

緊急應變指南(2016 年版)使用導讀

作者簡介



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提要

- 一、緊急應變指南主要是協助初期應變人員，迅速確認事故所波及物質一般危害，並保護自身與民眾安全。
- 二、美國運輸部於2016年更新緊急應變指南，變更內容包含增加全球調和系統(GHS)分類標示、修訂附表之初期隔離距離及其他相關項目，故研究2016年緊急應變指南修訂內容，並提供讀者運用參考。
- 三、藉由本篇使用導讀，使讀者得知緊急應變指南增修內容，充分瞭解如何使用本指南，並靈活運用於毒化災救援任務。

關鍵字：緊急應變指南、災害救援、危害物質

前言

緊急應變指南(Emergency Response Guidebook, ERG)為加拿大運輸部門(Transport Canada, TC)、美國運輸部(United States Department of Transportation, DOT)、墨西哥運輸通訊部(SCT)及阿根廷緊急化學資訊中心(CIQUIME)共同發展研究而成¹。本指南功能在於「應變初期階段」提供到達事故現場時，危險品存在及(或)辨識確認、最初採取的保護行動和區域安全作業的啟動，以及尋求合格救援人員的支援，但不提供危害物質的物理或化學性質等資訊。²

本指南於美洲地區廣泛使用在消防、環保、應變、業界與相關防救災人員的資訊(四年更新一次)，工研院綠能所緊急應變諮詢中心於1996年版開始編譯中文，每四年亦會修正發行。2016年緊急應變指南已修訂完成，故研究新舊版本之差異，作為各級處理毒化災救援應變時之參考。

緊急應變指南基本架構說明

緊急應變指南為便查閱，內頁設計依功能不同，區分為白色、黃色、藍色、橘色及綠色等，茲分述如下：

一、白色內頁

白色內頁為使用說明及其附件，包含指引目錄、安全防護措施、通報與技術資訊需求、危害物質分類系統、標示牌一覽表、名詞解釋、運輸槽車辨識圖、危害辨識碼、禁水性物質一覽表等，主要讓使用者瞭解緊急應變指南的使用方

1 工業技術研究院綠能所編，《2012 年版緊急應變指南》，初版，(新竹縣：工研院緊急應變諮詢中心，民國 102 年 12 月)，頁 449。

2 同註 1。

式及釐清一些必要的觀念。

二、黃色框頁

為危險物質的索引表，採聯合國編號(UN number)數字順序排列，即以四碼數字的聯合國編號為首，列出緊急應變指引和物質名稱，可由聯合國編號快速辨識適用的處理原則³，如圖1。

圖 1 危害物質索引-黃色框頁

ID No.	Guide No.	Name of Material	ID No.	Guide No.	Name of Material
1037	115	Ethyl chloride	1052	125	Hydrogen fluoride, anhydrous
1038	115	Ethylene, refrigerated liquid (cryogenic liquid)	1053	117	Hydrogen sulfide
1039	115	Ethyl methyl ether	1053	117	Hydrogen sulphide
1039	115	Methyl ethyl ether	1055	115	Isobutylene
1040	119P	Ethylene oxide	1056	121	Krypton
1040	119P	Ethylene oxide with Nitrogen	1056	121	Krypton, compressed
1041	115	Carbon dioxide and Ethylene oxide mixture, with more than 9% but not more than 87% Ethylene oxide	1057	115	Lighter refills (cigarettes) (flammable gas)
			1057	115	Lighters (cigarettes) (flammable gas)

資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.28

三、藍色框頁

為危險物質的索引表，採危險物質英文名稱筆劃順序排列，即以物質英文名稱為首，列出緊急應變指引和聯合國編號，可由物質英文名稱快速辨識適用的處理原則⁴，如圖2。

3 同註 1，頁 450。

4 同註 3。

圖 2 危害物質索引-藍色框頁

Name of Material	Guide No.	ID No.	Name of Material	Guide No.	ID No.
Antimony pentachloride, liquid	157	1730	Arsenic compound, liquid, n.o.s.	152	1556
Antimony pentachloride, solution	157	1731	Arsenic compound, liquid, n.o.s., inorganic	152	1556
Antimony pentafluoride	157	1732	Arsenic compound, solid, n.o.s.	152	1557
Antimony potassium tartrate	151	1551	Arsenic compound, solid, n.o.s., inorganic	152	1557
Antimony powder	170	2871	Arsenic pentoxide	151	1559
Antimony trichloride	157	1733	Arsenic trichloride	157	1560
Antimony trichloride, liquid	157	1733	Arsenic trioxide	151	1561
Antimony trichloride, solid	157	1733			
Aqua regia	157	1798			

資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.99

四、橘色框頁

橘色框頁為緊急應變指南最重要的部份，提供所有安全建議，包括了62種獨立處理原則，並用左右雙頁方式呈現(每個處理原則提供安全建議、保護個人及公眾之緊急應變資訊)，在左頁提供相關的安全資訊，而右頁提供緊急應變指引和火災狀況、溢散、洩漏意外和急救之應變行動資訊。每個指引係依據危險物質之化學與毒理特性相同或類似則予以歸類，並給予統一之處理原則編碼⁵，如圖3。

⁵ 同註3。

圖 3 處理原則-橘色框頁

GUIDE 113	FLAMMABLE SOLIDS - TOXIC (WET/DESENSITIZED EXPLOSIVE)
POTENTIAL HAZARDS	
FIRE OR EXPLOSION	
• Flammable/combustible material. • May be ignited by heat, sparks or flames. • DRIED OUT material may explode if exposed to heat, flame, friction or shock; treat as an explosive (GUIDE 112). • Keep material wet with water or treat as an explosive (GUIDE 112). • Runoff to sewer may create fire or explosion hazard.	
HEALTH	
• Some are toxic and may be fatal if inhaled, swallowed or absorbed through skin. • Contact may cause burns to skin and eyes. • Fire may produce irritating, corrosive and/or toxic gases. • Runoff from fire control or dilution water may cause pollution.	
PUBLIC SAFETY	
• CALL EMERGENCY RESPONSE Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. • Isolate spill or leak area immediately for at least 100 meters (330 feet) in all directions.	

