

出國報告（出國類別：會議）

出席國際危害性物質緊急應變隊 研討會

服務機關：行政院環境保護署

姓名職稱：張文興簡任技正

派赴國家：美國（巴爾的摩市）

出國期間：104年05月25日至06月03日

報告日期：104年08月18日

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壹、摘要

本次出國行程，主要為瞭解先進國家預防、整備、應變、監測、訓練及復原等運作現況與重要經驗成果，並增進國內相關環境事故應變量能，於 104 年 5 月 28 日至 31 日前往美國馬里蘭州的巴爾的摩市(Baltimore, MD)參與消防首長國際協會(International Association of Fire Chiefs, IAFC)舉辦為期 4 天之國際危害性物質緊急應變隊研討會與器材展。另至馬里蘭州環境局參訪，主要目的在於瞭解該州環境局、災害應變程序等資訊，以做為未來國內環境事故應變業務分工與精進之參考。

消防首長國際協會舉辦之研討會包括法令規定介紹、應變技術、分析技術、應變器材介紹等研討會議分別於 4 天內舉行，相關議題包括：緊急應變計畫及社區知情權法第 2 級報告-非僅是一份報告(EPCRA Tier 2 Report：Not Just Another Piece of Paper)、緊急事故處理八步驟(HM Incident Management：The Eight Step Process)、有害物質應變隊領導人員：誰正在笑?(The Hazmat Team Leader: Who's Laughing Now?)、標語牌背後的化學(Chemistry Behind the Placard)、有害廢棄物處理與應變的街頭智慧(Street Smart Hazmat)、有害物質事故的檢測分析(HazMat Incident Analysis)、有害物質應變的歷史：什麼樣的改變致需要應變(Hazmat History: What Changes did it Make to Response)、重大突發事故應變小組的使命(Major Emergency Response Incident Team)、建立應變計畫及管理應變(Build Your Plan and Manage Your Response; All Incidents Start and End Local)及瞭解有害物質事故發生時的六項感官運用(Understanding your Six Senses of Hazmat)等。

貳、行程概要

日期	地點	行程說明
5/25-5/26	桃園中正機場→美國紐約市甘迺迪機場→馬里蘭州巴爾的摩市	搭機前往美國，05/26 抵達馬里蘭州巴爾的摩市
5/27	馬里蘭州巴爾的摩市	1. 馬里蘭州環境局 (Maryland Department of the Environment) 參訪 2. 辦理研討會報到：領取資料，篩選後續參與之議題
5/28-5/31	馬里蘭州巴爾的摩市	參加 2015 年 IAFC 國際危害性物質緊急應變隊研討會
6/1-6/3	馬里蘭州巴爾的摩市→美國紐約市甘迺迪機場→桃園中正機場	搭機返回國內： 1. 自美國馬里蘭州巴爾的摩市至紐約市 2. 自紐約市甘迺迪機場返回桃園機場

參、行程內容

一、馬里蘭州環境局 (Maryland Department of the Environment) 參訪

本次出國行程特別安排至馬里蘭州環境局(Maryland Department of the Environment)參訪，由環境局田慶宗博士接待，並由該局緊急應變組(Emergency Response Division)人員說明該單位之職掌除負責相關緊急應變任務外，亦提供相關技術諮詢及援助，如環境毒化災事故發生時協助應變及偵檢、採樣等。在參訪行程中瞭解其緊急應變組之業務職掌、環境事故應變分工、災害應變程序等資訊，並進行分享與交流如圖 1。

馬里蘭州環境局緊急應變組成立被賦予的使命為「保護人類的健康及環境」，以環境監督管理機構的角色，引領有害物質事故及輻射緊急事故的應變，並依循國家緊急應變計畫擔任事故現場協調者角色，以及支援地區應變人員處理環境事故。該局應變的量能包括緊急應變方案、輻射事故緊急應變及提供應變技術的諮詢及協助等 3 方面，該局緊急應變組人員組成包括方案經理人、緊急應變組主管以及 6 名有害物質專家，該 6 名專家負責全時的應變工作，根據該局的統計資料顯示近幾年協助應變工作之事故件數平均每年達 500 件以上。該單位目前配有相關緊急應變器材及偵檢儀器，包括：輕型緊急應變車、大型緊急應變車、特種緊急應變車、移槽設備車輛、推土機、除污車（船）、移動式燃燒塔、緊急止漏設備、氯氣鋼瓶止漏器材等，相關環境偵檢儀器包括光離子偵測器、四用氣體偵測器、空氣採樣管、鼓式採樣器、汞蒸氣偵測器、大規模殺傷性武器偵檢設備、可攜式紅外光光譜儀、拉曼光譜儀等。

在參訪中據該局人員說明其緊急應變作業模式，該組根據近期發生之案例類型，檢討及盤點所準備之應變資材，並機動調整整備項目及數量；另緊急應變組也同時緊急應變組掌握州內各相關公私部門的應變資材資訊，以利事故發生時緊急應變調度，此項作法與本署推動聯防組織建立應變資材資訊相似，而公私部門對於該局在資材調度上，基本上都是全力配合。該局對於緊急應變組人力運用上，僱用退休專業人力或以部分工時僱用協助應變，除滿足應變人力需求，並兼具經驗傳承予後進應變人員。在環境事故災後環境復原措施，該局

以考量整體生態衝擊及平衡，不做過當的除污措施，如油污染事件噴灑過量散油劑，將造成環境二度衝擊，影響水體生態。



圖 1 馬里蘭州環境局緊急應變組參訪交流

二、研討會會議

本次消防首長國際協會舉辦之研討會包括法令規定介紹、應變技術、分析技術、應變器材介紹等研討會議分別於 4 天內舉行如圖 2 所示，謹就相關研討會的議題及內容摘要說明如下：

(一) 緊急應變計畫及社區知情權法第 2 級報告-非僅是一份報告(EPCRA Tier 2 Report : Not Just Another Piece of Paper)

本議題內容介紹緊急應變計畫及社區知情權法第 2 級報告之內容，事業單位若有使用或貯存達到規定量之化學物質或極度有害物質，就必須依 EPCRA section 311 及 312 規定於提報物質安全資料表、緊急應變計畫送地方及州政府審核，以及副知地方消防單位。所提報的內容必須包括廠址、設施及貯存資訊、聯絡資訊、物質資訊及員工數等，其中物質資訊必須包括物理與化學特性，設施資訊則包括相關操作條件等。另外必須將相關資訊內容與緊急應變計畫結合，而且事業單位必須提出場址安全方案，包括建立自己的應變組織及如何於災變時協助救災人員現場處理，以快速有效應變及降低危害。另事業單位也應於每年 3 月 1 日前，提交一份更新的化學物質清單。

依據職業安全與健康管理局(Occupational Safety and Health Administration, OSHA)規定，事業單位在貯存或使用有害化學物質的場所必須準備物質安全資料表，必須提報的事業單位包括使用或貯存 40 CFR part 355 Appendix A and Appendix B 的極度有害物質、加油站有使用大於 75,000 gallons 汽油貯槽或 100,000 gallons 柴油貯槽、其他大於 10,000 pounds 的有害化學物質(OSHA Hazard Communication Standard)。

