GN-14/2016

Implementation Guidelines on Mitigating the Risk of Gas Explosion in Telecommunications Manholes

Office of the Communications Authority

29 July 2016

FOREWORD

A number of gas explosion incidents occurred in utility manholes (including telecommunications manholes) in the past. Some of these incidents resulted in injuries and property damages. The Communications Authority ("CA") considers that there is a genuine need for the fixed network operators ("FNOs") to implement systematic and comprehensive mitigation measures to ensure safety of telecommunications manholes.

Licence Conditions

2. FNOs are licensed under their respective Unified Carrier Licences ("UCLs") or Fixed Carried Licences ("FCLs"), as the case may be, to provide fixed telecommunications services. They may install telecommunications cables, ducts and other telecommunications facilities such as manholes and joint boxes (hereinafter collectively referred to as "manholes") in unleased Government land including public streets to, inter alia, build their telecommunications networks and systems for the provision of telecommunications facilities in unleased Government land, the FNOs have to comply with, among others, the relevant conditions set out in their UCLs or FCLs.

3. Under General Condition 14 of their UCLs or FCLs, FNOs are required to ensure that proper and adequate safety measures are in

place to safeguard life and property in connection with all their networks and associated installations, and they shall comply with the safety requirements which may be prescribed from time to time by the CA and any directions of the CA in relation to the safety matter. Moreover, all utility companies have a common law duty of care to both their employees and the general public. Under Special Condition 25 of their UCLs, FNOs shall comply with any guidelines or codes of practice which may be issued by the CA from time to time for the purpose of providing practical guidance to them in respect of the use of Government facilities as well as facilities on Government property and unleased Government land for the provision of services under their licences.

Preparation and Update of the Guidelines¹

4. In September 2009. the former Office of the Telecommunications Authority (now the Office of the Communications Authority, hereinafter collectively referred to as "OFCA") set up a forum with FNOs, relevant government departments and utility undertakers² ("Joint Forum") with a view to identifying and agreeing on the additional mitigation measures and developing a work plan for implementing these mitigation measures to reduce gas explosions in telecommunications manholes. A number of such measures were reviewed by the Joint General consensus was reached on the additional mitigation Forum. measures to be undertaken by the telecommunications industry

¹ The Guidelines were first issued on 30 June 2010 and subsequently revised on 28 May 2013 and 29 July 2016.

² Companies and government departments participating in the Joint Forum are at <u>Annex 1</u>.

systematically. OFCA also appointed a consultant (the "Consultant") in March 2010 to study the following issues –

- (a) Design of vented covers for telecommunications manholes;
- (b) Procedures for field inspections to detect the existence of any flammable gas in telecommunications manholes; and
- (c) Type of gas detectors to be used for the inspections.

5. This document has been developed and updated in consultation with the Joint Forum and the FNOs concerned respectively, taking into account the recommendations of the Consultant. FNOs with manholes installed in unleased Government land including public streets should observe the requirements set out in Part 1 (Manhole Inspections) and Part 2 (Implementation of Mitigation Measures) of this document.

6. Parties concerned will gain experience with the implementation of the mitigation measures in accordance with this document. In tandem, there will certainly be further market and technological developments. This document will be updated as and when necessary to ensure the effectiveness of the mitigation measures undertaken by FNOs through further discussion with the industry.

Enquiry

7. For any enquiry or further information regarding this document or the related issues, please contact –

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PART 1: MANHOLE INSPECTIONS

1.1 Regular inspection of telecommunications manholes will enable early identification of irregularities or accumulation of flammable gases therein and is therefore conducive to reducing the risk of manhole explosion. In this regard, FNOs are required to step up the inspections of their telecommunications manholes. FNOs' staff should be equipped with appropriate gas detectors in order that they may competently carry out the inspections.

Procedure for Gas Detection inside Manholes

1.2 Inspection of the manholes will require opening of the covers. Taking into account the large number of manhole telecommunications manholes in unleased Government land including public streets and possible impact on the pedestrian flow with all manhole covers being opened for inspection, FNOs will conduct sample checks on their manholes to identify the possible accumulation of any flammable gas inside the manholes. Details of the sampling checks including the locations to be checked and the sampling rates are set out in paragraphs 1.9 and 1.10 below. Inspection should be carried out by trained and experienced staff to ensure that they are conducted in a safe manner. FNOs are recommended to follow the inspection procedure as specified below when opening manhole covers –

(a) Ensure that there is no naked lighting or smoking in the vicinity

of the manhole;

