

出國報告（出國類別：其他-國際研討會）

參加馬國「2013 環境法醫學國際研討會」

服務機關：國立雲林科技大學

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派赴國家：馬國

報告日期：103.01.10

出國期間：102.11.11 ~11.13

## 摘要

於 11 月 11 日至 13 日在馬國吉隆坡參加「2013 環境法醫學國際研討會」會議主題為包括環境污染物鑑定、評估和監測的新方法，快速評估和分析技術，污染控制技術，環境與健康風險評估，環境政策、治理和管理，環境資料開採、分析和建模等議題，此會議著重環境法醫學理論、檢驗執行與查證，也瞭解馬來西亞的主要取納環境法醫的各種方法，並和與會學者專家交流，吸取新知識及技術，並持續我校與 UPM 學術交流，並商談可能之研究計畫或未來學生交流之安排，促進兩校之合作研究及學術交流。

關鍵字: 環境法醫

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## 一、目的

參加馬來西亞「2013 環境法醫學國際研討會」(The International Conference on Environmental Forensics 2013, iENFORCE 2013) 了解環境法醫學發展的國際趨勢及擴大認識國際相關專家學者。且持續維繫本校與馬國博拉特大學 (Universiti Putra Malaysia, UPM) 之交流合作。

## 二、過程

本人於 11 月 11 日至 13 日在馬來西亞吉隆坡參加「2013 環境法醫學國際研討會」(iENFORCE 2013)，拜訪的行程如表 1 及議程表如附錄，此次會議主題為「環境法醫」，該會議主辦單位為馬國博特拉大學 (UPM) 環境學院，其研討會內容包括環境污染物鑑定、評估和監測的新方法，快速評估和分析技術，污染控制技術，環境與健康風險評估、環境政策、治理和管理、環境資料開採、分析和建模等議題，也包括其他相關議題有水管理和整治、危險廢物管理和整治、空氣污染、持久性有機污染物、內分泌干擾物 (EDCs)、環境問題的新興污染物、化學與微生物源追蹤，目的為促進各國於環境法醫學之技術交流。

表 1 行程表

日期	行程
11 月 11 日	去程。台灣(桃園)→馬來西亞
11 月 12 日	馬來西亞 參加「2013 iENFORCE」會議
11 月 13 日	參加「2013 iENFORCE」會議 回程。馬來西亞→台灣(桃園)

於 11 月 11 日晚上抵達馬來西亞吉隆坡 Putrajaya Marriott 旅館，隔(12)日上午參加 2013 iENFORCE 大會開幕式，有國歌、回教祈禱及校長和部長致詞，再來由馬國 UPM 之 ENFORCE 中心介紹此次會議目的是“從來源解決”，因污染物存在導致環境問題，此次會議交流環保技術，促進各國的防治技術水準。

隨後分組會議分三場次，下午時，與 UPM 環境學院 Mohamad Pauzi Zakaria 教授等人進一步學術交流，因該校為第一所馬國教育部核准學校與我國國立雲林科技大學於 2005 年正式簽署學術交流協定由雲科大林聰明校長親赴博大簽署。過去本人歷次至環境研究學院於大學部及研究所演講或參與會議，增進兩校學術交流。此次，再赴 UPM 環境學院希冀進一步討論及未來學生交流之安排，及各項可能之研究計畫，促進兩校之合作研究及學術交流。

主題演講為香港中文大學黃教授發表「Environmental Geochemistry of Persistent Toxic Substances & Emerging Chemicals of Concern」(如圖 1)，首先指出至 2007 年，國際上共有 3 仟多萬種各類有機、無機化合物（尚不包含蛋白質和核苷酸系列），約有 1 仟 4 佰萬種流通於市面所販售，但僅有約 20 幾萬須被列入製造登記或監管。若因為化學品的特殊性質導致難以被自然系統降解而長期曝露於環境當中，造成生物累積、動植物病變、生命危害之風險不容忽視。持久性有毒物質和新興的化學品及香港地區兩間污水處理廠調查發現依靠現有之初級、二級處理技術對於重金屬、持久性有機污染物、新興化學品、抗生素和生長激素的去除效率，發現所排放廢水中仍含有微量的有害物質並無法有效處理，如砷、全氟辛酸、紅黴素等。黃教授曾擔任中央和東北亞由聯合國環境計劃署（UNEP）和全球環境基金（GEF）資助項目“持久性有毒物質區域評估”的區域協調員，黃教授最近加入小組，檢討環境署/全球環境基金的倡議“新興化學品管理問題在發展中國家和轉型經濟體”有一個認識的來源，防止在快速發展的國家化學品對人類健康和環境的不利影響的目的。因此，未來國際發展趨勢應著重於針對此類似物質的環境監測，開發更為有效之污水處理技術，政府也須對於各危險化學品的特殊性訂定相關的管理政策，俾利於促進全球及地區的可持續發展。