這些有害化學物質清單及資訊必須提供給運作場址鄰近消防單位，而且根據州和聯邦公開記錄的法律，任何人都可以提出請求，要求收到或查看第 2 級報告的內容。另外警察單位、緊急醫療單位及地方緊急應變規劃委員會，將運用第 2 級報告的資訊進行相關事故緊急應變的規劃。

(二)緊急事故處理八步驟(HAZMAT Incident Management: The Eight Step Process)

本議題內容介紹有害物質(Hazardous Material, HAZMAT)事故管理的八大步驟，以達到降低風險、減少災害及確保人員安全之應變目的與環境復原。首先介紹在事件現場的指揮官必須確實執行下列任務，以確保事件在安全、有效的前提下完成災變處理：

1. 識別所有的有害物質以及狀況。
2. 採取適當行動，並確保適當地使用正確的個人防護裝備。
3. 限制在現場的人員，以確保安全。
4. 使用夥伴系統的和備用的緊急醫療服務的能力。
5. 指定一個安全官。
6. 實施適當的去污。

其次介紹有害物質運作團隊的管理者(HAZMAT group supervisor)的人選一般係由有害物質應變隊隊長或管理官員擔任，其任務及責任如下：

1. 此人選必須被訓練具有有害物質應變隊隊長的水準。
2. 必須向現場事件指揮官報告。
3. 管理有害物質團隊的運作，包括應變措施的選擇，以符合有害物質事件行動規劃指引。
4. 建立及監測有害物質災變場址控制區。
5. 主導監測災變場址出現的污染物及濃度。
6. 發展及執行災變場址的安全及控制計畫。
7. 建立災變場址應變目標。
8. 配合事件指揮官調理現場熱區的運作，以確保符合應變目標。

有害物質運作團隊的功能必須提供支援安全維護、提供後備資源、協助除污、場址進入管制、應變資訊及研究、醫療支援及救災資源支援等。在災變現場應變觀念必須建構在結構化與標準化的協議與程序，而在標準化的程序中才能確保應變措施的一致性。

在有害物質事件現場，落實應變處理的八大步驟將能有效妥善處理災害事故，其步驟如下：

1. **Site Management & Control**：管理及確保事故現場的安全性，若能有效控制狀況，便能安全並有效地掌握事故發展。
2. **Identify the Problem**：辨識影響範圍及危害物質的本質，包含裝載容器類型、壓力、破裂口型態或是否具爆炸性等。
3. **Hazard Assessment & Risk Evaluation**：根據事故危害物化學品評估風險等級，建立應變作為計畫，以有效處理事故。
4. **Select Protective Clothing & Equipment**：確保所有的應變人員在應變中穿著適當等級的個人防護裝備（包含皮膚及呼吸的防護）。
5. **Information Management & Resource Coordination**：有效的資訊管理、資訊傳遞及資材調度。
6. **Implement Response Objectives**：確保事故在安全、即時及有效的方法中處理完成。
7. **Decon & Clean-Up Operation**：藉由減少或排除受污染區域的危害物質，保障人員、裝備及其他支援之安全性。
8. **Terminate the Emergency**：當事故結束後，請確認後續督導工作已交由適當的單位。

(三) 有害物質應變隊領導人員：現在是誰在譏笑？(The HAZMAT Team Leader: Who's Laughing Now?)

本議題係由資深消防主管 Rick Lasky 先生演講，開場他幽默說明在多年以前對於公共安全，甚至於軍事安全，都認為對於有害物質事故應變訓練是一件困擾的事，大多數人都認為是一個笑話，而那些被訓練投入有害物質事故應變人員也經常被譏笑。然而時代改變了，經過許多事件之後人們開始瞭解到有害物質事故應變的訓練是多麼的重要，尤其在個人的防護部分，所以說現在是誰在譏笑？

一個進步的領導人員必須瞭解到對於個人或團隊而言，良好的有害物質應變訓練是一件非常重要的事，而且有害物質應變隊的領

導人員應該具有的態度及專業，講者以幽默的言語說明應變人員信仰及擁抱的核心價值包括責任、誠實、榮耀、承諾及廉正。並以「**That failing to prepare is preparing to fail!**」的觀念勉勵在場的學員，對於災害充分整備，將能夠提供災害應變一線曙光。所以，講者建議要有宏觀的思考、整備訓練、正確的態度，鞏固自己的信念、強化訓練、隨時整備，做好危害應變工作。

(四) 標示牌背後的化學(Chemistry Behind the Placard)

本議題內容主要介紹運送化學品時運輸標示牌所代表之意義及化學品的危害特性及其定義，並說明危險品運輸九大類標示，包含第一類爆炸性物質、第二類壓縮氣體、第三類易燃性液體、第四類易燃性固體/自燃物質/禁水性物質、第五類氧化性物質、第六類毒性物質、第七類放射性物質、第八類腐蝕性物質及第九類其他，在課堂中講者並導入「**Know Before You Go!!**」的觀念。

有害物質分類標示牌提供災變應變人員於事故發生時快速識別，並採取正確適當應變措施。標示牌必須正確的標示在運作場所或載具、貯槽的明顯處，標示牌以鑽石菱形呈現，其尺寸約 10.8 英寸×10.8 英寸，一般紅色代表可燃性物質，綠色代表不可燃性物質，黃色代表氧化性物質，藍色代表禁水性物質，白色代表吸入性有害及有毒物質，黑白色代表腐蝕性物質（酸或鹼），紅白色代表易燃性或自燃性物質，白黃色代表放射性物質，橘色代表爆炸性物質，白色帶黑色條紋代表其他有害物質。在菱形下方數字代表有害分類。而菱形商方則以圖形顯示危害特性，如骷髏頭及交叉骨頭代表有劇毒性，火焰代表易燃性等。

(五) 有害廢棄物處理與應變的街頭智慧(Street Smart Hazmat)

本議題內容主要說明根據聯邦法規之有害廢棄物處理與應變(29CFR 1910.120- Hazardous Waste Operation and Emergency Response)規範，包括應變人員的角色、採取的應變作為、應達到的訓練及複訓規定等，分別說明如下：

1. 災變現場狀況判定人員：其主要負責災情判定即通報，當日擊或發現有害物質意外釋放即啟動緊急應變系統，該等

人員必須具有危害辨識及組織能力，必須每年藉由複訓維持基本危害辨識及緊急應變系統運作能力。

2. 災變現場救災人員：其主要負責劃設熱區、暖區及冷區，執行救災防護確保人員安全、設施及環境保護，該等人員必須受過 8 小時的專業訓練，包括危害辨識、風險評估、個人防護設備使用技術、基本除污技術以及熟悉應變標準操作程序。
3. 有害物質處理技術人員：其主要負責阻絕有害物質排放，並進行容器修補作業，該等人員必須受過 24 小時的專業訓練，包括前 2 級人員之訓練，並且需有特殊個人防護設備使用技術、偵檢污染技術、除污技術及事故災後復原技術。
4. 有害物質處理專家：其主要協助有害物質處理技術人員執行應變工作，提供具體處理建議或技術協助，該等人員必須受過 24 小時的專業訓練，包括地區及較高的緊急應變計畫、特殊個人防護設備使用技術、偵檢污染技術、除污技術及事故災後復原技術。
5. 事故現場指揮官：其主負責事故處理之指揮調度，該人員必須受過 24 小時的專業訓練，包括現場救災人員之危害辨識、熟悉應變標準操作程序、瞭解地方、州及區域緊急應變計畫、熟悉事故除污及災後復原程序。