- (b) For manhole covers with vent holes, check if the vent holes are blocked. If they are blocked, clear the vent holes carefully to avoid generating sparks. For manhole covers without vent holes, follow Step (d);
- (c) Carry out gas test with the gas detector held close to the manhole cover and record the reading of any flammable gas. If the reading is equal to or greater than the Lower Explosive Limit ("LEL")³, report the finding immediately to the emergency service hotline (999) and the Hong Kong and China Gas Company Limited ("Towngas") emergency hotline (28806999). If the reading is lower than LEL, go to Step (d);
- (d) Pour water around the edges of the manhole cover⁴;
- (e) Open cover partially and conduct gas test by inserting the probe of the gas detector into the manhole, and record any flammable gas reading. If the reading is zero, close the manhole cover or continue to carry out works inside the manhole. If the reading is equal to or greater than the LEL, report the finding immediately to the emergency service hotline (999) and Towngas emergency hotline (2880 6999). If the reading is above zero but lower than the LEL, go to Step (f);
- (f) Ventilate the manhole for at least 5 minutes and conduct gas test again;

³ It is understood that some FNOs may call the emergency service hotline and Towngas emergency hotline when the reading exceeding a certain percentage of the LEL or a certain amount of specific flammable gas is recorded. FNOs may continue their existing practices out of safety consideration.

Adopted by at least one public utility company in Hong Kong, this measure is to avoid generating sparks in opening the manhole cover.

- (g) Record the flammable gas reading. If the reading is zero, close the manhole cover or continue to carry out works inside the manhole. If the reading is greater than zero, report the finding immediately to the emergency service hotline (999) and Towngas emergency hotline (2880 6999); and
- (h) Complete the "Telecommunications Manhole Inspection Log" for recording purpose (and for future investigation if required). A sample form of the inspection log is at <u>Annex 2</u>. FNOs may use log sheet with a different format provided that it contains all the information specified in the sample form. To align the level of details of the information recorded by different FNOs, OFCA may require FNOs to revise the format of their records if there is such a need to do so.

1.3 In the case of a manhole with a depth of 2m or more, or the manhole chamber is separated from the cover by an access shaft, gas test should be conducted in both the upper and the lower parts of the manhole before proceeding with any work.

1.4 A flowchart illustrating the inspection procedure is at <u>Annex</u> <u>3</u> for easy reference. The Chinese version of the inspection procedure is at <u>Annex 4</u>. With experience gained from implementation, the inspection procedure may be reviewed and fine-tuned subject to further discussion with the industry.

1.5 FNOs should maintain a summary record of inspections

completed as specified at <u>Annex 5</u>. They should provide a soft copy of the record for review upon request by OFCA or the Fire Services Department.

Report on Detection of Flammable Gases or other Anomalies

1.6 As mentioned in paragraph 1.2(e) and (g) above, the FNOs concerned should report the findings to the emergency service hotline (999) and Towngas emergency hotline (2880 6999) if flammable gas is detected during their inspections. Moreover, the FNOs concerned should report to the emergency service hotline and/or other relevant government departments in case of other anomalies found e.g. smoke or traces of burnt materials. For each of such cases, the FNO concerned should submit a report to OFCA, as soon as practicable, providing but not limited to the following information on the incident –

- (a) brief description of the incident;
- (b) date and time of occurrence;
- (c) location(s) and size(s) of the manhole(s) involved;
- (d) type(s) of mitigation measure(s) implemented for the manhole(s), if any;
- (e) cause of the incident, wherever identifiable; and
- (f) remedial/preventive actions taken/will be taken by the FNO.

Upon receipt of the said report, OFCA will circulate the relevant information to the other FNOs which may, as necessary, conduct inspections of their telecommunications facilities (if any) in the vicinity of the incident to check whether the facilities are affected. They should report to OFCA in the event that anomalies are found during their inspections.

Use of Gas Detectors

1.7 The gas detectors which meet the following functional requirements should be used to detect any flammable gases during inspections –

- (a) Fast response time (not greater than 20 seconds);
- (b) Measuring range -0 to 100% LEL;
- (c) Long running time batteries not less than 12 hours charge;
- (d) Audio and visual alarm;
- (e) Lightweight (not greater than 0.5kg);
- (f) Compact able to fit in pocket or clip to clothing/ harness;
- (g) Weatherproof suitable for use in humid conditions up to95% relative humidity;
- (h) Spark-proof;
- (i) Robust, able to withstand manual handling in a busy pedestrian environment; and
- (j) Automatic data logging and facility enabling download to a personal computer via universal service bus (USB) or by wireless means (an optional item).

1.8 The gas detectors shall be able to detect the following flammable gases which are most commonly found in utility manholes –

- (a) Carbon Monoxide (CO);
- (b) Hydrogen Sulphide (H_2S) ; and
- (c) Methane (CH_4) .

Manhole Inspection Plan

1.9 The Joint Forum has identified a list of public streets (as set out at <u>Annex 6</u>, hereinafter referred to as the "Busy Streets") with high pedestrian traffic where any manhole explosion will likely lead to serious ramifications. According to this risk assessment approach, priorities should be given to the inspections of manholes in the Busy Streets (in particular those manholes which have not been opened for a long time and without any one of the three mitigation measures, i.e. vented manhole covers, duct sealing and concrete surrounding of ducts mentioned in paragraph 2.13 below) implemented. For manholes located in the Busy Streets, FNOs should conduct inspections at a sampling rate of at least 20% of these manholes in every 12 months starting from 1 August 2016.

