行政院所屬各機關因公出國人員出國報告書

(出國類別：國際會議)

2011 年美南國建會科學工程及技術研討會及訪問美國出國報告書

服務機關：行政院環境保護署

姓名職稱：阮國棟所長、莊訓城簡任技正

出國地點：美國

出國期間：100 年 5 月 31 日至 6 月 9 日

報告日期：100 年 8 月 15 日

摘要

行政院環境保護署環境檢驗所阮所長國棟與空氣品質保護及噪音管制處莊簡任技正訓城於 100 年 5 月 31 日至 100 年 6 月 9 日出席美南國建協進會等主辦的「2011 年科學工程及技術研討會，SETS」，並參訪紐約及華府之環保設施。此行主要應美南環保公安協會（Chinese American Society of Environmental Protection and Safety），進行「環保危機、奇蹟與契機—台灣的經驗」專題演講並分享交流我國環保相關經驗，由空保處莊簡任技正訓城，發表「我國移動污染源管制策略」，說明移動污染源管制措施及電動機車電池交換系統簡介，藉機宣達我國重視環境保護工作；環檢所阮所長國棟，在午餐主題演講，發表「市鎮污水和高科技工業廢水回收氮磷」專題報告，介紹主軸爲「台灣創新・台灣獨特」，說明台灣如何開發 4 項創新廢水處理技術，行銷全世界，以及應用在高科技產業必須回收廢水至少 85% 再用的世界獨有的成功經驗，與會人士約 300 人。於 6 月 3 日由休士頓固體廢棄物管理局陳副局長天生所策畫的「綠色環保之旅」活動，當日參觀休士頓同時也是美國最新的環保科技、廢水處理、電腦回收、綠色建築等四大主題。

另參訪紐約、2011 美南國建協進會 SETS 大會等環保設施及拜會華府環保官員，除收集有關美國先進之環境分析檢測及空氣污染管制政策與技術資料外，並進行意見交換與技術資訊交流，有助於未來雙邊合作與交流。此行包括參觀康乃迪克州 University of New Heaven 李昌鈺教授的鑑識科學實驗室、康州 Hartford 地區的都會區水處理廠（Water Treatment Plants at The Metropolitan District）、拜會美國環保署國際合作處助理署長（Ms. Depass）及科長（Director Jean Nishida）、台美計畫經理人 Justin Harris 等，他們對 6 月 13 日即將在台舉辦的區域環保活動都讚譽有加，認爲終於完成多年來將台美雙邊合作計畫拓展爲區域合作的理想。

目錄

一、 出國日期 …… 1

二、 出國行程 …… 1

三、 出席會議與參訪情形 …… 2

四、 結語與建議 …… 8

五、 附件 …… 9

附件一 照片…… 9

附件二 2011 SETS 大會議程…… 17

附件三 Green Houston Tour…….. 53

附件四 Gulf Coast Waste Disposal Authority Bayport Facility……. 54

附件五 專題演講資料－阮所長國棟…… 61

附件六 專題演講資料－莊簡任技正訓城…… 90

一、出國日期

100 年 5 月 31 日（星期二）至 100 年 6 月 9 日（星期四）

二、出國行程

日期	國外地點	工作內容	備註
5/31（星期二）	台北→舊金山→紐約	啓程	
6/1（星期三）	紐約	參觀紐約環保設施	
6/2（星期四）	紐約→德州休士頓	路程	
6/3（星期五）	德州德州休士頓	參加 2011 美南國建協進會 SETS 大會環保設施參觀行程	
6/4（星期六）	德州	1. 參加 2011 美南國建協進會 SETS 代替　署長擔任致詞貴賓 2. 發表論文	
6/5（星期日）	德州→華府	路程	
6/6（星期一）	華府	拜會華府環保官員	
6/7（星期二）	華府→舊金山→台北	返程	
6/8（星期三）	華府→舊金山→台北	返程	
6/9（星期四）	華府→舊金山→台北	返程	