其中特別介紹有害物質複訓課程：HAZMAT FACTS OF LIFE，讓學員充分瞭解所面臨之應變實務，其內容包括：

1. 到處都有有害物質的運作，包括正常及異常 2 種狀況，正常狀況包括英製造、貯存、中止使用、廢棄及運送；異常狀況包括有場址溢漏、溢漏時間、暴露範圍及危害種類。
2. 在緊急事故中總是關注直接或間接結果。
3. 有害物質對於每一個人或事情，都會造成傷害，人員安全是緊急應變最重要的結果，緊急應變人員絕對不能有「我一定做某件事」或「不可能發生在我身上」的態度或觀念。

4. 你所處的位置將直接影響對緊急事件的觀察，如安全、不安全或是危險的。
5. 前 5 分鐘應變作為將影響擬後續的人生。
6. 為了要存活，必須辨識危害，其有 6 項線索必須確認：(1) 有害物質位置；(2) 盛裝容器形狀；(3) 外觀顏色；(4) 標示牌；(5) 運輸文件；(6) 感官知覺。
7. 知訊是應變重要關鍵。

(六) 有害物質事故的檢測分析(HazMat Incident Analysis)

本議題內容探討如何在不明或極端事故中正確地執行檢測與分析事故現場狀況，其分析的程序包括提出檢測資料、轉換為環境資訊及提出檢測分析結論。在資料判讀方面，首先運用所檢測分析的資料勾勒出初步災變事實與現況，如儀器的讀值、現場的標示、目擊者的說明、溫度及風向等，分析程序資料輸入的錯誤可能產生倒金字塔效應，造成垃圾資料。從分析的資料中得到資訊，並做為建立結論的基礎，資訊通常分為基礎及高階資訊，在基礎資訊部分將所分析資料依時間、來源、位置、單位轉換及交叉比對方式，建置表格化資料；高階資訊則運用模式模擬進行預測、資料庫比對及提出關聯性之分析資料。

以傅立葉紅外光譜儀(FTIR)為例說明檢測分析過程中可能因為圖譜資料庫不足或有問題，造成所得到的檢測結果有誤，致衍生錯誤的判斷與資訊提供，而嚴重影響應變作為及安全，也就如黑天鵝(Black Swan)事故。其中也說明造成錯誤分析的因素包括有偏差（人為及儀器）及心理因素，而心理因素易引起因個人喜好造成以說故事方式闡釋所得到的資訊、或選擇式挑選數據解釋情境、或以僅有數據誇大闡釋情境、或過於簡化的線性預測情境等。

(七) 有害物質應變的歷史：什麼樣的改變致需要應變(Hazmat History: What Changes did it Make to Response)

本議題內容回顧介紹曾經發生的有害物質危害事故，也說明在有害物質事件的應變的轉變過程。首先是 1917 年的鐳女孩(Radium Girls)事故，這是發生在一家從事表框印刷螢光漆的工

廠，由於漆料含有鐳的放射性物質，而造成部分女性員工嚴重貧血、骨折及下顎壞死等症狀，開啟職業病訴訟案件，並引起世人對於有害物質的關注。1970 年美國環保署成立，1971 年美國職業安全與衛生管理局成立，1973 年美國運輸部發行緊急應變指南，同時期 1971 年發生在密蘇里州時報海灘的橘劑（落葉劑）廢棄物污染事故，1976 年在紐約州愛渠發生化學廢棄物非法掩埋污染事故，1979 年在肯塔基州布利特郡發生廢棄化學桶污染事故，1984 年在印度波帕爾發生異氰酸甲酯(MIC)外洩事故，而在 1989 年美國制定有害廢棄物處理及緊急應變規範。經過諸多的有害物質事件，人們意識到其危害性及重要性，開始省思與改進相關法令管制與研究，以免除遭受有害物質的危害。

（八）重大突發事故應變小組的使命(Major Emergency Response Incident Team)

本議題內容介紹重大突發事故應變小組是由 Verizon 公司成立於 1993 年，其任務為處理化學、生物、人為、天然等災害或恐怖攻擊之應變。該小組成員來自於各領域菁英份子，經由訓練處理該公司所有資產發生的有害物質事故應變處理。該小組有 32 位全職人員及 2 位顧問。所有成員均須通過 OSHA 1910.120(q) 及 NFPA 472 (64 小時) 的訓練認證，通過認證成員每年必須參加 2 項複訓，包括為期 1 週的再認證訓練及 3 天的實際操作訓練，另必須進行為期 2 個月的基礎影音教材學習，而且每月參加至少 1 次研討會議。另外會中也說明 MAY-DAY 的無線電緊急求救操作程訓練目的、使用時機及領隊的角色與責任。會中也提到訓練隊員如何執行現場疏散之作業程序，以確保人員安全。

（九）建立應變計畫及管理應變(Build Your Plan and Manage Your Response; All Incidents Start and End Local)

本議題內容介紹建立當地的應變計畫及管理應變，從歷史事故中可以發現運用當地的資源才能有效快速處理災變，掌握當地的資源及地理環境與特色才能有效運用及降低損害。另外地方政府也必

須擁有可用且充足的應變設備及資材，當沒有可替代產業和管線運輸公司專業知識與經驗的人才時，就必須要建立夥伴關係，以獲得專業人力的奧援協助應變救災，而地方政府也應該於事先掌握產業和管線運輸公司是如何規劃其應變措施，業者則更需要完全熟悉其本身的應變計畫，以利第一時間應變處理。

(十) 瞭解有害物質事故發生時的六項感官運用(Understanding your Six Senses of Hazmat)

本議題內容介紹當事故發生時，如何運用我們的六項感官，以輔助我們做最正確判斷，其內容包括：

1. 運用邏輯判斷所看到的情境。
2. 聞到的氣味像什麼。
3. 聽到什麼聲音。
4. 觸摸的感覺像什麼。
5. 口中嘗到的味道像什麼。
6. 神秘的第六感-直覺。

會中介紹善用六項感官所給的訊息，不斷練習判斷區別異常情形，講者並導入「我們的“直覺”是以以前的知識和經驗累積，它會下意識地試圖立即解決問題」概念。



圖 2 IAFC 研討會議及資材展覽

肆、心得與建議

本署職司毒性化學物質管理，在有效降低毒性化學物質事故危害風險，除藉由完備法令管制及中央與地方主管機關協力合作落實管理外，尚須持續強化毒性化學物質防救體系，並提升災害防救及應變量能，方能營造健康寧適家園，邁向本署擘劃之「健康永續」施政願景。本次行程心得與建議事項如下：