資料來源:Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.164

五、綠色框頁

包含下列三種表格：

- (一)初期隔離與保護行動距離表：以聯合國編號排序，列出吸入性毒性危害 (TIH)物質，包含某些化學試劑及會與水起反應釋出毒氣之物質。提供日間與夜間及大、小洩漏等不同類型之初期隔離距離與保護行動距離建議⁶，如表1。

6 同註 1，頁 451。

表1 初期隔離距離與保護行動距離表

TABLE 1 - INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES								
ID No.	Guide	NAME OF MATERIAL	SMALL SPILLS (From a small package or small leak from a large package)			LARGE SPILLS (From a large package or from many small packages)		
			First ISOLATE in all Directions Meters (Feet)	Then PROTECT persons Downwind during		First ISOLATE in all Directions Meters (Feet)	Then PROTECT persons Downwind during	
				DAY Kilometers (Miles)	NIGHT Kilometers (Miles)		DAY Kilometers (Miles)	NIGHT Kilometers (Miles)
1163	131	1,1-Dimethylhydrazine	30 m (100 ft)	0.2 km (0.1 mi)	0.5 km (0.3 mi)	100 m (300 ft)	1.0 km (0.6 mi)	1.8 km (1.1 mi)
1163	131	Dimethylhydrazine, unsymmetrical						
1182	155	Ethyl chloroformate	30 m (100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	60 m (200 ft)	0.3 km (0.2 mi)	0.5 km (0.3 mi)
1183	139	Ethylchlorosilane (when spilled in water)	30 m (100 ft)	0.1 km (0.1 mi)	0.2 km (0.2 mi)	60 m (200 ft)	0.6 km (0.4 mi)	2.0 km (1.2 mi)
1185	131P	Ethyleneimine, stabilized	30 m (100 ft)	0.2 km (0.1 mi)	0.4 km (0.3 mi)	150 m (500 ft)	0.9 km (0.6 mi)	1.7 km (1.1 mi)
1196	155	Ethyltrichlorosilane (when spilled in water)	30 m (100 ft)	0.2 km (0.1 mi)	0.7 km (0.4 mi)	150 m (500 ft)	1.9 km (1.2 mi)	5.6 km (3.5 mi)
1238	155	Methyl chloroformate	30 m (100 ft)	0.2 km (0.2 mi)	0.6 km (0.4 mi)	150 m (500 ft)	1.1 km (0.7 mi)	2.1 km (1.3 mi)
1239	131	Methyl chloromethyl ether	60 m (200 ft)	0.5 km (0.3 mi)	1.4 km (0.9 mi)	300 m (1000 ft)	3.0 km (1.9 mi)	5.6 km (3.5 mi)

資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016), p.298

(二)危險的禁水性物質一覽表：列出當洩漏至水中會與水反應放出大量吸入性毒性化學物質氣體的物質，及辨識產生之TIH氣體，均以聯合國編號依序列出⁷，如表2。

表2 危險的禁水性物質一覽表

TABLE 2 - WATER-REACTIVE MATERIALS WHICH PRODUCE TOXIC GASES			
Materials Which Produce Large Amounts of Toxic-by-Inhalation (TIH) (PIH in the US) Gas(es) When Spilled In Water			
ID No.	Guide No.	Name of Material	TIH Gas(es) Produced
1716	156	Acetyl bromide	HBr
1717	155	Acetyl chloride	HCl
1724	155	Allylchlorosilane, stabilized	HCl
1725	137	Aluminum bromide, anhydrous	HBr
1726	137	Aluminum chloride, anhydrous	HCl
1728	155	Amylchlorosilane	HCl
1732	157	Antimony pentafluoride	HF
1741	125	Boron trichloride	HCl

資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016), p.348.

⁷ 同註1，頁452。

(三)經常遭遇到的六種吸入性毒性危害物質之初期隔離距離和防護行動距

離表：以物質之英文字母順序排列，列出經常遭遇到的六種吸入性毒性危害物質之初期隔離距離和保護行動距離⁸，如表3。

表3經常遭遇到的六種吸入性毒性危害物質之初期隔離距離和防護行動距離表

TABLE 3- INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES FOR LARGE SPILLS FOR DIFFERENT QUANTITIES OF SIX COMMON TIH (PIH in the US) GASES									
	First ISOLATE in all Directions	Then PROTECT persons Downwind during							
		DAY						NIGHT	
		Low wind (< 6 mph = < 10 km/h)	Moderate wind (6-12 mph = 10 - 20 km/h)	High wind (> 12 mph = > 20 km/h)	Low wind (< 6 mph = < 10 km/h)	Moderate wind (6-12 mph = 10 - 20 km/h)	High wind (> 12 mph = > 20 km/h)	Low wind (< 6 mph = < 10 km/h)	Moderate wind (6-12 mph = 10 - 20 km/h)
	Meters (Feet)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)	km (Miles)
TRANSPORT CONTAINER	UN1040 Ethylene oxide: Large Spills								
Rail tank car	200 (600)	1.6 (1.0)	0.8 (0.5)	0.7 (0.5)	3.3 (2.1)	1.4 (0.9)	0.8 (0.5)		
Highway tank truck or trailer	100 (300)	0.9 (0.6)	0.5 (0.3)	0.4 (0.3)	2.0 (1.3)	0.7 (0.4)	0.4 (0.3)		
Multiple small cylinders or singleton cylinder	30 (100)	0.4 (0.3)	0.2 (0.1)	0.1 (0.1)	0.9 (0.6)	0.3 (0.2)	0.2 (0.1)		
TRANSPORT CONTAINER	UN1050 Hydrogen chloride, anhydrous: Large Spills UN2186 Hydrogen chloride, refrigerated liquid: Large Spills								
Rail tank car	500 (1500)	3.7 (2.3)	2.0 (1.2)	1.7 (1.1)	9.9 (6.2)	3.4 (2.1)	2.3 (1.5)		