1.10 The Joint Forum agreed that a lower frequency of inspections and sampling rate could be adopted for manholes located in the unleased Government land other than the Busy Streets (hereinafter referred to as "Other Places"). FNOs should conduct inspections of at least 5% of these manholes in every 24 months from 1 August 2016

onwards. Manholes located inside country parks are not included in the regular inspection programme in view of the remoteness of their locations, and that the consequence of any gas explosion should be relatively less serious.

1.11 FNOs should provide OFCA, on a half yearly basis, with tentative schedules⁵ showing the list of public streets/locations with manholes they plan to inspect in the coming six months. It is also the FNOs' responsibility to arrange and conduct inspections timely with the participation of OFCA (and other Government officers as appropriate) if such requests are raised.

⁵ The inspection schedules are for advance information of the relevant government departments. FNOs may make adjustments as necessary according to their manpower deployment and work arrangements.

PART 2: IMPLEMENTATION OF MITIGATION MEASURES

2.1 According to the Highways Department's consultancy report entitled "Prevention of Gas Explosion in Utility Manhole" ("the Highways Report") issued in April 2008, ventilating manholes is one of the possible measures to mitigate the risk of gas explosion in utility manholes. This approach has been used extensively by North American utility companies which have experienced similar problems of manhole explosion.

2.2 In principle, the more and bigger the openings are in a manhole cover, the more effective they will be in the dispersal of gases. However, one should be mindful of the need to limit the number and size of the holes to avoid such practical nuisances as sticks and high-heeled shoes being caught, or loosening of paving blocks caused by having too many holes on a recessed manhole cover⁶. Given that vented manhole covers and gullies are already in use by other utilities and government departments, the retrofitting of holes in existing telecommunications manhole covers should be cost effective, and should not hinder FNOs' day-to-day operation or give rise to environmental concerns.

2.3 The following two sections provide the designs recommended by the Consultant for the introduction of vent holes on telecommunications manhole covers. They include the new designs and modifications of existing designs for the manhole covers commonly used

⁶ See paragraph 2.3 and footnote 7 for further details.

in Hong Kong, namely -

- (a) Recessed covers⁷;
- (b) Concrete infill covers 8 ; and
- (c) Cast iron covers 9 .

Design of New Manhole Covers

2.4 Figure 1 below illustrates the schematic layout of the design of new type of manhole covers which is applicable to both recessed covers and concrete infill covers. The manhole cover should consist of at least two metal compartments, each of which comprises two holes, i.e. the upper hole for manhole lifting key and the lower hole located at the base tray for ventilation. These two holes provide a passage for lighter-than-air gases to escape to the atmosphere. To minimize possibility of trash falling through, the width of the upper hole should be in the range of 15mm to 20mm. The size of the lower hole should be determined based on the requirement that the hole will remain unblocked even though dust and debris may enter through the upper hole. According to the Consultant's study report, a hole of 30mm in diameter or equivalent area will allow dust and trash to pass directly through to the manhole chamber without blocking the vent hole.

⁷ Recessed covers, sometimes referred to as 'inset covers', are used within paved area to 'mask' the presence of manholes, inspection chambers and access fittings.

⁸ Concrete infill covers are manufactured in galvanised steel and are factory filled with reinforced high strength concrete. These covers are suitable for use in footpaths, car parks, grass verges and areas with slow moving traffic.

⁹ Cast iron covers are usually used in carriageway and other vehicular access areas.



Figure 1: Schematic Layout of Vent Hole in the New Design for Concrete Infill Cover or Recessed Manhole Cover

2.5 Figure 2 below illustrates the schematic layout of the new design for cast iron covers. There should be one hole of 30mm in diameter or equivalent in area provided to each triangular cover in addition to the keyhole. The precise location should be determined taking into account the pattern on the exterior surface and the location of the stiffeners on the underside of the cover.



Figure 2: Schematic Layout of Vent Hole in the New Design for Cast Iron Manhole Cover

2.6 The reference drawings of the new designs of manhole covers are at <u>Annex 7</u>. FNOs should adopt the design for their new vented manhole covers unless they opt for other acceptable measures (i.e. duct sealing or concrete surrounding of ducts) as specified in paragraphs 2.13 to 2.16 below.

2.7 FNOs should deploy over the entire territory of Hong Kong the newly designed covers for all their newly built manholes as well as existing manholes where covers are to be replaced under normal maintenance or upgrading works. For the avoidance of doubt, a large manhole with multiple covers should be fitted with covers that conform to the new design and with an adequate number of vent holes that commensurate with the area of the manhole.