- 一、參訪馬里蘭州環境局緊急應變組之緊急應變作業，其作業模式可資國內參考運用：(1)根據案例調整應變資材整備項目及數量；(2)掌握州內公私部門相關資材資訊，以利緊急應變調度；(3)僱用退休專業人力或以部分工時僱用協助應變，除滿足應變人力需求，並兼具經驗傳承；(4)災後環境復原措施，考量整體生態衝擊及平衡，不做過當的除污避免造成環境二度衝擊。
- 二、國際上對於危險物品緊急應變，隨著科技進步，在應變技術、設備、體系與全球化應變資訊方面均有顯著進步與提升，國內相關負責災害應變部會，應積極參與，並廣泛蒐集相關應變技術與設備資訊，透過專業研究並內化至各項災害應變模組，加強應變人員訓練，提升應變專業能力。
- 三、從研討會應變資材展覽上，可以瞭解現階段用於環境災害現場所需使用之資材種類，包括環境偵檢、個人防護、圍堵止漏、資訊科技運用以及災後復原等設備。除此之外此次於會場上接觸許多民間訓練單位，反觀國內現況，政府可輔導國內廠商積極投入應變器材開發製造與引進訓練技術，供應適合國內各項災變之應變資材與培訓公私部門專業應變人力。
- 四、由於有害物質之災害應變，涉及災害的通報系統、救災系統與後續的環境復原系統，在美國亦分屬相關單位負責，惟其救災主力仍由消防單位負責，各相關部門依職權提供救災時第一時間協助，災後各依職權辦理後續復原工作，各相關部門係以夥伴關係相互合作及協助，此部分亟待國內各相關部會省思。
- 五、HAZMAT 的訓練，除可讓救災單位檢視瞭解本身資材整備情形，是否可達到救災需求，最重要讓第一線應變人員，有充分救災專業知識及技能，面對高危險救災工作，而應變隊領導人員，更需有精確判斷力，執行引導隊員救災、安全疏散等任務。國內未來應加強此部分訓練，包括政府部門

與民間事業單位。

- 六、 在化學物質災害或恐怖攻擊事故，暴露在未知的危害情境中，救災單位應有充分檢測儀器，可於救災第一時間提供環境資訊供指揮官及應變人員參考，以進一步應變因應。國內各救災部門應加強檢（監）測儀器的充實與訓練，以確保應變救災人員安全。
- 七、 鑑於運用電腦輔助系統協助救災，如導入救災資材系統、維生系統、地理資訊系統、管線系統、運輸系統、醫療系統及污染擴散模擬系統等，整合成災害應變決策系統，提供救災指揮官及應變人員運用，國內應由救災單位，透過跨部門合作建置此系統平台，平時加強演練，以備災時提供迅速有效的救災運用。
- 八、 先進國家於防災應變資訊系統中開始建置多種化學品相互作用危害程度分析之化學品資訊，此功能有助於多種化學品之事故應變，以提供更正確的安全建議。另也有建置以傷者症狀判斷化學品種類之分析功能，以圖像化與問答方式提供現場應變人員簡便的操作模式。國內可引進類似軟體或開發建置，以提供災變時準確的評析及決策。
- 九、 本次研討會中部分議題均強調專業訓練的重要性，並有民間單位協助開發救災應變的模擬訓練軟體，強化應變人員熟悉災害情境。鑑於國情，此訓練部分應由政府建立專業災害應變訓練場所開始推動，並逐步引進訓練實體模組及模擬軟體，強化專業訓練，並導入救災專業證照制度，落實專業化；另外透過法規要求，強化公民營事業單位專業防災人力，以減少災害事故發生。
- 十、 美國緊急應變計畫及社區知情權，規範事業單位權利義務，而我國各業管法令亦有類似規範，惟其差異點在於提報資料內容必須有利於救災應變及審核單位包括消防單位及居民代表等，值得國內各部門就業管災害未來管理參考。


Department of the Environment

**Emergency Response and
Planning Program**

Emergency Response Division





**Our mission is to Protect
human health and the
environment**



 MDE/ERD is the lead state agency in response to:

















 **How?**

- State Environmental Regulatory Agency
- Lead State Agency for HAZMAT Response
- Lead State Agency for Radiation Emergency Response
- State On-Scene Coordinator under the NCP
- Support Local Responders



 **MDE Response**

- Emergency Response Division
- Radiation Emergency Response
- Technical Consultation and Assistance



ERD Staffing

- 6 Hazardous Material Specialists (available 24 hrs. a day, 7 days a week)
- Nuclear Utility Planner/Liaison
- Environmental Sampling Specialist
- Division Chief/Supervisor
- 3,500+ Spill Reports Annually
- 500+ Responses Annually

Equipment Capabilities



Light Response Vehicles



Heavy Response Vehicles



Specialty Vehicle



Containment Boom Trailers



Corrosive Transfer System

- 2-2" Kynar double diaphragm pumps
- 300' Teflon lined 2" hose with all Kynar accessories
- Soda Ash
- Stainless Steel 07 off-loaders
- Air purification system
- 250 cfm air compressor





Local Spill Trailers






Bobcat





Watercraft



Photos by MDC Emergency Response Division




Specialty Equipment

Remote Drum Punch





Specialty Equipment

Elemental Mercury Emergencies and Assessments








Specialty Equipment

Chlorine Emergencies





Specialty Equipment

Propane Flare (3/4 & 1 inch)






Instruments and Mitigation

- Photoionization Detectors
- Explosimeters
- Air Sampling Tubes
- Drum Sampling Equipment
- Mercury Vapor Detectors and Vacs
- WMD Detection Equipment
- 2 each Chlorine A, B, C kits
- 2 Chlorine Cylinder Recovery Vessels
- Remote Drum Punch
- Sorbents and Oil Containment Boom
- Filtered Glove Box
- Portable Infrared Spectrometer ("TravelIR")




Communications

- High and Low Band VHF
- Marine Radio
- NEXTEL and Digital Cellular
- Satellite Radio/Telephone
- Custom Level "A" Commo




Incidents




Where





These Incidents Do Happen

MDE

Maryland

Howard Street Tunnel fire

MDE

(Baltimore Sun photo)

Maryland

Chalk Point pipeline spill

MDE

Maryland

Fixed Facility Incidents

MDE

Maryland

Transportation Incidents

MDE

Maryland

Transportation Incidents

MDE

Maryland

MDE Diesel spill from a tractor trailer



MDE Leaking container of acid



MDE Overturned gasoline tanker



MDE Tank truck transfer operation

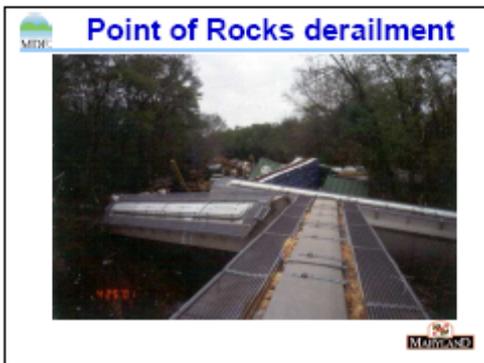


MDE Overturned acid tanker



MDE Sodium hypochlorite tanker







MDC

Training & Outreach

MDC



**HAZMAT INCIDENT MANAGEMENT:
The Eight Step Process**

**HAZMAT INCIDENT
MANAGEMENT:**

The Eight Step Process®

Gregory G. Noll, CSF, CEM
Hildebrand and Noll Associates
Lancaster, PA

Objectives

- ◆ Describe the critical success factors in managing a hazmat incident.
- ◆ Describe the critical tactical functions and tasks which must be addressed during a hazmat incident.
- ◆ Provide a forum to share ideas and experiences.