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**International Conference on Environmental  
Forensics – KL, Malaysia**  
12-13 Nov 2013

**Environmental Geochemistry of  
Persistent Toxic Substances &  
Emerging Chemicals of Concern**

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黃教授簡報封面圖

當日最後參加分組會議(P2A 場), 聆聽 Maizatun Mustafa 和 Mariani Ariffin 教授報告「在馬來西亞的角度來看環境法醫學和環境法回顧」, 此回顧說明環境法目的是有關環境保護和污染控制, 需要取證調查和分析科學的協助調查什麼是環境及從那裡來的, 並使用該數據來檢測, 阻止或起訴環境犯罪。在馬來西亞和其他地方, 執法人員都為了證明對環境取證的科學學科嚴重, 依賴法律的滿意度, 污染的實例是誰負責。馬來西亞在 1974 年環境質量法案時, 環境責任一般都是環保部門通過執法的職權範圍。這種行為制定, 以幫助實現環保政策, 是平衡的可持續發展的目的經濟和環境需要的客觀的主要法律。這種行為也是關鍵的立法, 已形成了許多起訴的基礎, 它所含的各種規定, 直接或間接地涉及環境取證。目的是探討的行為, 並確定其對環境的取證的法律進程中的應用程序實現環境保護和可持續發展的總體目標為目的的相關性。此研究是非常重要的, 在馬來西亞的研究從法律角度環境取證。因此, 此研究對於政策制定者、執法、司法、科學家和其他利益相關者了解並擴大其在法律的範圍內環境法醫學的知識。

13 日上午進行主題演講由日本學者 Hideshige Takada 報告之「International Pellet Watch : Global monitoring of persistent organic pollutants (POPs) and sewage pollution」,介紹一個以志願者為基礎的全球 POPs 監測網絡 (International Pellet Watch, IPW),蒐集散布於海洋及海岸周遭而造成環境污染之塑膠廢料,分析其累積的 POPs 濃度,推估 POPs 散布於全球的範圍及嚴重程度。自 2005 年推出以來有來自約 50 個國家的 80 個團體或個人參與,內容更引述了此計畫的相關調查成果,令人驚嘆 POPs 對全球的影響現況。

**International Pellet Watch :  
Global monitoring of persistent organic  
pollutants (POPs) and sewage pollution.**

**Hideshige Takada, Yeo Bee Geok, Mahua Saha,  
Junki Hosoda, Yu Saitoh**

Laboratory of Organic Geochemistry (LOG),  
**Tokyo University of Agriculture and Technology**

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**Hideshige Takada 簡報封面圖**

繼續,本人也於分組 3C(議程如附錄)報告「News Media and Network Analysis on Hazard Chemical Incidents in Taiwan」(簡報如附錄),其研究動機始於近年來台灣工商產業及高科技產業蓬勃發展,各種危害性化學物質被廣泛使用以致危害風險程度大幅提升,除了減災應變的實際作為外,透過相關資料的蒐集和分析也可達到事先預防的效果。為了解國內化學品災害事故之背景與演進,首先蒐集國內發生案例並進行事故類型及災害類型分類,以媒體報導統計與網路分析探究國內對化學品管理的重視程度及核心項目,最後搭配問卷調查方式了解全國化學品運作工業看待化學品管理、化學災害預防及緊急應變的重視和執行的情況。研究發現,化學品災害事件自 2008 年 200 件至 2011 年 350 件,有逐年成長之趨勢,其中中部地區因幾大科學園區