資料來源:Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.356

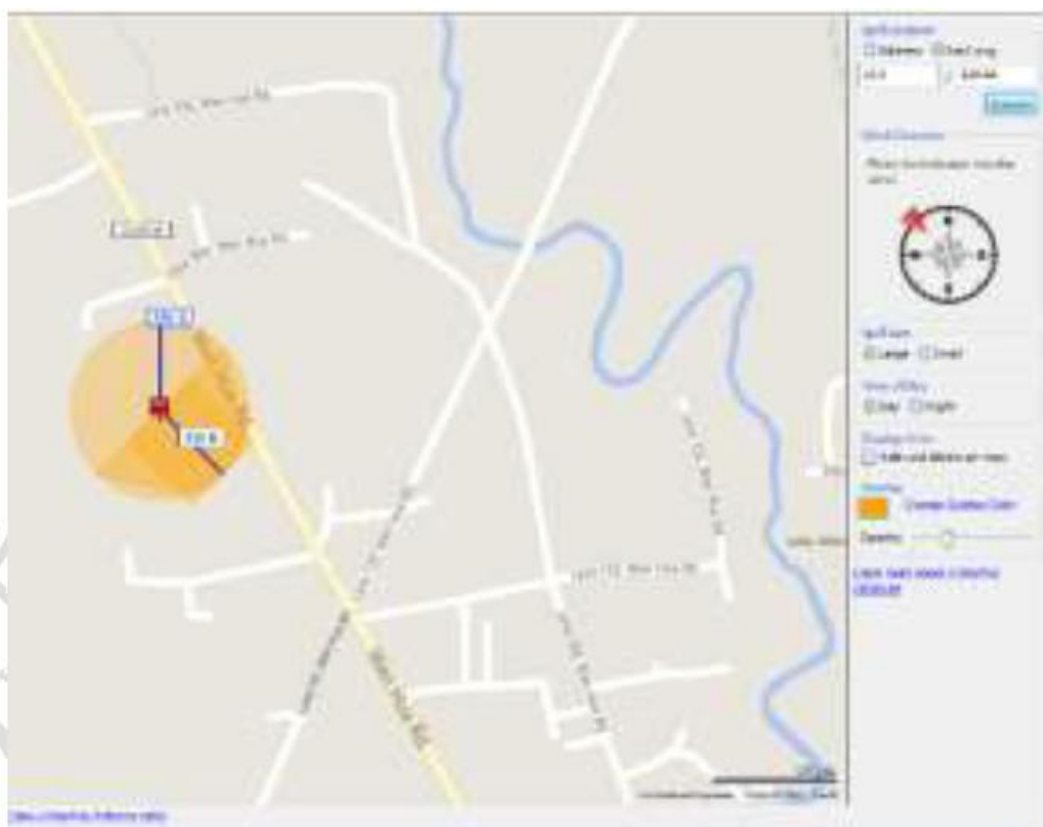
2016 年版緊急應變指南增修概要

2016年度推出新的緊急應變指南版本，有別以往僅就書面或APP 查詢之功能，另新增電腦版可直接下載。亦可結合應變指南相關建議距離與地理圖層，將初期隔離距離或保護行動距離等資訊，清楚於圖層上呈現⁹，如圖3。

⁸ 同註 7。

⁹ 張榮興、吳紘宇，〈2016 年國際危險物品緊急應變交流研討會與會記要〉，《環境事故簡訊電子報》，第 60 期，(新竹市：工業技術研究院，民國 105 年 9 月)。

圖4 保護行動距離疊圖功能



資料來源:張榮興、吳紘宇,〈2016年國際危險物品緊急應變交流研討會與會記要〉
《環境事故簡訊電子報》,第60期,(新竹市:工業技術研究院,民國
105年9月)。

其增訂項目包含使用說明流程圖、全球調和系統(GHS)分類標示及說明等；另修訂標示牌圖示、鐵、公路運輸槽車辨識圖及增修危害物質項目與處理原則部分指引內容，其中新增兩個吸收氣體(adsorbed gases)處理原則之建議資訊。亦依據最新的毒理資訊與反應特性，修訂附表之初期隔離距離、保護行動距離與特定六種物質大量洩漏之保護行動距離資訊¹⁰。修訂內容分述如下：