Incident Commander

HAZWOPER IC Requirements

- ◆ Identify all hazardous substances and/or conditions
- ◆ Implement appropriate operations and ensure appropriate use of proper PPE
- ◆ Limit personnel on-site
- ◆ Use of the buddy-system & stand-by EMS capability
- ◆ Designate a Safety Officer
- ◆ Implement appropriate decontamination

HazMat Group Supervisor

- ◆ Normally filled by HMRT Leader or HM Officer
 - Trained to the HMT level
 - Reports to the IC or OSC
 - Manages HM Group operations, including tactical options to fulfill the HM portion of the IAP



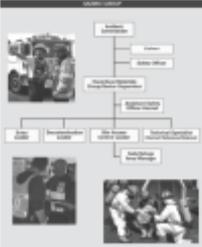
HazMat Group Supervisor

- ◆ Responsibilities:
 - Establish and monitor hazard control zones
 - Conduct site monitoring to determine presence and concentration of contaminants
 - Develop and Implement Site Safety & Control Plan (ICS-208 HM) for HM Group operations
 - Establish tactical objectives for HM operations
 - Coordinate all hot zone operations with OSC or IC to ensure tactical objectives are being met

HazMat Group

HMG Functions

- ◆ Safety
- ◆ Entry / Back-Up
- ◆ Decontamination
- ◆ Site Access Control
- ◆ Information / Research
- ◆ Medical Support
- ◆ Resource Support



FF Fatalities @ HM Incidents

- ◆ Found 20 North America incidents from 1971 to 2015
- ◆ Resulted in 81 fatalities
- ◆ FRO - 79 / HMT - 2
 - 1970's - 29
 - 1980's - 23
 - 1990's - 10
 - 2000's - 10
 - 2010's - 11



FF Fatalities @ HM Incidents

- ◆ Class 2.1 HM = 12
- ◆ Class 2.3 HM = 1
- ◆ Class 3 HM = 4
- ◆ Class 4 HM = 2
- ◆ Class 5.1 HM = 2



The National Fallen Firefighters Memorial

Concept of Operations

- ◆ On-scene response operations must:
 - Be based on a structured and standardized system of protocols & procedures
 - Rely on standardized procedures to bring consistency to the tactical operations



The Eight Step Process*

1. Site Management & Control
2. Identify the Problem
3. Hazard Assessment & Risk Evaluation
4. Select Protective Clothing & Equipment
5. Information Management & Resource Coordination
6. Implement Response Objectives
7. Decon & Clean-Up Operations
8. Terminate the Emergency

The Eight Step Process*

- ◆ Outlines basic tactical functions that integrates a risk-based response philosophy
- ◆ Flexible guideline, not a rigid rule
- ◆ Recognizes that the majority of incidents involving HM are minor in nature
- ◆ Expands as the scope and magnitude of the incident grows
- ◆ Provides a consistent management structure

Laws of Incident Management

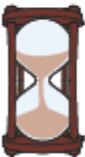
Good procedures are so simple that you don't need to write them down or use a dictionary to remember them!!!



Site Management & Control

- ◆ **Function:** Manage & secure the physical layout of the incident.
 - Separate people from the problem.
 - Can't safely & effectively manage the incident if you don't have control of the scene.
- ◆ **Goal:** Establish the playing field for the players (us) and the spectators (everyone else).

Site Management & Control



Reality is that the initial 10 minutes of the incident will determine operations for the next 60 minutes, and....

The first 60 minutes will determine operations for the first 8 hours.

Site Management & Control

- ◆ Experience at major incidents has shown that the 'initial window' of the incident may be a CF
- ◆ The challenge is to keep that window to as small a duration as possible.



Site Management & Control

Site Management Tasks

- ◆ Safe approach & positioning.
- ◆ Establish Staging (Level I, II), as necessary.
- ◆ Establish Isolation (Outer) Perimeter around site.
- ◆ Establish Hazard Control Zones (Inner Perimeter)
- ◆ Size-up need for immediate rescue, emergency decon and Public Protective Actions (PPA).

Site Management & Control

Approach & Positioning

- ◆ Outdoors - uphill and upwind; use distance.
- ◆ Indoors - look at ventilation, type of floor, location of floor drains, etc.
- ◆ The nose is no substitute for air monitoring!!!
- ◆ Getting in vs. getting out



Site Management & Control

Staging

- ◆ Forward location for temporary resource positioning (Level 1 vs. Level 2 staging)
- ◆ Resources on maximum 3-minute availability



Site Management & Control

Isolation Objectives

- ◆ Isolate the area and deny entry.
 - May also be known as the "outer perimeter."
- ◆ Promote operational efficiency by separating "players" from the "spectators."
- ◆ Include land, water and air areas.
- ◆ Distance determined by the hazard.
- ◆ Role of facility / plant security personnel.

Site Management & Control

Isolation Tactics

1. Immediately limit personnel contaminated or potentially exposed.
 - Direct to safe refuge area
2. Control most practical, distant access point(s).
3. Control territory between objectives #1 and #2.

Site Management & Control



Don't try to control more real estate than you can effectively isolate and control!!!

Site Management & Control



Site Management & Control

Hazard Control Zones

- ◆ Initial ("SWAG") = get the zones established and communicated to the players.
- ◆ Secondary = conduct air monitoring and "refine" the size / location of hazard control zones.



Site Management & Control

Air Monitoring Priorities

- ◆ Hazmat known or unknown?
- ◆ Open air, indoor or confined space release?
- ◆ Effects of corrosive vapors upon electronic instruments?
- ◆ Is radiation a potential hazard?

Site Management & Control

Air Monitoring Priorities

<u>Confined Space Release</u>	<u>Open Air Release</u>
◆ Oxygen Deficiency	◆ Flammability
◆ Open Enrichment	◆ Oxygen Deficiency
◆ Flammability	◆ Oxygen Enrichment
◆ Toxicity	◆ Toxicity

Site Management & Control

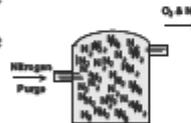
Action Levels - Flammability

- ◆ $\leq 10\%$ of LEL = Proceed with caution; monitor frequently
- ◆ Greater than 10% of LEL = Withdraw immediately to a safe location

Site Management & Control

Action Levels - Oxygen

- ◆ Oxygen deficient atmosphere - $\leq 19.5\% O_2$
- ◆ Oxygen enriched atmosphere - $\geq 23.5\% O_2$
- ◆ **Question:** What is displacing the oxygen?



The diagram shows a cylindrical tank with a 'Nitrogen Purge' inlet on the left and an 'O₂ & N₂' outlet on the right. Inside the tank, there are several oxygen (O₂) and nitrogen (N₂) molecules represented by pairs of spheres. An arrow points from the nitrogen inlet into the tank, and another arrow points from the tank to the oxygen and nitrogen outlet.

Site Management & Control

Action Levels - Toxicity

- ◆ Actual release location is considered to be an IDLH environment.
 - Look for physical / biological indicators
- ◆ Hot Zone / Warm Zone Line - concentrations \leq TLV/STEL.
- ◆ Warm Zone / Cold Zone Line - concentrations \leq TLV/TWA.