Modification of Existing Manhole Covers

2.8 As a large number of manhole covers are being used throughout the territory, mitigation measures should be applied to the manholes before their existing covers are due for replacement. Although modification of the existing manhole may be less effective in ventilation as compared with the use of newly designed manhole covers, the Consultant recommended this as an expedient approach to avoid extensive replacement of manhole covers, especially for those in the busy streets.

2.9 Owing to limitations in the existing manhole covers, it may not be possible to make available holes of 30mm in diameter or equivalent area as specified in the new type of manhole covers. However, an existing manhole cover should be retro-fitted with smaller vent holes in the range of 15mm to 20mm in diameter or equivalent area. When applying this mitigation measure to a larger manhole, the FNOs should ensure that all the covers of the manhole are provided with an adequate number of vent holes.

2.10 The following options are available for modifying the existing recessed covers and concrete infill covers –

- 16 -

Option (**1A**) is illustrated in Figure 3. It is applicable to recessed covers. The paving blocks on top of the recessed cover may first be removed to allow for holes of 20mm in diameter or equivalent area to be drilled through the base plate and side wall of the keyhole opening. The bottom edge of the blocks would also need to be chamfered through saw cutting or chiselling to provide a clear route for the gases to escape from the manhole.



Figure 3: Modification of Existing Manhole Covers – Option (1A)

Option (**1B**) is illustrated in Figure 4. It is applicable to concrete infill covers. For these covers, it is practically difficult to remove the concrete infill and drill the hole. A hole of 15mm in diameter or equivalent area may therefore be drilled through both the frame and the concrete from the keyhole opening.



Figure 4: Modification of Existing Manhole Covers – Option (1B)

Option (2) is illustrated in Figure 5. It is similar to the newly designed manhole covers and is applicable to both recessed covers and concrete infill covers. If the keyhole compartment is large enough, a hole in the range of 15mm to 20mm in diameter or equivalent area may be drilled directly through the keyhole compartment to the manhole chamber.



Figure 5: Modification of Existing Manhole Covers – Option (2)

Option (3) is illustrated in Figure 6. It is applicable to both recessed covers and concrete infill covers. Separate vent holes may be drilled directly down through the paving blocks or concrete and through the base plate. This option may be deployed where drilling of a hole through the keyhole is found to be impractical. Considering that the holes should be of small diameter and no larger than the keyhole openings so as not to give rise to any hazard to pedestrians, a larger number of holes should be provided to reduce the increased risk of blockage by debris. In general, four such holes of 15mm in diameter or equivalent area should be provided symmetrically around the edges in each manhole cover.



Figure 6: Modification of Existing Manhole Covers – Option (3)

2.11 Cast iron manhole covers are used for manholes located within the carriageway or other vehicular access areas. As the manhole keyholes are typically larger in size and continuous through the whole depth of the cover, this already provides a path for egress of the lighter-than-air gases. As such, additional vent holes for existing cast iron covers are not required.

2.12 The standard reference drawings incorporating the vent holes for retro-fitting existing covers mentioned above are at <u>Annex 8</u>. For

easy reference, the table below shows the requirements of the number and size of vent holes in each manhole cover –

Requirements	Design of new type of	Modification of existing
	manhole covers	manhole covers (except for
		cast iron covers)
Number and size of	Two holes of 30 mm in	Two holes of 20 mm in
vent holes in each	diameter or equivalent	diameter or equivalent area;
manhole cover	area	or
		four holes of 15 mm in
		diameter or equivalent area

Alternative Mitigation Measures

2.13 As the causes of most of the previous gas explosion incidents could not be identified, the Joint Forum was of the view that it might not be possible to draw a conclusion about the most effective mitigation measure at this stage. As such, the Joint Forum suggested that some flexibility should be allowed so that FNOs may, according to their own consideration as well as the surrounding and condition of manholes, implement duct sealing or concrete surrounding of ducts as an alternative to the vented manhole covers. Both of these measures are specified in the national standards¹⁰ of the Mainland China.

¹⁰ The Standard GB 50373 – 2006 entitled "Design Code for Communication Conduit and Passage Engineering" and GB 50374 – 2006 entitled "Code of Construction and Acceptance for Communication Conduit Engineering" promulgated on 11 December 2006 and implemented on 1 May 2007 refers.

2.14 Duct sealing is to seal up ducts leading into manholes to prevent flammable gases from entering and accumulating inside manholes. According to the Highways Report, duct sealing is another possible mitigation measure for use in utility manholes. To ensure effectiveness of the sealing, duct plugs or suitable sealing materials¹¹ should be employed for sealing of all ducts leading into the manhole including those occupied with telecommunications cables.