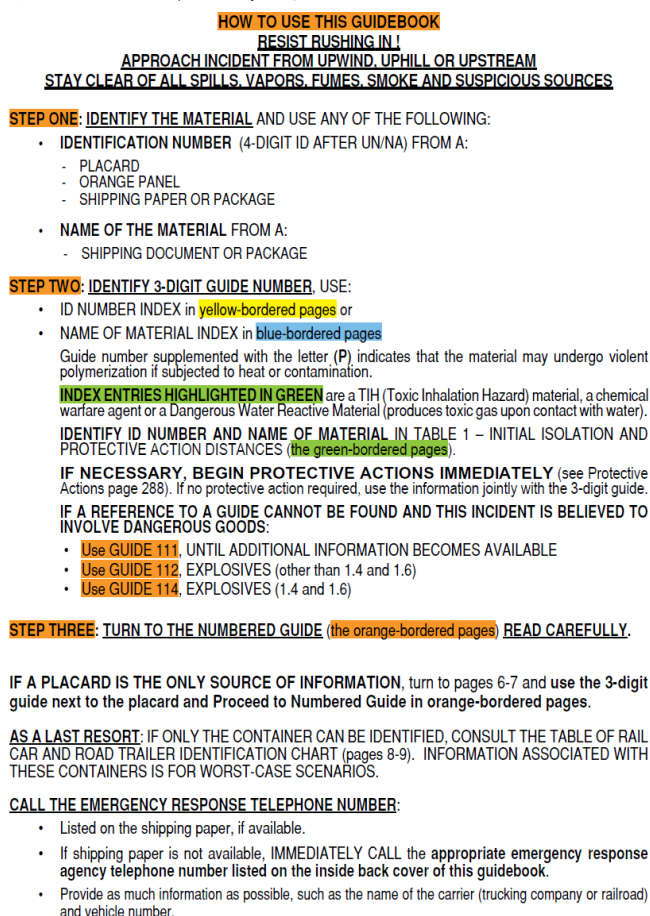
一、增訂使用流程圖

(一)運用流程圖取代第一頁純文字撰述之使用說明，使讀者易於瞭解如何使用本指南¹¹，如圖5、6。

¹⁰ 同註 9。

¹¹ 〈Summary of changes from ERG2012 to ERG2016〉, Transport Canada ,
<http://www.tc.gc.ca/eng/canutec/guide-menu-summarychanges-1147.htm> , 2017/02/20。

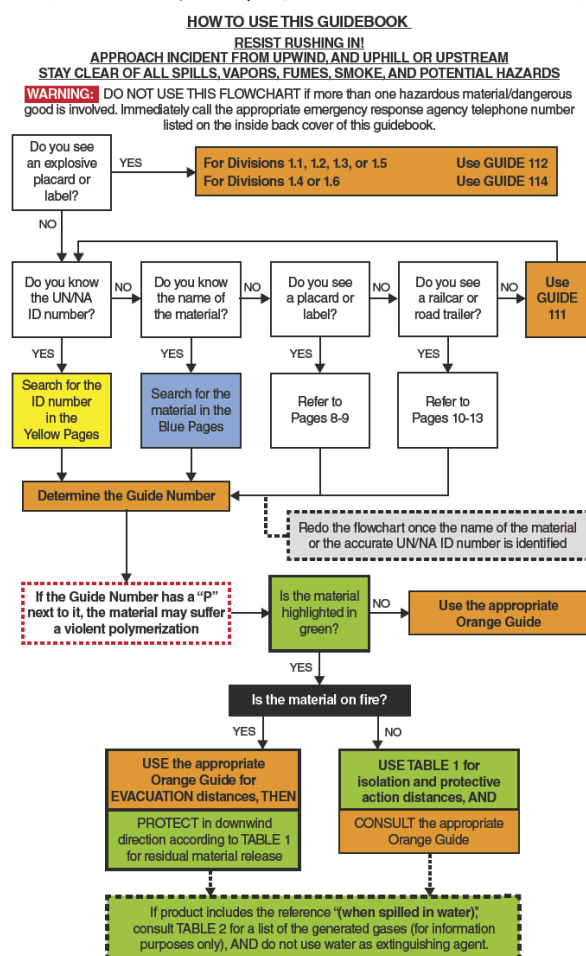
圖5 2012年版緊急應變指南使用說明



資料來源: Michel Cloutier and George Cushmac, 2012 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2012),p.1

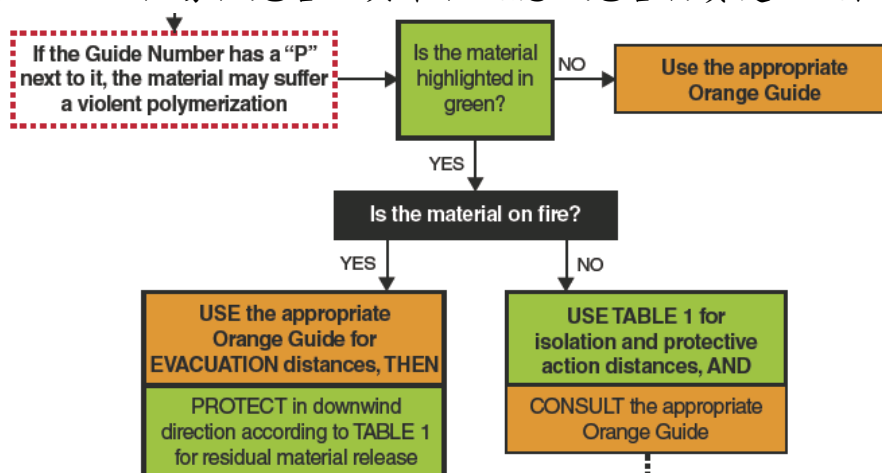
(二)新增吸入性毒性危害且具聚合反應危害物質處理流程圖(如圖7)，藉是否處於火災現場情境，導引查閱橘色框頁或綠色框頁(如表1)所列疏散距離。

圖6 2016年版緊急應變指南使用說明圖



資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.1

圖7 吸入性毒性危害且具聚合反應之危害物質處理流程圖



資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.1

二、新增化學品分類與標示之全球調和制度危害圖示

緊急應變指南當初設計係提供第一線應變人員在運輸事故初期約30分鐘內查詢使用，故只放入九大類危害運輸標示牌。於2016年版本增加化學品分類與標示之全球調和制度(27類)危害圖示¹²，可使閱讀者快速識別危害物質類別或特性，如圖8。

圖8 化學品分類與標示之全球調和制度危害圖示

GHS Pictograms	Physical hazards	GHS Pictograms	Health and Environmental hazards
	Explosive; Self-reactive; Organic peroxide		Skin corrosion; Serious eye damage
	Flammable; Pyrophoric; Self-reactive; Organic peroxide; Self-heating; Emits flammable gases when in contact with water		Acute toxicity (harmful); Skin sensitizer; Irritant (skin and eye); Narcotic effect; Respiratory tract irritant; Hazardous to ozone layer (environment)
	Oxidizer		Respiratory sensitizer; Mutagen; Carcinogen; Reproductive toxicity; Target organ toxicity; Aspiration hazard
	Gas under pressure		Hazardous to aquatic environment
	Corrosive to metals		Acute toxicity (fatal or toxic)

