Minor (40)	Carpark		
MW 9/6	Hut no. 60A, Area 4, Pak Tin, Shatin	23/9	BD	23/9 (21:30)	Soil cut slope	Minor	Squatter hut		
MW 9/7	No. 9, Tai Long Village, Lantau Island	30/9	DO/I	5/11	Soil cut slope	Minor (4)	Squatter hut Pedestrian pavement		
MW 9/8	Same incident as ME94/9/11								

Table B4 - List of Incidents in Western New Territories Reported to GEO in 1994 (Sheet 20 of 20)

Incident No.	Location (Slope Ref. No. if any)	Call		Failure			Area Affected	Consequence	Remarks
		Date	From	Date (Time)	Type	Scale (m ³)			
MW 10/1	Shui Chuen Au Street, Tsok Pok Hang, Shatin	29/9	AFD	August	Soil cut slope	Minor (40)	Country park		
MW 10/2	No. 7, Ka Nam Village, North Lamma Island	4/10	DO/IS	June	Soil cut slope	Minor (10)			
MW 10/3	Yi Pei Chun, Lo Wai, Tsuen Wan	19/10	DO/TW	19/10 (am)	Retaining wall	Minor (2)	Squatter hut Open space Footpath	1 hut temporarily evacuated	
MW 10/4	No. 104, Shatin Wai Village, Shatin	5/10	DO/ST	Unknown	Soil cut slope	Minor (<0.1)	Building access		
MW 12/1	Fuk Hang Tsuen, Lam Tei, Tuen Mun	8/12	Public	8/12	Subsidence	Minor (1)	Footpath		
MW 12/2	Hut no. 29, Yung Shue Long New Village, Lamma Island (14NE-A/C12)	9/12	Police	8/12	Soil cut slope	Minor (5)	Squatter		
MW 12/3	Adjacent Shek Kip Mei Polyclinic, Shek Kip Mei	4/11	HyD/K	Unknown	Soil cut slope	Minor (0.5-1)	Park		
MW 12/4	Works Area 23, Lantau Fixed Crossing, Ma Wan	10/12	Public	10/8	Soil cut slope	Minor (20)	Construction site		

APPENDIX C

DAILY RAINFALL AT THE ROYAL OBSERVATORY IN 1994

APPENDIX C

LIST OF TABLES

Table No.		Page No.
C1	Summary of Daily Rainfall at the Royal Observatory in 1994	160

Table C1 - Summary of Daily Rainfall at the Royal Observatory in 1994

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	Trace	0.0	0.0	1.1	0.0	1.9	Trace	0.0	0.0	0.0
2	0.0	Trace	0.0	0.0	Trace	Trace	0.0	1.2	0.0	0.0	0.0	Trace
3	0.0	0.0	Trace	0.0	86.8	0.7	14.6	11.8	12.6	0.0	0.0	0.1
4	0.0	Trace	Trace	0.0	19.4	1.0	28.9	12.0	14.5	0.0	0.0	0.7
5	0.0	0.2	0.1	0.0	0.0	0.0	50.5	44.2	27.8	Trace	0.0	0.0
6	0.0	0.0	0.0	0.0	Trace	Trace	10.6	33.1	9.3	0.9	0.0	Trace
7	0.0	Trace	Trace	0.0	0.0	10.3	18.8	20.6	1.6	0.0	0.0	0.1
8	0.0	Trace	Trace	0.0	0.0	33.4	39.6	5.1	4.4	0.2	0.0	58.9
9	0.0	0.0	Trace	0.4	0.3	Trace	Trace	27.9	Trace	0.0	0.0	0.3
10	0.0	0.2	0.4	1.9	Trace	42.5	0.0	48.3	79.1	0.0	0.0	0.0
11	0.0	10.7	Trace	Trace	15.5	1.8	21.5	Trace	14.1	0.0	0.0	0.0
12	0.0	3.2	Trace	0.7	0.3	Trace	75.9	1.3	32.1	0.0	0.0	7.2
13	0.0	Trace	Trace	0.6	Trace	0.3	28.1	11.6	0.5	Trace	0.0	3.6
14	Trace	Trace	0.2	Trace	0.0	0.6	46.1	5.1	3.2	0.0	0.0	0.0
15	Trace	0.1	0.2	0.0	1.6	Trace	42.0	50.9	Trace	Trace	0.0	0.2
16	Trace	3.1	Trace	0.0	0.0	0.2	8.8	125.2	0.0	Trace	0.0	0.8
17	0.0	0.9	Trace	Trace	0.2	0.2	1.8	26.4	1.0	0.0	0.0	0.0
18	Trace	7.9	1.9	Trace	0.0	48.9	4.0	0.0	8.9	Trace	0.0	0.1
19	0.0	23.1	18.5	0.0	0.0	89.8	0.0	Trace	0.0	1.1	0.0	0.0
20	0.0	0.0	0.0	0.0	Trace	13.0	12.9	23.6	3.6	0.0	Trace	0.0
21	0.0	Trace	Trace	Trace	0.0	13.0	32.5	1.3	12.2	0.0	0.0	0.0
22	0.0	0.1	2.3	0.0	0.0	3.3	297.0	0.0	0.0	0.0	Trace	0.0
23	0.0	0.3	0.0	0.0	0.0	5.4	195.1	Trace	58.4	0.0	0.2	0.0
24	0.0	0.7	0.0	Trace	0.0	4.5	119.1	Trace	0.6	0.0	Trace	23.9
25	0.0	Trace	Trace	Trace	0.0	16.5	53.3	0.0	0.9	0.0	0.0	24.7
26	0.0	0.0	0.0	0.0	0.0	1.2	8.6	41.8	0.0	0.0	0.0	2.0
27	0.0	Trace	0.0	Trace	1.4	Trace	3.7	73.4	4.7	0.0	0.0	Trace
28	0.0	Trace	Trace	0.0	5.4	0.0	25.6	18.7	9.4	0.0	0.0	0.0
29	0.0	--	Trace	2.4	Trace	2.2	3.2	12.2	0.0	0.0	Trace	0.0
30	Trace	--	0.0	0.0	26.2	0.3	3.8	0.0	0.0	0.0	0.0	0.0
31	0.0	--	2.9	--	26.6	--	1.2	0.0	--	0.0	--	Trace
TOTAL	0.0	50.5	26.5	6.0	183.7	290.2	1147.2	597.6	298.9	2.2	0.2	122.6
Note : Annual Rainfall of 1994 is 2725.6 mm.												

LIST OF DRAWINGS

Drawing
No.

GCSP 8/15	Location Map of Landslides and Related Incidents in 1994
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