之進駐後，近年來化學品使用數量及頻率大幅上升，連帶導致意外事件頻率之增加，又以工廠火災事故與槽車洩漏事故為近年主要發生之事故發生類型；從媒體報導統計來看，報導的件數同樣隨民眾關注程度提昇而增加，但仍與實際發生案例件數有一定落差，民眾關注的趨勢主要為緊急應變 (30%)、環境污染 (22%)、危害預防 (18%) 和其他 (30%)；調查化學品運作廠家業界從業人員，則發現相關業界對環境污染與危害預防議題較受關注，此外對於化學品管理及危害預防、應變處置等教育訓練逐漸重視，但仍較缺乏化學品洩漏因應等實場訓練，故研究指出國內應加強化學品災害預防觀念灌輸與健全相關配套措施，輔導並提高業者之參與意願。



本人簡報封面圖

因學校有其他事務，故於 13 日下午即赴機場搭乘班機返台，並未參加下午之議程。



### 三、心得

本次行程參加馬來西亞吉隆坡「2013 環境法醫學國際研討會」(iENFORCE 2013)，除聆聽大會主題演講外，也與學者們交流環境法醫技術，吸收新的趨勢知識及技術，並與 UPM 環境學院持續交流。

本次心得彙整如下：

1. 此次研討會主題演講，包括黃教授介紹持久性有機污染物及新興化學品所造成環境問題，並不能於一般廢水處理消彌，值得我國注意！Maizatun Mustafa 和 Mariani Ariffin 教授回顧在馬來西亞的環境法醫學和環境法的執行方式及應用。Hideshige Takada 介紹持久性有機污染物和污泥污染造成全球影響，可自海邊收集之塑膠粒檢測，值得關切。
2. 研討會中認識多位專研有環境法醫的教授，且與 UPM 環境學院教授們互動，並我校應與 UPM 持續簽署 MOU，繼續國外之學術合作。
3. 本人發表文章是台灣發生危害化學品事件的新聞媒體及網絡分析，及進行事件類型及災害類型分類，用媒體報導統計與網路分析化學品管理方式，不僅可幫助工廠降低發生災害且可了解災害應變之媒體報導及參與團體的表現。

### 四、建議事項

本次會議會了解環境法醫之新趨勢，對環保技術增加新的經驗及知識有幫助，未來作者將持續參與及追蹤環境法醫學國際研討會(iENFORCE 2015)的發展趨勢，以提昇對環保技術之了解及促進交流。

而我校與 UPM 並持續簽署 MOU 及交流，擴大參與各項可能之研究計畫或未來學生交流之安排，促進兩校之合作研究及學術交流。

## 五、附錄

### 1. 議程表

12 <sup>th</sup> November 2013 (Tuesday)	
08:15 - 09:00	Registration
09:00 - 10:00	Opening Ceremony
10:00 - 10:15	Group Photo
10:15 - 10:20	Coffee Break
10:20 - 11:00	Poster Session 1
11:00 - 11:30	<b>KEYNOTE 1 Prof. Dr. Wong Ming Hung</b> Chairperson: Assoc. Prof. Dr. Ahmad Zaharin Aris
11:30 - 12:30	Parallel Paper Presentations, Session 1A, 1B and 1C Session 1A: Characterization, assessment and monitoring Chairperson: Prof. Dr. Wong Ming Hung Session 1B: New approach, rapid assessment and analytical techniques Chairperson: Dr. Wan Lutfi Wan Johari Session 1C: Treatment technology Chairperson: Assoc. Prof. Dr. Mohammad Firuz Ramli
12:30 - 13:00	Poster Session 2
13:00 - 14:30	Lunch
14:30 - 15:15	<b>KEYNOTE 2 Prof. Datin Paduka Dr. Fatimah Mohamed Arshad</b> Chairperson: Assoc. Prof. Dr. Ramdzani Abdullah
15:15 - 16:15	Parallel Paper Presentations, Session 2A, 2B and 2C Session 2A: Policy, governance and management Chairperson: Assoc. Prof. Dr. Mohd Bakri Ishak Session 2B: Environmental health and risk assessment Chairperson: Assoc. Prof. Dr. Puziah Abdul Latif Session 2C: Environmental monitoring Chairperson: Assoc. Prof. Dr. Wan Nor Azmin Sulaiman
16:15 - 16:30	Coffee Break
16:30 - 17:45	Recent Updates in Environmental Forensics Chairperson: Prof. Dr. Mohamad Pauzi Zakaria