資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials

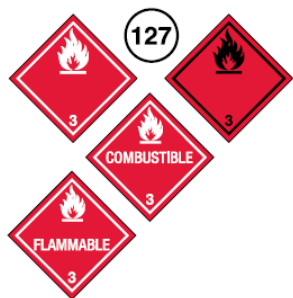
12 同註 11。

Safety Administration, U.S. Department of Transportation, 2016),p.15

三、修訂標示牌一覽表內容

於白色內頁之標示牌一覽表增加部分新的圖形，另將處理原則編號以黑底圓圈、白色號碼方式顯現(原白底、黑圓圈、黑號碼)，如圖9、10。

圖9 2012年版緊急應變指南標示牌 圖10 2016年版緊急應變指南標示牌



資料來源: Michel Cloutier and George Cushmac, 2012 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2012),p.6



資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.8

四、修訂鐵路及公路運輸槽車辨識圖

新增鐵路及公路運輸槽車新式槽體之外觀圖、乘載壓力及適合儲放物質介紹，使應變人員，可以依其外觀判斷儲放物質及槽體壓力¹³，如圖11至14。

13 同註 11。

圖11 2012年版緊急應變指南
鐵路運輸槽車識別圖

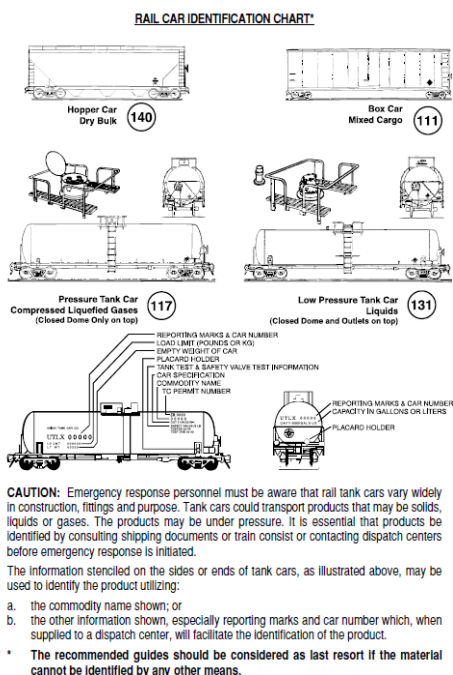
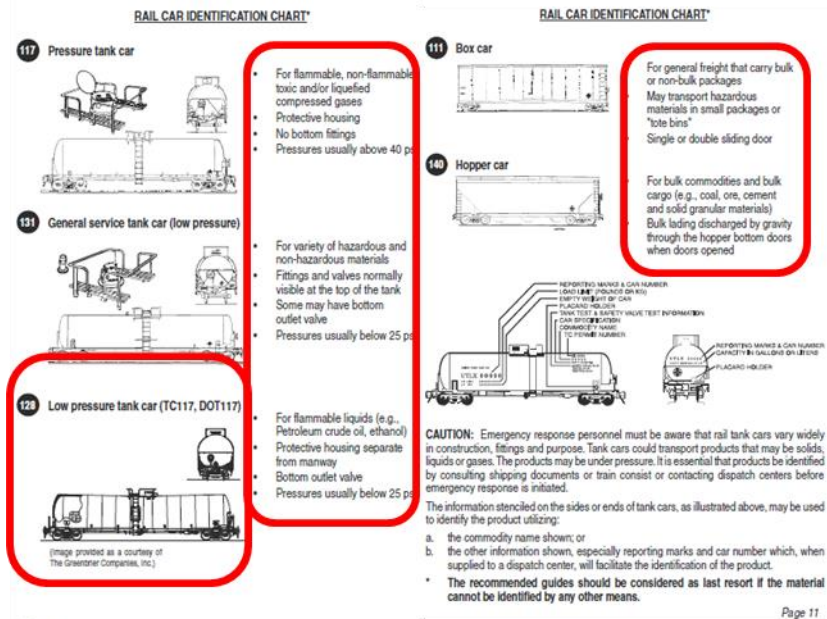


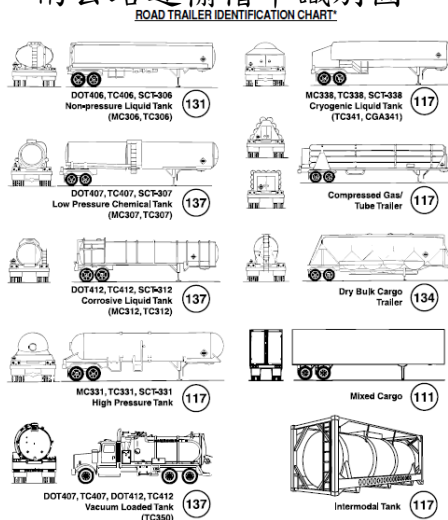
圖12 2016年版緊急應變指南
鐵路運輸槽車識別圖



資料來源: Michel Cloutier and George Cushmac, 2012
Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2012),p.8