三、出席會議與參訪情形

(一)出席會議

「2011 環保永續發展及科技研討會」於 6 月 4 日在糖城市的 Marriott 飯店舉行，由美南環保公安協會、美南國建協進會、行政院環保署、駐休士頓科技組以及休士頓市政府等單位共同舉辦之，自上午 9 時開始一系列精彩的講座，當日會議主題分科技、醫學、商務管理與教育四大項，除環保科技議題外，尚包含奈米科技、石油技術、專業會計師—財務管理、教育、替代能源、電腦科技、健康講座及生活等議題。另參訪紐約、2011 美南國建協進會 SETS 大會等環保設施及拜會華府官員，除收集有關美國先進之環境分析檢測及空氣污染管制政策與技術資料外，並進行意見交換與技術資訊交流，有助於未來雙邊合作與交流。此行包括參觀康乃迪克州 University of New Heaven 李昌鈺教授的鑑識科學實驗室、康州 Hartford 地區的都會區水處理廠（Water Treatment Plants at The Metropolitan District）、拜會美國環保署國際合作處助理署長（Ms. Depass）及科長（Director Jean Nishida）、台美計畫經理人 Justin Harris 等，他們對 6 月 13 日即將在台舉辦的區域環保活動都讚譽有加，認爲終於完成多年來將台美雙邊合作計畫拓展爲區域合作的理想。

6 月 3 日由休士頓固體廢棄物管理局陳副局長天生所策畫的「綠色環保之旅」活動，當日參觀休士頓同時也是美國最新的環保科技、廢水處理、電腦回收、綠色建築等四大主題。

6 月 4 日當日會議主題之各組負責人詳述各專題講座內容如下：

1.奈米科技講座，由白先慎介紹，今年介紹奈米及複合科技最新的發展，講員包括：Dr. Dmitri Lapptko (萊斯大學)，白先慎，李國強， Dr. M.A. Wahab，連崑，王開陽，歐陽震宇，彭樹成等人。

2.環保科技講座：由陳天生任主席，今年的主題爲：「永續環保發展」，陳天生並介紹將於六月三日(星期五)舉行的「Green Houston Tour」「綠色休士頓之旅」，他們將帶領大家參與垃圾，廢水，污水，電腦的回收，並參觀休士頓港務局，ＢＰ的綠色建築，以及「環保講座」：清潔能源(太陽能)廢水，電腦回收，以及餐會上，並邀請中華民國行政院環保署主講「環保危機，奇蹟，與契機——台灣的經驗」。

3.石油技術講座：葛家豪介紹，今年將由史大昌主講「地質勘探風險」，張永網主講「海洋地質數據採集的新進展」，李怡德主講「地質勘探風險評估的圖像技術」，以及葛家豪主講：「海浮貯產的概觀」。

4.財務管理講座：今年的主題爲：「所得課稅規定與財務規劃」，主講人詹煥彩會計師主講「健保法的影響」及馮波會計師財務規劃師主講「稅務規劃，遺產及贈與稅實例研討，企業繼承方案，國際稅務，轉讓定主價等。

5.教育講座；(1)由 Dr. Irene L. Chen 主講「教室教學技巧」幫助老師作一個整體的集成，用「Power Point」作一個有效的教學。(2)林欣慧主講「教學技巧電子化」，提供老師一個捷徑，把教學的各種方案，用電腦整合方式來有效的教學。

6.替代能源講座：白先慎介紹，今年將介紹 LED－未來的燈，Ion 電池，以及照明用的「發光二極管」，（此有很大商機）。

7.健康講座：由陳康元醫師，陳王琳博士主持，將由唐衍賢醫主講「現今心血管疾病之最新療法」，施惠總醫師主講「心電生理學之簡介與新知」，以及陳康元醫師主講「生活模式，情緒和環境對心血管健康之影響與控制」。

8.生活講座：由工商婦女協會主辦，由林婉真，陳白煌教大家跳 Rumbar。

9.電腦科技講座：由主席丁幼珍介紹，將由符濟群主講「社交網路對社會的衝擊：從尋找失落的孩子到推翻獨裁者，由幾個例子來看社交網路對今日人們的衝擊」，汪乃強主講「移動計算之演變」介紹智慧型手機和平板電腦此兩個市場的最新發展。

環保科技議題主要由休士頓固體廢棄物管理局副局長陳天生擔任講座主持人，邀請美國環保相關產業主管及國內環保署等擔任主講人員，包括：阿卡利能源公司（Akari Energy）的執行長 Vance Nobe 先生分享永續發展中綠能源所扮演的腳色；海灣廢水處理局（Gulf Coast Waste Disposal Authority）協理 Henry Chiu 先生在會中探討工業廢水處理；廢棄物處理公司南德州分部（Waste Management-South Texas Area）回收作業主任 Alan Bachrach 先生同與會聽眾分享現今社會的資源回收；電腦周期公司（Computer Cycle）副總經理 Clive Hess 先生則向聽眾講解電子產品回收的重要性與負責性回收認證的概念，接著行政院環境保護署空氣品質保護及噪音管制處的莊簡任技正訓城介紹我國移動污染源管制策略，說明移動污染源管制措施及電動機車電池交換系統簡介。下午的講座以替代能源爲主，由休士頓大學白先慎博士教授擔任主持人，主講人員包括台達電林明村先生、楊位剛博士、邱媛媛博士、周大昶博士等人，探討主題包括 LED 照明、鋰電池、電動車、綠能源等。講座內容豐富多元，與會聽眾皆感收穫豐富。