Site Management & Control

Action Levels - Toxicity

- ◆ Some chemicals have published TLV/TWA, but have insufficient toxicological data to develop other exposure values.
- ◆ ACGIH Estimated Exposure Values
 - TLV/STEL - 3 x TLV/TWA
 - TLV/C - 5 x TLV/TWA
 - IDLH - 10 x TLV/TWA

Site Management & Control

Action Levels - Radioactivity

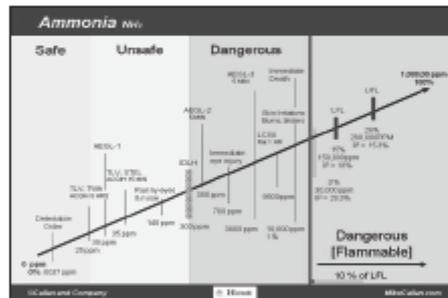
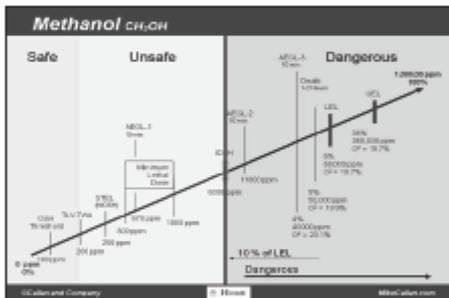
- ◆ Remember the Basics - Time, Distance, Shielding
- ◆ Any positive readings above background levels.
- ◆ What is the intensity of the suspected radioactive source - alpha particles, beta particles, gamma rays?



Site Management & Control

Action Levels - Physical Hazards

- ◆ Downed power lines
- ◆ Structural instability
- ◆ Container instability or effects of reactivity
- ◆ Excessive noise levels

Laws of Incident Management

The First Law of Hot Zone Operations

- ◆ Trained to play
- ◆ Dressed to play
- ◆ Buddy / Back-Up system (2 in, 2 out)
- ◆ Decon set-up
- ◆ Coordination w/Command and Safety



Site Management & Control

Rescue Operations



Site Management & Control

Rescue Size-Up

1. Do we actually have a real victim?
2. Type of HM involved and its hazards?
3. How long has the victim been exposed or trapped?
4. Do you have trained personnel, as well appropriate equipment and resources.
5. Do you have control of the situation and a coordinated action plan?

Site Management & Control

Public Protective Actions

- ◆ **Objective:** To protect the spectators from actual or potential harm.
- ◆ **Tactical Options:**
 - Evacuation
 - Sheltering-In-Place
 - Combination



Protective Actions

Observations

- ◆ There are no clear "black & white" criteria, but alot of gray areas.
- ◆ Guidelines should not be viewed as a replacement for the IC's view and assessment of the incident scene.
- ◆ PIP and evacuation are not mutually exclusive options; often implemented simultaneously and in conjunction with each other.

Protective Actions

Decision-Making Resources

- ◆ Pre-Incident Planning.
- ◆ Hazards analysis process.
- ◆ NAERG *Table of Initial Isolation and Protective Action Distances*.
- ◆ Plume dispersion models (e.g., Aloha, Safer, Safer RMP).
- ◆ "Street smarts" and experience.



Identify the Problem

- ◆ **Function:** Identify the scope and nature of the problem.
- ◆ **Goal:** Identify the scope and nature of the problem, including type and nature of HM involved
 - HM(s) Involved - who & what is the enemy?
 - Type of container, as appropriate
 - Nature of container stress / breach / release
 - Exposures (i.e., exposed, contaminated)

Identify the Problem

Street Smart Observations

- ◆ "A problem well-defined is half-solved."
- ◆ Identification → Classification → Verification
- ◆ Always verify your initial information!!!



Identify the Problem

Identification Methods and Procedures

- ◆ Occupancy and Location
- ◆ Container Shapes
- ◆ Markings and Colors
- ◆ Placards and Labels
- ◆ Shipping Papers / Facility Documents
- ◆ Air Monitoring & Detection Equipment
- ◆ Senses



Identify the Problem

Recon Operations

- ◆ Successful offensive operations should be preceded by a thorough defensive and/or offensive reconnaissance.
- ◆ "Sometimes you just have to go and look."
- ◆ Monitor → Damage Assessment → Sampling




Hazard and Risk Evaluation

- ◆ **Function:** Determine whether to intervene, and what strategic objectives and tactical actions should be pursued.
- ◆ **Goal:** Assess the hazards present, evaluate the level of risk, and establish an Incident Action Plan to make the problem go away!



Hazard and Risk Evaluation

Street Smart Observations

- ◆ **THE** most critical task that responders must perform.
- ◆ If you can't do it properly, then get help from someone who can provide that assistance.
- ◆ Focus on those things that you can change and that will make a positive difference in the outcome!
- ◆ There aren't a lot of black & whites, but many grays! Must be a risk evaluator!!!

Hazard and Risk Evaluation

The image shows a pair of scales of justice. The left pan is labeled 'HAZARD' and contains several small icons representing different types of hazards. The right pan is labeled 'RISK' and contains several small icons representing different types of risks. The scales are balanced, suggesting a relationship between hazard and risk.

Hazard and Risk Evaluation

Risk-Based Response Process (RBR)

Systematic process by which responders analyze a problem involving HM/WMD, assess the hazards, evaluate the potential consequences, and determine appropriate response actions based upon the facts, science, and the circumstances of the incident (NFPA 472).

The flowchart illustrates the RBR process. It starts with 'IDENTIFY THE PROBLEM' and 'GATHER INFORMATION'. This leads to 'ASSESS THE HAZARD' and 'EVALUATE THE RISK'. The final step is 'DETERMINE APPROPRIATE RESPONSE ACTIONS'. The process is supported by 'SCIENCE' and 'FACTS'.

Hazard and Risk Evaluation

1. Assess the Hazards posed by the problem.
 - Health, Chemical, Physical, Weapons, Other
 - Information Management ← collect, prioritize & manage data / information
2. Evaluate the Risks.
3. Establish an Incident Action Plan.
 - Strategic Goals and Tactical Objectives

The icon shows a person wearing a hard hat and safety vest, looking at a clipboard. There are also some hazard symbols and a small diagram.

Assess the Hazards Involved

Information Sources

- ◆ Technical Reference Manuals
- ◆ Technical Information Centers
- ◆ Hazmat Databases (manual / electronic)
- ◆ Technical Specialists
- ◆ Safety Data Sheets (SDS)
- ◆ Monitoring and Detection (fixed / portable)

Assess the Hazards Involved

Technical Reference Manuals

- ◆ Must know HOW to use ERG s before an incident.
- ◆ "Rule of Three" s
- ◆ Conflicting information
- ◆ Develop a matrix when multiple products are involved.

The image shows a person sitting at a desk, looking at a large technical reference manual or ERG. There are some papers and a pen on the desk.

Assess the Hazards Involved

Technical Information Centers

- ◆ Why?
 - Provide hazard information.
 - Provide conduit to product & container specialists.
 - Confirm / verify information gathered on-scene.
- ◆ Where?