資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.10~11

圖13 2012年版緊急應變指南
公路運輸槽車識別圖

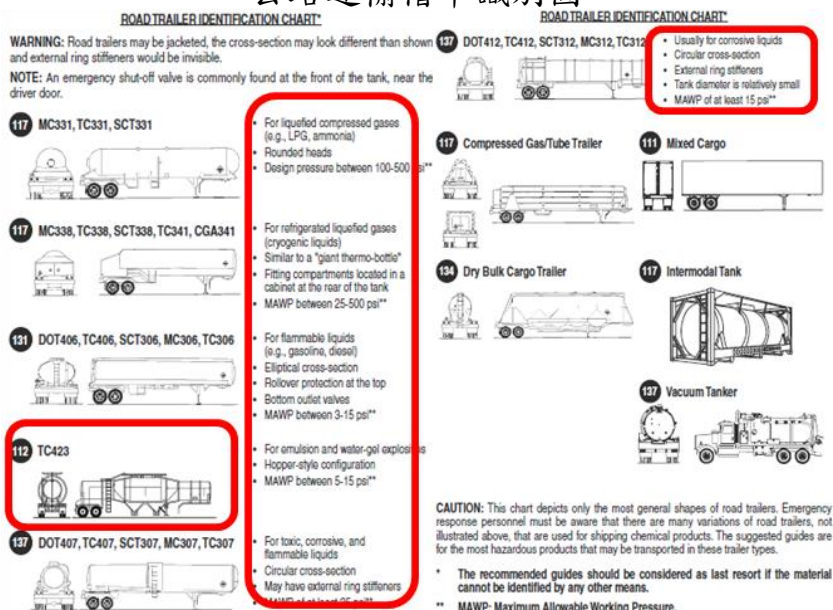


CAUTION: This chart depicts only the most general shapes of road trailers. Emergency response personnel must be aware that there are many variations of road trailers, not illustrated above, that are used for shipping chemical products. The suggested guides are for the most hazardous products that may be transported in these trailer types.

* The recommended guides should be considered as last resort if the material cannot be identified by any other means.

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圖14 2016年版緊急應變指南
公路運輸槽車識別圖



CAUTION: This chart depicts only the most general shapes of road trailers. Emergency response personnel must be aware that there are many variations of road trailers, not illustrated above, that are used for shipping chemical products. The suggested guides are for the most hazardous products that may be transported in these trailer types.

* The recommended guides should be considered as last resort if the material cannot be identified by any other means.

** MAWP: Maximum Allowable Working Pressure.

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資料來源: Michel Cloutier and George Cushmac, 2012 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2012), p.9

資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016), p.12~13

五、增(修)訂危害物質

依據聯合國危險物質運輸建議書第19版次中所列新的危險物質/有害物質，增(修)訂於黃色框頁及藍色框頁內¹⁴。

六、增(修)訂處理原則

除了修訂橘色框頁部分處理原則外，新增兩個吸收氣體(adsorbed gases)處理原則173及174號之建議資訊¹⁵ (2012年版處理原則編號僅編碼至172號)，如圖15。

14 同註 11。

15 同註 11。

圖15 橘色框頁吸收氣體(adsorbed gases)處理原則

GUIDE 173 ADSORBED GASES - TOXIC*	GUIDE 174 ADSORBED GASES - FLAMMABLE OR OXIDIZING
POTENTIAL HAZARDS	POTENTIAL HAZARDS
HEALTH • TOXIC; may be fatal if inhaled or absorbed through skin. • Vapors may be irritating. • Contact with gas may cause burns and injury. • Fire will produce irritating, corrosive and/or toxic gases. • Runoff from fire control may cause pollution.	FIRE OR EXPLOSION • Some gases will be ignited by heat, sparks or flames but NOT readily due to low transportation pressure. • Substance does not burn but will support combustion. • Vapors may travel to source of ignition and flash back. • Cylinders exposed to fire may vent and release flammable gas through pressure relief devices. • Containers may explode when exposed to prolonged direct flame impingement.
FIRE OR EXPLOSION • Some gases may burn or be ignited by heat, sparks or flames but NOT readily due to low transportation pressures. • May form explosive mixtures with air. • Oxidizers may ignite combustibles (wood, paper, oil, clothing, etc.) but NOT readily due to low transportation pressures. • Vapors may travel to source of ignition and flash back. • Some of these materials may react violently with water. • Cylinders exposed to fire may vent and release toxic and flammable gas through pressure relief devices. • Runoff may create fire hazard.	HEALTH • Vapors may cause dizziness or asphyxiation without warning. • Some may be irritating if inhaled at high concentrations. • Contact with gas may cause burns and injury. • Fire may produce irritating and/or toxic gases.
PUBLIC SAFETY	PUBLIC SAFETY
• CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. • As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. • Keep unauthorized personnel away. • Stay upwind, uphill and/or upstream. • Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). • Ventilate closed spaces before entering.	• CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. • As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. • Keep unauthorized personnel away. • Stay upwind, uphill and/or upstream. • Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). • Ventilate closed spaces before entering.

資料來源: Michel Cloutier and George Cushmac, 2016Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.284 、286.

七、修訂初期隔離距離和保護行動距離表

綠色框頁主要說明具有吸入性毒害之危害物質資訊(如氯氣)。在2016年緊急應變指南除了依據新的毒性數據和反應性研究，修正附表之初期隔離距離、保護行動距離與特定六種物質大量洩漏之保護行動距離資訊（表1和表3）外，亦新增「從環境線索估計風速表」，使閱讀者易於觀察環境現象，得知概約風速¹⁶，如圖16。

圖16 環境線索估計風速表
Estimating Wind Speed from Environmental Clues

mph	km/h	Wind Description	Specifications
< 6	< 10	Low wind	Wind felt on face; leaves rustle; ordinary vane moved by wind
6 - 12	10 - 20	Moderate wind	Raises dust, loose paper; small branches are moved
> 12	> 20	High wind	Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty

資料來源: Michel Cloutier and George Cushmac, 2016Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.354