2.15 Concrete surrounding of ducts, on the other hand, is to surround the ducts with concrete to protect the ducts and to prevent flammable gases from entering the manholes. Any FNO adopting this measure should file a complete set of drawings related to such installations for record of OFCA. In addition, the FNOs should place appropriate caution tapes showing the types and owners of the facilities on the concrete surface for easy identification. FNOs may follow the following practice in their implementation –

- (a) The caution tape is laid at 300 mm above the uppermost ducts of duct formation; and
- (b) The following number of caution tape is laid for the whole length of duct according to the formation shown below –
 - 1-way to 18-way ducts: one length of caution tape;
 - 24-way to 48-way ducts: two lengths (in parallel) of caution tape;
 - 64-way to 80-way ducts: three lengths (in parallel) of

¹¹ One of the following materials should be used for the duct sealing: resin pack 7A or compound 16A.

caution tape; and

• 120-way ducts: four lengths (in parallel) of caution tape.

A sample drawing of the caution tape is at <u>Annex 9</u>.

2.16 For the avoidance of doubt, if an FNO does not intend to deploy vented covers in any manhole as required under paragraphs 2.4 to 2.12 above, it should ensure that all the ducts leading to that manhole should have been sealed and/or surrounded with concrete according to the same implementation schedule. The Joint Forum will review the effectiveness of the mitigation measures implemented and where necessary explore other suitable mitigation measures which may be applicable in Hong Kong.

Manhole Size

2.17 According to the Consultant who is also the author of the Highways Report, in calculating the interior volume of a manhole the FNOs may exclude the space occupied by facilities residing inside the manhole. That is, when determining whether mitigation measures should be applied according to the size of a manhole, their assessments may be based on the net interior volume instead of the gross interior volume of the manhole. This suggestion has been adopted by the Joint Forum. For manholes with net interior volumes equal to or greater than 0.5 m^3 , the Joint Forum agreed that mitigation measures would be needed. For manholes located in the Busy Streets, having regard to the risk and consequence of manhole explosion in these locations and having

consulted the FNOs, mitigation measures should also be implemented irrespective of the size of the manholes.

Implementation Schedule for Existing Manholes

2.18 The Joint Forum including the FNOs agreed that priority should be given to the implementation of the mitigation measures for the manholes in the Busy Streets. All FNOs have completed the implementation of at least one of the three mitigation measures (i.e. vented manhole covers, duct sealing and concrete surrounding of ducts) mentioned in paragraph 2.13 above for all their existing manholes with net interior volumes equal to or greater than 0.5 m^3 in the Busy Streets by As for the remaining manholes with net interior June 2012.¹² volumes less than 0.5 m³ in the Busy Streets, all FNOs should also progressively implement at least one of the three mitigation measures as a matter of priority in particular starting with those of the highest pedestrian traffic first. In regard to the implementation schedule for these remaining manholes, FNOs are divided into three groups as follows –

(a) Group 1 FNOs: FNOs which, as of April 2016, had less than 2 000 manholes in the Busy Streets without any of the mitigation measures implemented. These FNOs should complete implementation of at least one of the three mitigation measures for their manholes in the Busy Streets within a period of two years starting from 1 August

¹² Excluding some 12 manholes due to site constraints.

2016;

- (b)Group 2 FNOs: FNOs which, as of April 2016, had 2 000 to 4 000 manholes in the Busy Streets without any of the mitigation measures implemented. These FNOs should complete implementation of at least one of the three mitigation measures for their manholes in the Busy Streets within a period of three years starting from 1 August 2016; and
- (c) Group 3 FNOs: FNOs which, as of April 2016, had more than 4 000 manholes in the Busy Streets without any of the mitigation measures implemented. These FNOs should complete implementation of at least one of the three mitigation measures for their manholes in the Busy Streets within a period of four years starting from 1 August 2016.

Further, the respective group of FNOs should plan the above implementation by phases with the indicative cumulative percentage of manholes completed as given below –

	Indicative Cumulative Percentage of the Remaining Manholes in the Busy Streets with Mitigation Measures Implemented		
Phase (Completion Date)	Group 1 FNOs	Group 2 FNOs	Group 3 FNOs
Phase 1 (on or before 31 January 2017)	25	16	12
Phase 2	50	33	25

	Indicative (Cumulative Perce	ntage of the
	Remaining Ma	anholes in the Bu	sy Streets with
	Mitigation Measures Implemented		
Phase	Group 1 FNOs	Group 2 FNOs	Group 3 FNOs
(Completion Date)			
(on or before 31 July 2017)			
Phase 3	75	50	37
(on or before 31 January 2018)			
Phase 4	100	66	50
(on or before 31 July 2018)			
Phase 5		83	62
(on or before 31 January 2019)			
Phase 6		100	75
(on or before 31 July 2019)			
Phase 7			87
(on or before 31 January 2020)			
Phase 8			100
(on or before 31 July 2020)			

2.19 In order that OFCA may keep track of the implementation progress of the mitigation measures, each FNO is required to submit to OFCA its implementation schedule (a sample is at <u>Annex 10</u>) and provide subsequent updates on a half yearly basis. Without prejudice to the overall implementation schedule, FNOs may adjust their implementation plan and choice of mitigation measures according to the effectiveness of the mitigation measures implemented and findings of any relevant incidents. However, FNOs should update OFCA about such adjustments by submitting the revised schedule two weeks before the actual implementation is put into effect.