<b>13<sup>th</sup> November 2013 (Wednesday)</b>	
09:00 - 09:45	<b>Talk by Prof. Dr. Hideshige Takada</b> Chairperson: Prof. Dr. Mohamad Pauzi Zakaria
09:45 - 10:00	Coffee Break
10:00 - 10:30	Poster Session 3
10:30 - 12:00	Parallel Paper Presentations, Session 3A, 3B, and 3C Session 3A: Characterization, assessment and monitoring Chairperson: Mdm. Rosta Harun Session 3B: New approach, rapid assessment and analytical techniques Chairperson: Dr. Mohd Yusoff Ishak Session 3C: Environmental monitoring Chairperson: Mdm. Tengku Hanidza Tengku Ismail
12:00 - 13:00	Poster Session 4
13:00 - 14:00	Lunch
14:00 - 14:45	<b>KEYNOTE 3 Dr. Tracy Collier</b> Chairperson: Prof. Dr. Narayanan Kannan
14:45 - 16:00	Parallel Paper Presentations, Session 4A, 4B, and 4C Session 4A: Pollution control technology Chairperson: Dr. Faradiella Mohd Kusin Session 4B: Environment health and risk assessment Chairperson: Dr. Ferdaus Mohamat Yusuff Session 4C: Environmental modelling Chairperson: Assoc. Prof. Dr. Ahmad Makmom Abdullah
16:00 - 16:15	Coffee Break
16:15 - 17:30	Recent Updates in Environmental Forensics Chairperson: Dr. Tracy Collier
17:30	Closing Remarks

13th November 2013 (Wednesday) 10:30 – 12:00 Session 3C (Kuala Lumpur Room) Theme: Environmental monitoring Chairperson: Mdm. Tengku Hanidza Tengku Ismail			
Time	Authors	Title	Code
1030	Ananthy Retnam, Hafizan Juahir, Mohamad Pauzi Zakaria, Ahmad Zaharin Aris and Mohd Fadhil Kasim	Water quality and enrichment of sedimentary polycyclic aromatic hydrocarbons (PAHs) relation to fish culture in Malaysia	P3C-1
1040	Eddie Cheah Kee Wan and Ferdaus Mohamat Yusuff	Contamination of trace elements (Cu, Pb, Cr) in Kong Kong Laut, Johor, Malaysia	P3C-2
1050	Herni Halim and Ramdzani Abdullah	Equivalent Noise Level Response to Number of Vehicles: A Comparison between a High Traffic Flow and Low Traffic Flow Highway in Malaysia	P3C-3
1100	Mande Kato Hosea, Ahmad Makmom Abdullah, Ahmad Zaharin Aris and Ahmad Ainuddin Nuruddin	Soil carbon dioxide efflux and atmospheric impact in a 10 years dipterocarpus recovering lowland tropical forest, Peninsular Malaysia	P3C-4
1110	Hazzeman Haris and Ahmad Zaharin Aris	Mercury distribution in Port Klang mangrove and estuarine sediment	P3C-5
1120	Fatemeh Valizadeh- kakhki, Mohamad Pauzi Zakaria, Ahmad Zaharin Aris, Mehdi Mohamadi and Hassan Tajik	Source discrimination of PAHs in Industrial Soil of the Persian Gulf Coast	P3C-6
1130	Nur Azian Fathiah Adnan and Tengku Hanidza Tengku Ismail	The accumulation of Fe, Pb, Zn, Ni and Cd in <i>Nerita lineata</i> and <i>Thais bitubercularis</i> obtained from Tanjung Harapan and Teluk Kemang, Malaysia	P3C-7

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1140	Mehrzaad Keshavarzifard, Mohamad Pauzi Zakaria, Tan Shau Hwai, Normala Halimoon, Shuhaimi Mustafa, Vahab Vaezzadeh, Najat Masood, Sami M. Magam and Chew Weiyun	Polycyclic Aromatic Hydrocarbons (PAHs) in Sediments from Prai and Malacca Rivers, Peninsular Malaysia	P3C-8
1150	Yi-Ta Hsieh, Chin-Ying Kuo, Jyun-Hong Shen and Jao-Jia Horng	News Media and Network Analysis on Hazard Chemical Incidents in Taiwan	P3C-9

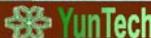
## 2. 簡報：News Media and Network Analysis on Hazard Chemical Incidents in Taiwan

International Conference on Environmental Forensics 2013 (ENFORCE 2013),  
12-13 November 2013, Putrajaya Marriott Hotel, Kuala, Malaysia