16 同註 11。

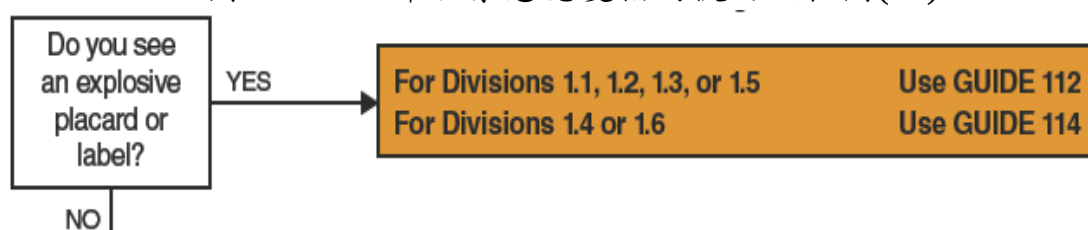
2016 年緊急應變指南使用範例

應變人員在處理化學危害物質意外事故時必須兼顧時效性及安全性，因此人員抵達事故現場救災前，應確切了解其所面對是何種危害物質及應當採取何種方式、途徑去救災，以維自身及周遭人民之安全。故在第一時間獲得正確資訊，提供有效建議對現場應變人員是非常重要的，這些資訊甚至影響至應變任務結束。如何使用2016年版的緊急應變指南？依據新的流程圖可以快速有效的獲得資訊，其使用程序如下：

一、確認危害物質及處理原則編號

- (一)應變人員抵達事故現場，應該先在遠距地方(上風處)盡可能蒐集資料，辨別是否為爆炸物，若確認此為爆炸物，應立即以112或114處理原則處理，如圖17。

圖17 2016年版緊急應變指南使用流程圖(一)

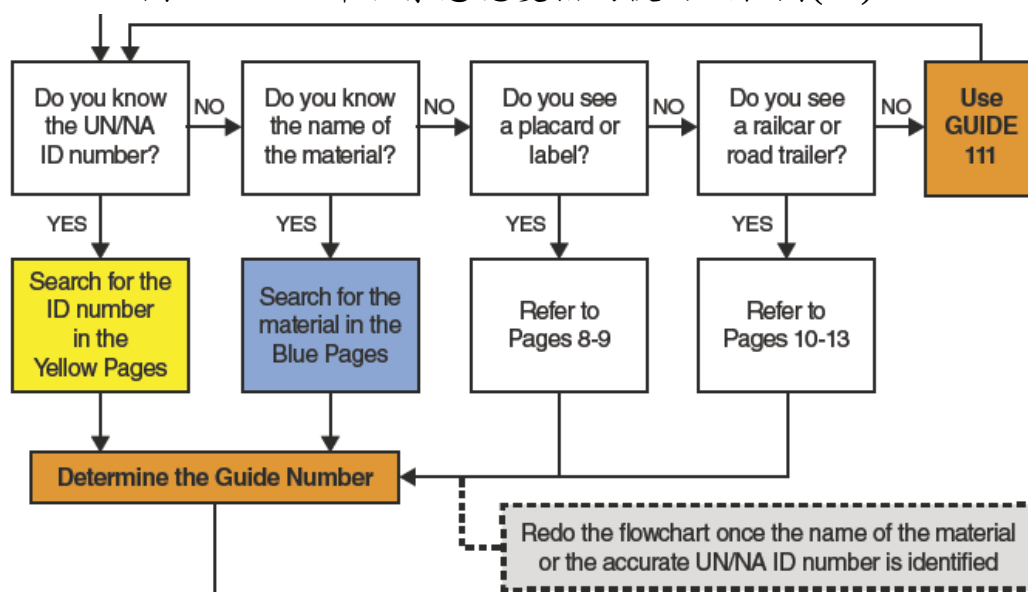


資料來源: Michel Cloutier and George Cushmac, 2016Emergency Response

Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.1

- (二)若由標示牌上得知聯合國編號，翻閱黃色框頁索引找到相關資訊，及處理原則編號，從其原則號碼可以找到相關隔離距離及應變建議，如圖18。
- (三)若由運輸許可證、告示或包裝上得知道物質名稱，則在藍色框頁內找相對應處理原則號碼及其資訊，如圖18。
- (四)如果現場只有標示牌或標誌，翻閱頁次8或9，找到相對應的處理原則號碼，如圖18。
- (五)如果只能大概看到運輸載體或容器(槽體)外觀或大小，翻閱頁次10至13，核對其外觀，以找到對應的處理原則號碼，如圖18。
- (六)若找不出任何參考指引時，確認此物是危險物質時，應立即以處理原則111應變，當獲得新資訊時，須不斷重新檢討所做的決定，如圖18。

圖18 2016年版緊急應變指南使用流程圖(二)



資料來源: Michel Cloutier and George Cushmac, 2016Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.1

(七)部分處理原則號碼旁多一個「P」字母，表示此危害物質在某種條件下會出現爆炸性聚合反應，例如：有添加穩定劑的丙烯酸異丁酯，如圖19。

圖19 黃色框頁危害物質索引-處理原則多一個「P」字母

2501 152	Tris-(1-aziridinyl)phosphine oxide, solution	2526 132	Furfurylamine
2502 132	Valeryl chloride	2527 129P	Isobutyl acrylate, stabilized
2503 137	Zirconium tetrachloride	2528 130	Isobutyl isobutyrate
2504 159	Acetylene tetrabromide	2529 132	Isobutyric acid
		2531 153P	Methacrylic acid, stabilized

資料來源: Michel Cloutier and George Cushmac, 2016Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.57