2.20 It should be emphasised that the safety of the

telecommunications manholes, irrespective of their sizes, in the Other Places should not be neglected. FNOs are encouraged to implement at least one of the three mitigation measures (i.e. vented manhole covers, duct sealing and concrete surrounding of ducts) mentioned in paragraph 2.13 above for these manholes with a view to further reducing the risk of gas explosion. FNOs are also advised to continue with their existing practices of inserting duct plugs to empty ducts.

2.21 OFCA (and other Government officers as appropriate) may request sample checks on the implementation progress of the mitigation measures by individual FNOs. FNOs shall arrange such checking to be conducted in a timely manner.

29 July 2016 Office of the Communications Authority

Annex 1

Companies and Government Departments

Participating in the Joint Forum

Government Departments

- Office of the Communications Authority
- Highways Department
- Electrical and Mechanical Services Department
- Fire Services Department
- Drainage Services Department

<u>FNOs</u>

- Hong Kong Cable Television Limited
- Hong Kong Broadband Network Limited
- Hutchison Global Communications Limited
- New World Telecommunications Limited
- PCCW-HKT Telephone Limited and Hong Kong Telecommunications (HKT) Limited
- Towngas Telecommunications Fixed Network Limited
- TraxComm Limited
- Wharf T&T Limited

Other Utility Companies

- CLP Power Hong Kong Limited
- The Hong Kong and China Gas Company Limited
- The Hong Kong Electric Company Limited

Annex 2

Telecommunications Manhole Inspection Log

Telecommunications Manhole Inspection Log

電訊沙井檢查記錄

Telecommunications Manhole Inspection Log 電訊沙井檢査記錄				
Basic Information 基本資料				
Date 日期:	District 地區:			
	Street Name 街名:			
Time 時間:	Manhole No. 沙井號碼:			
Name of Fixed Network Operator 固定網絡營辦商名稱:				
Name of Inspection Staff 員工姓名:				
Gas Test Result 氣體測試結果				
1 st Gas Test (Above Manhole Cover, for m	nanhole cover with vent holes only)			
第一次氣體測試(沙井蓋面,只適用加	於有氣孔之沙井蓋)			
Flammable Gas Reading 易燃氣體讀數				
□ 0 □< LEL 低於	於爆炸下限 □≥ LEL 相等或高於爆炸下限			
□ Not Applicable 不適用				
2 nd Gas Test (Inside Manhole)				
第二次氣體測試 (沙井內)				
Flammable Gas Reading 易燃氣體讀數				
□ 0 □ <lel td="" 低於<=""><td>於爆炸下限 □≥ LEL 相等或高於爆炸下限</td></lel>	於爆炸下限 □≥ LEL 相等或高於爆炸下限			
3 rd Gas Test (Inside Manhole, for flamma	ble gas reading < LEL in 2^{nd} gas test)			
第三次氣體測試 (沙井內,適用於第二次氣體測試之易燃氣體讀數低於爆炸下限)				
Flammable Gas Reading 易燃氣體讀數				
□ 0 □ <lel td="" 低於<=""><td>〉爆炸下限 □≥LEL 相等或高於爆炸下限</td></lel>	〉爆炸下限 □≥LEL 相等或高於爆炸下限			
Signature 簽署:				

Annex 3

Flowchart of the Telecommunications Manhole Inspection Procedure

Flowchart of the Telecommunications Manhole

Inspection Procedure



Annex 4

Chinese Version of the Telecommunications Manhole Inspection Procedure

電訊沙井檢查步驟

- (a) 確保沙井附近沒有火種及執行禁煙措施;
- (b) 如沙井蓋有氣孔,檢查氣孔是否受堵塞,並小心清理受堵塞之 氣孔,以免產生火花。如沙井蓋沒有氣孔,執行步驟(d);
- (c) 於沙井蓋面以氣體探測器進行氣體測試,並記錄易燃氣體的讀 數。如測試結果顯示易燃氣體的濃度相等於或超過爆炸下限¹, 當場致電緊急服務熱線(999)及煤氣公司緊急熱線(2880 6999)報
 告測試結果。如測試結果顯示易燃氣體的濃度不高於爆炸下限, 執行步驟(d);
- (d) 於沙井蓋邊緣注水;
- (e) 局部打開沙井蓋以避免產生火花,將氣體探測器探測端放入沙井內進行氣體測試,並記錄易燃氣體的讀數。如易燃氣體的讀 數為零,可放回沙井蓋或安排員工於沙井內進行工作。如測試 結果顯示易燃氣體的濃度相等於或超過爆炸下限,當場致電緊 急服務熱線(999)及煤氣公司緊急熱線(2880 6999)報告測試結果。 如測試結果顯示易燃氣體的濃度不高於爆炸下限,執行步驟 (f);