**News Media and Network Analysis on Hazard Chemical Incidents in Taiwan**

Yi-Ta Hsieh<sup>1,3</sup>, Chin-Ying Kuo<sup>1</sup>, Jyun-Hong Shen<sup>2</sup>  
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INTRODUCTION (1/3)

### Dangerous Chemicals (DC)

**GHS-Hazard Pictograms and Correlated Hazard Classes**

*If those chemicals leaking or firing*

**Physical Hazards**

- Flammable Liquids
- Oxidizing Liquids
- Compressed Gases
- Explosives
- Corrosive to Metals

**Health Hazards**

- Acute Toxicity
- Irritant
- Carcinogen
- Corrosive to Skin
- Hazardous to Environment

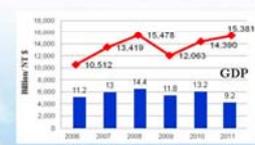
**Env. Hazards**



INTRODUCTION (2/3)

### Threats for the Central Region of Taiwan

- Chemical production capacity and related activities increased rapidly in the central region of Taiwan due to operation of the Yunlin Offshore Industrial Park by Formosa Plastics (FP) and the Central Taiwan Science Park (CTSP)- increasing Threats



As production values increased substantially, the activities of chemical operations and the risk of DC events also increased.

INTRODUCTION (3/3)

### Research Targets

- To study the DC events in News Media
  - How they compare to governmental statistics?
  - What types of DC events were reported?
  - What trend was found for the DC operation and economic development?
- Our study covered the follows.
  - Collected and analyzed the information of DC events from Taiwan Environmental Protection Agency (EPA) and domestic news media from 2008 to 2011.
  - Applied the **network analysis**, and verified with **questionnaire survey** to conclude our findings.

METHODOLOGY (1/2)

### Media Data Processing and Network Analysis

**Level 1**

- 260 News DC events from 2008 to 2011 from China Times News, Economic Daily News, and United Daily News (92, 67, and 101, respectively).

Collection: 260

**Level 2**

- Removing repetition and commercials, those news events were further classified to
  - Six subjects: environment, economics, regulation, prevention, response, community
  - Five stratum: local, county, national, regional, and international

Selection & Classification: 180

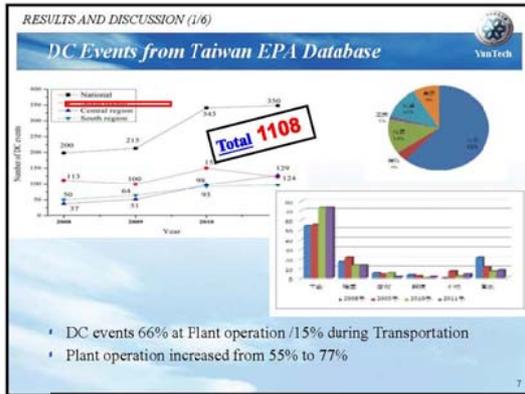
**Level 3**

- Then, the software of Discourse Network Analyzer (DNA 1.17) was used to encode and classify the data. Subsequently, the network diagrams were accomplished by software of UCINET.

METHODOLOGY (2/2)

### Questionnaire Design and Analysis

- The questionnaire surveyed the perceptions from the domestic chemical operation mainly in the central region of Taiwan.
- Questionnaire contents: Basic information, Topics and Subjects. The results would be compared with those of news media.
- SPSS for Windows 12.0 was used for data analysis and hypothesis testing.
- Limitations**
  - We surveyed the operation on chemical industries in central Taiwan rather than the entire domestic regions that news media covered.
  - Due to the concise wordings of questionnaire, some information might not be able to obtain or the questions might not be understood comprehensively and not answer honestly.