The image shows a person sitting at a desk, looking at a computer monitor. There is a logo for 'Responsible Care' and 'Public Environment' in the background.

Assess the Hazards Involved

Hazmat Databases

- ◆ Should be viewed as a tool!!!
- ◆ Direct Access Systems and GAMEO, EIS-C, TOMES, WISER
- ◆ Remote Access Systems (subscriber-based services)
- ◆ Internet web sites

Assess the Hazards Involved

Technical Specialists

- ◆ Who Are They?
 - Generalists vs Specialists
 - "Experts"
- ◆ How To Use Them?
 - Play role of Detective
 - Always verify level of expertise
- ◆ Final responsibility still rests with IC



Assess the Hazards Involved

Air Monitoring Considerations

- ◆ Identify or classify material involved
- ◆ Verify hazard information
- ◆ Determine appropriate levels of PPE
- ◆ Determine size / location of perimeters and Hazard Control Zones
- ◆ Develop PPA recommendations and quadrants



Assess the Hazards Involved

Monitoring Considerations Include...

- ◆ Always use the appropriate instrument based upon dealing with known or unknown chemicals.
- ◆ Personnel should have some idea of what type of readings to expect. If abnormal, confirm with another instrument.
- ◆ Absence of a positive doesn't always mean that contaminants are not present.
- ◆ Never assume that only one hazard is present.

Risk-Based Response

What's in Your Toolbox?

- ◆ Spill Classifier Sticks
- ◆ Multi-Gas Instruments
- ◆ Colorimetric Detector Tubes
- ◆ Photo-Ionization Detectors (PID)
- ◆ Chemical Agents Meters / Detectors
- ◆ Radiation Detectors / Pagers
- ◆ Biological Test Kits
- ◆ Infrared Sensors (Travel IR)
- ◆ WMD Monitoring Devices



Evaluating Risks

Risk Factors

- ◆ Nature of the problem and HM involved
- ◆ Quantity of materials involved
- ◆ Type of container
- ◆ Nature of container stress
- ◆ Type & proximity of exposures
- ◆ Level of available resources





Develop Incident Action Plan

- ◆ Establish strategies that address:
 - Source control
 - Protection of people
 - Protection of property
 - Protection of environment, especially sensitive areas
- ◆ Tactical / Task Objectives - Specific and measurable objectives to meet a strategy.
- ◆ Mode of Operations - offensive, defensive, non-intervention

Develop Incident Action Plan

Strategy	Offensive	Defensive	Nonintervention
Rescue	X		
Public protective actions	X	X	X
Spill control	X	X	
Leak control	X		
Fire control	X	X	
Clean-up and recovery	X	X	

Develop Incident Action Plan

Most initial on-scene response operations will be defensive-oriented OR offensive operations which can be implemented from a remote or safe location.

Hazard and Risk Evaluation

Both the On-Scene Incident Commander and Emergency Responders **MUST** become Risk Evaluators rather than Risk Takers.



Select Personal Protective Eqmnt

- ◆ **Function:** Based upon the IAP, select the proper level of PPE
- ◆ **Goal:** Ensure all responders have appropriate level of PPE (skin and respiratory) for the expected tasks.

Select Personal Protective Eqmnt

Skin Protection

- ◆ Structural FF Clothing
- ◆ Chemical Protective Clothing
 - Liquid Chemical Splash
 - Chemical Vapor
- ◆ High Temperature Clothing

Select Personal Protective Eqmnt

Respiratory Protection

- ◆ Air Purifying Respirators
- ◆ Air Supplied Respirator
 - SCBA
 - Airline Hose Respirator
- ◆ *Always start off with SCBA / airline respirators. Respiratory protection can only be downgraded after conducting air monitoring.*

Select Personal Protective Eqmnt

1. Hostile environment - what can hurt you?
 - Skin Protection
 - Respiratory Protection
 - Physical Protection
2. Tasks to be Performed?
 - Tactical Objectives
 - Recon, offensive or defensive ops
3. Capabilities of the User

Select Personal Protective Eqmnt

Hour 1 Issues

- ◆ Unknown - Level A or B entry?
- ◆ Compatibility of available CPC materials?
- ◆ Is CPC contamination likely?
- ◆ Need for both thermal and chemical protection?
- ◆ Others???

Select Personal Protective Eqmnt

Chemical Compatibility Issues

- ◆ Where possible, use the manufacturer's data.
 - Breakthrough Time / Cumulative Permeation
 - Permeation Rate
 - Extrapolation of data for other chemicals
- ◆ Compare the data against the objective of entry operations (offensive, defensive).
- ◆ Be realistic in interpreting the compatibility data!!!

Select Personal Protective Eqmnt



PERSONAL PROTECTIVE CLOTHING IS THE LAST LINE OF DEFENSE!!!



Information & Resource Mgmt.

- ◆ **Function:** Management, coordination and dissemination of all pertinent info within the ICS
- ◆ **Goal:** Timely & effective management, coordination & dissemination of all pertinent data, info & resources among all of the players
 - Situational Awareness
 - Common Operating Picture

Information & Resource Mgmt.

Command Issues

- ◆ Consider safety & security of the ICP
- ◆ Single Command vs. Unified Command
- ◆ Unity of effort – never allow freelancing!
- ◆ Expand the ICS organization, as appropriate
- ◆ Make sure there is continuing progress towards solving the problem(s)

Information & Resource Mgmt.

Planning Issues

- ◆ Don't look stupid because you don't have a plan
- ◆ Establish Planning section early
- ◆ PACE planning template
- ◆ Changing the IAP – make sure there is continuing progress towards solving the incident in a timely manner

Information & Resource Mgmt.

Information Issues

- "What do we know vs. what we think we know"
- Is everyone on the "same page?"
- Who are your information customers?
- Bad news doesn't get better with time! Make sure your boss isn't the last one to know!

Information & Resource Mgmt.

Resource Issues

- ◆ Logistics is critical at long duration incidents
- ◆ Do we have the resources to address the tasks?
- ◆ If you need it, where's it coming from, and how will it get here?
- ◆ Always have a Plan B logistics plan!!!



Implement Response Objectives

- ◆ **Function:** Phase where emergency responders implement the best available IAP that will produce the most favorable outcome.
- ◆ **Goal:** Ensure that the incident priorities are accomplished in a safe, timely and effective manner.

Implement Response Objectives

- ◆ **Strategies - What are we going to do to meet incident priorities?**
 - Rescue
 - Public Protective Actions
 - Spill Control
 - Leak Control
 - Fire Control
 - Recovery

Implement Response Objectives

Strategy	Offensive	Defensive	Nonintervention
Rescue	X		
Public protective actions	X	X	X
Spill control	X	X	
Leak control	X		
Fire control	X	X	
Clean-up and recovery	X	X	

Implement Response Objectives

Tactical Decision-Making

- ◆ Specific and measurable objectives to meet a strategy.
- ◆ Is not a "black and white" process. Uncertainty of the decision-making process forces the IC to consider:
 - Conflicting or uncertain information
 - Conflicting or competing values

Implement Response Objectives

It is important to get buy-in from the risk-takers!!!