¹ 據了解,部分固定網絡營辦商會在易燃氣體濃度讀數超過爆炸下限的某個百分比或易燃氣 體含量超過特定數值時,致電緊急服務熱線(999)及煤氣公司緊急熱線(2880 6999)報告事件。 固定網絡營辦商可基於安全考慮繼續按照其現行的做法報告緊急事故。
- (f) 為沙井安排通風至少5分鐘,然後再將氣體探測器探測端放入沙井內進行氣體測試;
- (g) 記錄易燃氣體的讀數,如易燃氣體的讀數為零,可放回沙井蓋 或安排員工於沙井內進行工作。如測試結果顯示易燃氣體的 讀數高於零,當場致電緊急服務熱線(999)及煤氣公司緊急熱線 (2880 6999)報告測試結果;
- (h) 填寫「電訊沙井檢查記錄」。檢查記錄可参照<u>附件 2</u>提供的表 格樣本。固定網絡營辦商亦可採用其本身格式,但檢查記錄必 須包含表格樣本內的資料。如有需要,通訊事務管理局辦公室 或會要求營辦商修改其記錄格式,以劃一不同營辦商所提供的 資料細節。

Summary of Telecommunications Manhole Inspections

Summary of Telecommunications Manhole Inspections 電訊沙井檢查摘要

Date of Inspection 檢查日期	District 地區	Street/Location 街道/位置	Manhole Number 沙井編 號	Located in Busy Street set out in Annex 6? 是否位於 附件 6 的繁 忙街道?	Is It a Newly Built Manhole? 是否新建 沙井?	The Highest Flammable Gas Reading Recorded 最高易燃 氣體濃度	Action Taken and Follow-up Action 已採取措 施及跟進 措施

List of Public Streets of High Pedestrian Traffic

1. Hong Kong Island

Hong Kong Island	Districts	Streets			
	Sai Wan	Belcher's Street			
	Sai Ying Pun	Des Voeux Road West			
		Queen's Road West			
		Wing Lok Street			
		Boham Strand West & East			
	Sheung Wan	Wing Kut Street			
		Morrison Street			
Central & Western		Jervois Street			
		Pedder Street			
		Des Voeux Road Central			
		Queen's Road Central			
	Control	Stanley Street			
	Central	Wellington Street			
		Lan Kwai Fong			
		D'Aguilar Street			
		Chater Road			
		Electric Road			
		Tong Shui Road			
	North Point	King's Road			
		Chun Yeung Street			
		King's Road			
Eastern	Quarry Day	Tong Chong Street			
		Taikoo Shing Road			
	Shau Kei Wan	Shau Kei Wan Road			
		Shau Kei Wan Main Street East			
		Mong Lung Street			
		Kam Wa Street			

Hong Kong Island Districts		Streets		
	Stanlay	Stanley Main Street		
	Stanley	Stanley New Street		
Southorn	Aberdeen	Nam Ning Street		
Southern		Old Main Street, Aberdeen		
		Aberdeen Main Street		
		Tung Sing Road		
		Sai On Street		
		Hennessy Road		
	Wan Chai	Wan Chai Road		
		O'brien Road		
		Tin Lok Lane		
Wan Chai		Marsh Road		
		Bowrington Road		
		Queen's Road East		
		Johnston Road		
		Harbour Road		
		Russell Street		
		Percival Street		
		Yee Wo Street		
		Paterson Street		
		Sugar Street		
		Jardine's Bazaar		
		Jardine's Crescent		
Causeway Bay	Causeway Bay	Lee Garden Road		
		Kai Chiu Road		
		Pak Sha Road		
		Lan Fong Road		
		Great George Street		
		East Point Road		
		Sharp Street East		
		Tang Lung Street		

Hong Kong Island	Districts	Streets
		Causeway Bay Road
		Matheson Street
		Irving Street

2. Kowloon

Kowloon	Districts Streets		
	Kowleen City	Nga Tsin Wai Road	
Vardaar City	Kowiooli City	Prince Edward Road West	
Kowloon City			
	To Kwa Wan	Lok Shan Road	
		Ngau Tau Kok Road	
Kowloon Bay	Kowloon Bay	Jordan Valley North Road	
		Kwun Tong Road	
		Yue Man Square	
		Fu Yan Street	
		Shui Wo Street	
Kwun Tong	Kwun Tong	Mut Wah Street	
		Hoi Yuen Road	
		Chong Yip Street	
		How Ming Street	
		Tung Yau Street	
		Yen Chow Street	
		Kweilin Street	
	Sham Shui Po	Pei Ho Street	
Sham Shui Da		Nam Cheong Street	
		Apliu Street	
		Fuk Wah Street	
		Fuk Wing Street	
		Yu Chau Street	