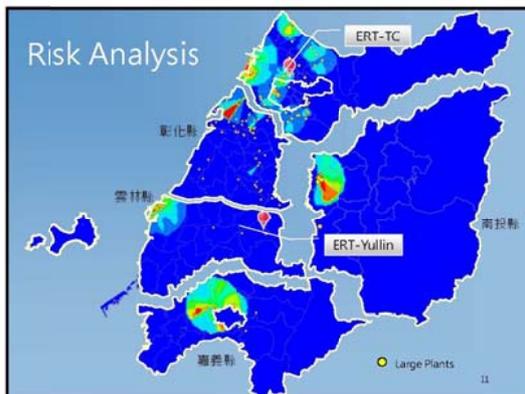
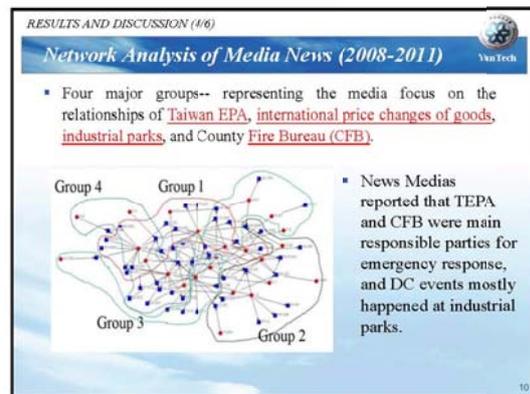
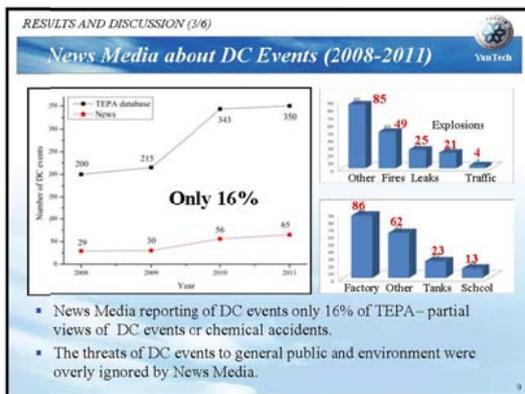
RESULTS AND DISCUSSION (2/6)

### Characterization of DC Events (2008-2011)

From Total 1108 Events

	Fires	Leaks	Traffic Accidents	Explosions	Other
Factory	81	10	0	5	4
Tankers	4	18	71	2	5
School	55	12	2	0	31
Hospital	100	0	0	0	0
Other	38	31	6	3	22
Unknown	6	14	0	0	80

- Fires of DC events were the most common at Hospital/Factory/School
- Leaks of DC events occurred as unknown/others, while Factory/Tankers/School also worth concerned.



RESULTS AND DISCUSSION (5/6)

### Questionnaire Analysis

- The respondents were practitioners of chemical operations. The total number of questionnaires was 886 with recovery ratio 75 % and the **effective recovery rate 68% (603)**.

	Organization				Number of questionnaires		
	Industry	Government	Academic	Other	total	recovery	effective
North	79	2	1	5			
Central	313	23	15	33	886	667	603
South	70	22	20	20			
Total	462	47	36	58			

RESULTS AND DISCUSSION (5/6)

### Concerns on Subjects

0 → ..... Score → ..... 5  
 weak → ..... Concern Intensity → ..... strong

- The issues of **environmental pollution** and **hazard prevention** were the most concerned subjects for respondents, while laws and regulations was of less concern.

RESULTS AND DISCUSSION (7)

### Concerns on Emergency Responses

0 → ..... Score → ..... 5  
 weak → ..... Concern Intensity → ..... strong

- Less concern on Monitoring, Response Capacity/Time

RESULTS AND DISCUSSION (8)

### Concerns on Prevention

0 → ..... Score → ..... 5  
 weak → ..... Concern Intensity → ..... strong

- All issues being concerned

CONCLUSIONS (1/2)

- As economic developing and chemical operation increasing, the threats of DC events to general public and environment would be of concerns. Both TEPA statistics and news media showed the DC events increased from 2008 to 2011.
- However, the news media failed to call on attentions for public to DC events since they only reported 16% of events. But, they did correctly point out the DC events were responded by TEPA and CFB as occurred often at industrial parks.
- The types of DC events in Taiwan (2008-2011) were mostly fires and leaks for the factory/tankers/school/hospital—but different with those locations.

CONCLUSIONS (2/2)

- From questionnaire survey, we found that laws and regulations were less concerned by chemical operations personnel during DC events. The attitudes of practitioners were not following the domestic regulations of disaster prevention as well as mutual aids on regional defense for DC events.
- For responding to DC events, the practitioners ignored the needs for monitoring/capacity and timing. Thus, more training and education will be needed. Those practitioners were concerned evenly on all issues of prevention, such as SOP/management/facility inspection, etc.
- Future studies should be extended to practitioners on specialized operations, such as petrol-chemical and high-tech industry.