Tactical Decision-Making

- ◆ Most hazmat incidents cannot be resolved using one tactic.
- ◆ Effective tactical decision-making requires thinking ahead.
- ◆ Consideration should be given to how long it will take to accomplish the objective.
- ◆ As the clock ticks, tactical options will often become more limited.

Tactical Decision-Making

- ◆ Examples of tactical options that can be used to buy time include:
 - Barriers
 - Time or Distance
 - Techniques
- ◆ Tactical decision-making sometimes involves trial and error.
- ◆ Not everything works the way you planned and trained.

Implement Response Objectives

Decision Tags - QEB

- ◆ Quickest
- ◆ Easiest
- ◆ Best = most value, least risk and most benefit towards meeting response objectives.



Decon & Clean-Up Operations

- ◆ **Function:** Process of making personnel, equipment and supplies safe by reducing or eliminating harmful substances that are present when working in contaminated areas.
- ◆ **Goal:** Ensure responder safety by reducing the level of contamination on-scene and minimize the potential for secondary contamination beyond the incident scene.

Decontamination & Clean-Up

1. *Emergency Decon* - "quick and dirty"
2. *Technical Decon* - planned entry operations.
3. *Mass Decon* - large numbers of civilians
4. *Contaminated Patients* - decon, handling & treatment of "dirty" patients.
5. Clean-up and disposal of contaminated supplies and equipment.

Decontamination & Clean-Up

- ◆ Location of the decon area – marked & identified
- ◆ Technical decon ops are coordinated with tactical ops
- ◆ Technical decon challenges
- ◆ Mass decon challenges
- ◆ Clean-up & disposal of contaminated supplies & equipment




Terminate the Incident

- ◆ **Función:** Terminate emergency response activities and begin the initiation of post-emergency response operations (PERO).
- ◆ **Goal:** Ensure overall command is transferred to the proper agency when the emergency is terminated and all post-incident admin activities are completed per local policies and procedures.

Terminate the Incident

- ◆ Debriefing
- ◆ Critique
- ◆ Incident Investigation



INTERNATIONAL HAZARDOUS MATERIALS
Response Teams Conference

The Haz-Mat Team Leader: *Who's Laughing Now?*

Chief Rick Lasky

www.iafc.org/hazmat



Haz-Mat what???

Years ago some of those in public safety as well as some in our military, looked upon the training in and response to, Hazardous Materials incidents as a burden, something we shouldn't be involved in and in some cases as a joke.



www.iafc.org/hazmat

Those who trained and dedicated themselves to the handling of these incidents were often ridiculed and made fun of.



www.iafc.org/hazmat

Well times have changed and due to recent events many now realize just how invaluable those trained in Haz-Mat truly are in the protection of those we serve, not just in North America, but world-wide.

So, who's laughing now?



www.iafc.org/hazmat

They were "Haz-Mat" when Haz-Mat wasn't cool!

Chief Bob Rubel



Chief John Eversole



www.iafc.org/hazmat

Progressive was confused with "Geek"

To be honest, I was tired of being embarrassed at Haz-Mat calls.

So I got into it and look what happened next...



www.iafc.org/hazmat



...Awareness classes, Technician classes, Haz-Mat Incident Command classes and yes... Chemistry for Hazardous Materials classes.



I became a Haz-Mat Geek!



What I learned was...

That progressive leaders understand the importance of good, well trained, Haz-Mat personnel and teams.



They were awake enough to see the big picture

They believed and embraced core values such as...
Duty, Honor, Pride, Commitment, and Integrity!



That failing to prepare is preparing to fail!

"Disaster Preparedness" took on a new light.

These are not the "olden" days.



It'll never happen here!



So what can you do?

- ✓ Think BIG picture
- ✓ Prepare
- ✓ Train
- ✓ Have the right attitude



- ✓ Get them onboard right from the start, in the academy
- ✓ Train, keep training and remember to make it interesting when you can



- ✓ Keep the simple stuff "simple"
- ✓ Educate both the internal and external customer
- ✓ Succession plan
- ✓ It's not going away!



- ✓ Remember those who fought hard to get us where we are today?
- ✓ Where will you take it next?
- ✓ What about your legacy?



- ✓ It CAN and WILL happen anywhere!
- ✓ Be prepared
- ✓ Take *Pride* in your team
- ✓ Remember all of the hard work that got you here



Everything we do from this point on is about the future, our future, their future.



Take a look around this conference, at the people, at the commitment.



Tell me they don't define Duty, Honor, Pride, Commitment, and Integrity!



So, who's laughing now?



Thank you and be safe!



Understanding Your Six Senses In HAZMAT

Lt. David Bullard
Columbia County Fire Rescue
HEPACO LLC

Vision



RULE OF THUMB
A good thing is never as good as it seems and a bad thing is never as bad as it seems.

Focus is a good thing, except when it isn't....
What can our vision lead us into and what
can it miss?

What do you see?



Reality is...

- Not what we always see
- We tend to rationalize....
 - Misleads us
 - Makes us miss what would seem to be obvious clues...



Logic is our friend

Does what we see, match what makes sense?



Seeing Clearly...



Low frequency, high risk.....

Vision is looking at what we are doing...

What color is the firetruck?

Go beyond the obvious....look deeper and look ahead.




Reality and Perception




Smell

Something Smells Fishy...

Things just don't add up....



Share the nose...

Compare the smell, with what others smell...

Odors during investigation

Tales that don't add up

Anything that smells of bad news





Are we better off?

PPE has evolved...which is good.

Technology has evolved, which may have made us weaker in basic skills.

Touch can lead the way...

Understand where our limitations exist
Getting out when time is limited..
Deviation from normalcy

Taste

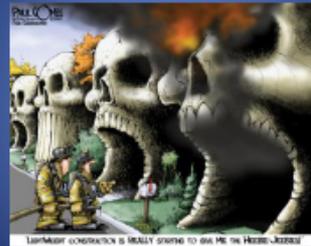
Some things just leave a bad taste...

Do we always remember, how bad something tasted?

Learn the new flavors



The Mysterious 6th Sense



The Sixth Sense "Gut Feeling"

"gut feeling"

Your "gut" is your previous knowledge and experiences subconsciously and instantaneously trying to solve a problem

Your mind processes all the senses: checking the memory bank for outcomes!!!



Fight or Flight Syndrome

How Do We Teach Instinct??



The Sixth Sense "Gut Feeling"

The recipe...

Learned Instincts +
Several Fearful Incidents +
Proactive Training =
A dependable "gut feeling"



When a person trains once, nothing happens. When a person forces himself to do a thing a hundred or a thousand times, then he certainly has developed in more ways than physical.

Deviation of normalcy

*"Basketball is an intricate, high-speed game filled with split-second, spontaneous decisions. But that spontaneity is possible only when everyone first engages in hours of highly repetitive and structured practice—perfecting their shooting, dribbling, and passing and running plays over and over again—and agrees to play a carefully defined role on the court. . . . spontaneity isn't random."
— Malcolm Gladwell*

The video clip that follows is of a hazardous materials transportation tank incident that happened July 21, 2011, in Sawyer, Michigan. While stopping at a truck stop, the driver saw that the tank was leaking and that pressure inside the cargo tank was higher than normal. Local police were called to the scene and a safety perimeter was established while waiting for the fire department response unit. Watch what happens next!





Thank You!

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