Kowloon	Districts	Streets		
		Cheung Sha Wan Road		
		Un Chau Street		
	<u> </u>			
		Cheung Sha Wan Road		
Cheung Sha Wan	Cheung Sha Wan	near Lai Chi Kok MTR Station		
		Cheung Sha Wan Road		
		Ching Tak Street		
	Wong Tai Sin	Sheung Fung Street		
		Wan Fung Street		
Wang Tai Sin				
wong 1ai Sin		Tai Shing Street		
	San Po Kong	Tseuk Luk Street		
		Tai Yau Street		
		Shung Ling Street		
		Nathan Road		
	Mongkok	Sai Yeung Choi Street South		
		Tung Choi Street		
		Fa Yuen Street		
		Sai Yee Street		
		Portland Street		
		Shanghai Street		
		Mong Kok Road		
		Argyle Street		
Yau Tsim Mong		Fife Street		
		Nelson Street		
		Shantung Street		
		Soy Street		
		Bute Street		
		Prince Edward Road West		
		Flower Market Road		
	Yau Ma Tei	Dundas Street		
		Temple Street		

Kowloon	Districts	Streets	
		Bowring Street	
		Nathan Road	
		Jordan Road	
		Shanghai Street	
	Taine Cha Tarri	Kimberley Road	
		Granville Road	
		Cameron Road	
		Peking Road	
	Isim Sna Isui	Haiphong Road	
		Nathan Road	
		Canton Road	
		Mody Road	

3. New Territories

New Territories	Districts	Streets		
	Kwai Chung	Hing Ning Road		
V-uoi Taina		Kwai Hing Road		
Kwai Ising		Tai Lin Pai Road		
		Tai Wo Hau Road		
	Fanling	Luen Hing Street		
		Luen Cheong Street		
		Pak Wo Road		
North District		Lung Sum Avenue		
	Sheung Shui	Lung Wan Street		
		San Fat Street		
		San Fung Ave		
		San Hong Street		
	Tseung Kwan O	Tong Tak Street		
Soi Vung				
Sai Kung	Hang Hau	Po Ning Road		
		Pui Shing Road		

New Territories	Districts Streets	
	Sai Kung	Fuk Man Road
		Man Nin Street
		Sai Kung Hoi Pong Street
		Po Tung Road
		-
		Sha Tin Centre Street
Sho Tin	She Tin	Ngan Shing Street
Sha Thi	Sha Thi	Sha Kok Street
		Ngau Pei Sha Street
	Tai Po	Kwong Fuk Road
Tai Da		On Po Road
		Po Heung Street
		On Cheung Road
		Sha Tsui Road
		Yeung Uk Road
		Tai Ho Road
Tsuen Wan	Tsuen Wan	Tsuen Wan Market Street
		Hoi Pa Street
		Chuen Lung Street
		Chung On Street
	I	I
Tuen Mun	Tuen Mun	Tin King Road
	Yuen Long	Yuen Long On Ning Road
		Kau Yuk Road
		Tai Tong Road
Yuen Long		Hop Yick Road
		Yuen Long New Street
		Castle Peak Road - Yuen Long

New Designs of Manhole Covers









































Modification of Existing Manhole Covers







Sample Drawing of Caution Tape


GENERAL SPECIFICATIONS

- TAPE SIZE ---- 200 mm WIDE x 250 m LONG, TO BE MOUNTED ON A HARDBOARD REEL WITH A CENTRE SPINDLE HOLE OF DIAMETER 40 mm.
- FINISH NATURAL
- TOLERANCE ---- A GENERAL TOLERANCE ON ALL DIMENSIONS (EXCEPT MATERIAL) ± 0.5 mm

Annex 10

Implementation Schedule of Mitigation Measures

Implementation Schedule of Mitigation Measures by [Name of the Fixed Network Operator] / 01 February 20yy – 31 July 20yy 01 August 20xx – 31 January 20xx • No. of Manholes of all size: [xxx] • No. of Manholes (net interior volume $\ge 0.5 \text{ m}^3$): [xxx] • No. of Manholes (net interior volume $\ge 0.5 \text{ m}^3$) with measures completed: [XXX] • No. of Manholes (net interior volume $< 0.5 \text{ m}^3$): [xxx] • No. of Manholes (net interior volume $< 0.5 \text{ m}^3$) with measures completed: [XXX] **Mitigation Measures Planned/Adopted** Districts Vented Concrete Streets Duct Covers Sealing Surround \checkmark [District X] [Street A] \checkmark [Street B] [District X] \checkmark \checkmark [District Y] [Street C] \checkmark [District Z] [Street D]

Company Name: _____

Company Chop: _____

Contact Person: _____

Contact Telephone:	
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Date: _____