二、處理原則

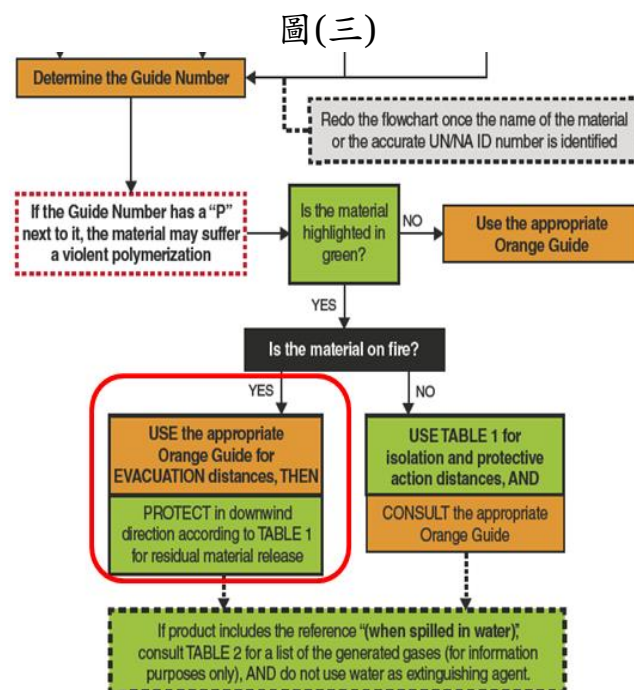
- (一)依處理原則編號，翻閱橘色框頁，得知此類物質之潛在危害(火災或爆炸、健康危害)、公共安全(隔離距離、防護衣、疏散距離)、緊急應變(火災、洩漏或外洩、急救)，以利緊急應變處理行動及搶救。
- (二)若聚合反應危害物質的名字反綠並現場有燃燒情況，請依據橘色框頁內容選擇適當疏散距離，若有殘留之物質持續外洩，則參考表一的下風保護距離，如圖20、21。

圖20 吸入性毒性危害且具聚合反應之危害物質

ID No.	Guide No.	Name of Material
3299	126	Ethylene oxide and Tetrafluoroethane mixture, with not more than 5.6% Ethylene oxide
3299	126	Tetrafluoroethane and Ethylene oxide mixture, with not more than 5.6% Ethylene oxide
3300	119P	Carbon dioxide and Ethylene oxide mixture, with more than 87% Ethylene oxide
3300	119P	Ethylene oxide and Carbon dioxide mixture, with more than 87% Ethylene oxide

資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.78

圖21 2016年版緊急應變指南使用流程

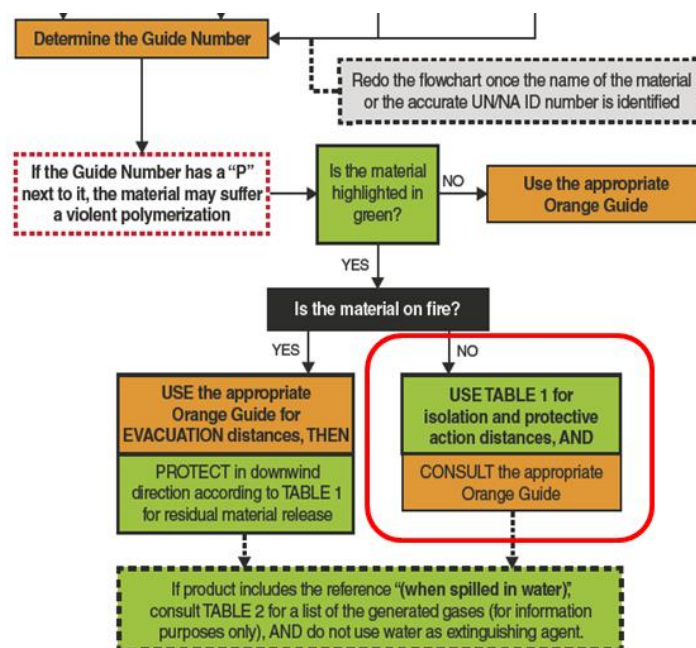


資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.1

(三)若危害物質的名字反綠但現場沒有燃燒情況，請使用表一的隔離及保護距離並參考橘色框頁內容以確定相關應變安全資訊，如圖22。

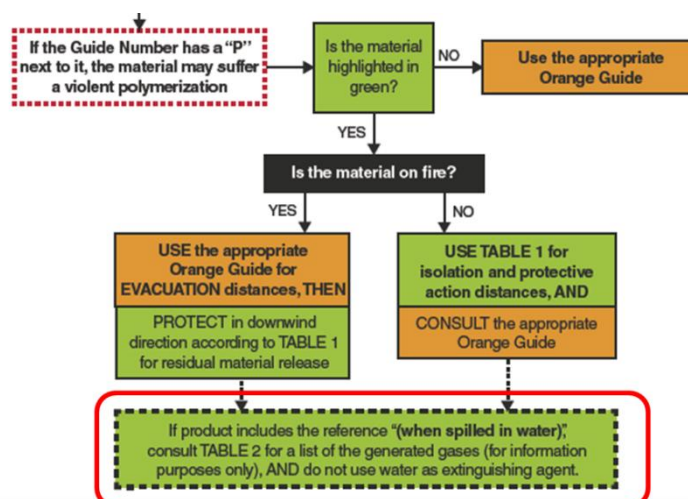
(四)若表一危害物質說明包含「當洩漏至水中」，請參閱表二，查出遇水反應之後可能產出之毒性氣體，同時間並注意不要使用水或泡沫當作滅火劑，如圖23。

圖22 2016年版緊急應變指南使用流程圖(四)



資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.1.

圖23 2016年版緊急應變指南使用流程圖(五)



資料來源: Michel Cloutier and George Cushmac, 2016 Emergency Response Guidebook (United States of America : Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 2016),p.1.

結語

在無法預期事故意外發生的情況下，危害辨識及立即處置在整體應變程序中是相當重要的，因為應變人員於現場作業時，必須立即研判危害物質的種類及其效應，評估對人員與環境之危害，妥採防護措施，以確保作業人員安全並

有利後續搶救作業之遂行。故期透過本文，使大家能了解2016年版緊急應變指南增(修)內容，易於使用此書，進而增進相關應變資料查詢的能力。

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