阮所長國棟在午餐會上做 Keynote Speech，主題爲「市鎮污水和高科技工業廢水回收氮磷」專題報告，介紹主軸爲「台灣創新・台灣獨特」，說明台灣如何開發 UASB、MBR、FBC 等創新廢水處理技術，行銷全世界，以及應用在高科技產業

必須回收廢水至少 85% 再利用的世界獨有的成功經驗，並以圖文並茂方式說明台灣在廢水處理的成就，獲得在場聽眾熱烈掌聲，與會人士約 300 人。茲將廢水處理技術說明如下：

1. UASB 廢水處理技術（Modified Upflow Anaerobic Sludge Bed ）

此項技術於 1980 年由工研院開發，目前已爲成熟商業化技術，實際工程應用於膠帶、石化、化工、醱酵、塑膠等各種工業廢水之處理，廠商包括：亞洲化學、菸酒公賣局宜蘭等 7 個酒廠、華隆公司……等公司，亦近代廢水厭氣處理技術發展過程中，最具代表性的一項技術，特色爲低投資及操作成本、潛在可用的回收物質，其特點詳述如下(1)槽內污泥濃度高，處理效率高(2)不需曝氣，動力消耗低(3)污泥產率低，二次污染性低(4)特別適合推展應用於地狹人稠、資源不足等條件限制的地區。UASB 處理槽主要由四個部份構成，即(1)進流水分佈裝置(2)污泥床(3)污泥毯(4)氣固液分離裝置。

2. MBR 廢水處理技術（Membrane-Based Bioreactor）

利用膜組件對混合液具有高效分離功能，幾乎沒有污泥流失。若按生物反應器需氧性能來分類則可分爲好氧性 MBR 和厭氧性 MBR；其中好氧性 MBR 主要用在處理城市廢水和生活污水，而厭氧性 MBR 則主要用於處理高濃度有機廢水。MBR 之優點爲：占地面積小、徹底去除出水中的固體物質、出水無需消毒、COD、固體和營養物可以在一個單元內被去除、高負荷率、低/零污泥產率、流程啓動快系統不受污泥膨脹的影響、模組化/升級改造容易，而其缺點則爲：曝氣受到限制、膜污染、膜價格高。

3.FBC 廢水處理技術（Fluidized Bed Crystallization）

爲利用先進處理技術使污染物直接轉換成可資源回收再利用的物質，爲綠色環保世界性的新潮流，至今已發展的資源化回收技術包括流體化床結晶法、離子交換樹脂法、電解還原法及薄膜分離法等，其中流體化床結晶法被認爲是一種有效、簡單且經濟的方法，較容易被業者接受。流體化床結晶技術是化工製程結晶程序的新里程碑，工研院經過精心的研究，研發成功此項技術，並應用於環工領域，成爲近年來新開發建立之最具成效廢水處理技術之一。目前本項技術應用範圍包括：(1)電子業含氟廢水處理及回收(2)表面處理業鎳、銅等重金屬廢水處理及回收(3)製造業節水或水回收再利用(4)廢水脫氮除磷等技術。

莊簡任技正訓城藉由背景現況說明、現行管制措施、電動機車電池交換系統及移動源管制之願景等項目來介紹我國移動污染源管制策略，說明移動污染源管制措施及電動機車電池交換系統簡介。各項內容敘述如下：

1.藉由歷年人口、經濟、車輛與能源消耗成長趨勢及移動污染源歷年排放量變化來說明目前之背景現況及環境負荷變化。

2.現行管制措施含新車管制、使用中車輛管制、潔淨燃料推動、低污染車輛推廣及交通管理措施等。

(1)新車管制包括逐期加嚴排放標準、新車型審驗及新車抽驗、審驗及核章電子化等。

(2)使用中車輛管制包括機車排氣定期檢驗、機車柴油車不定期檢驗、鼓勵檢舉烏賊車、加速淘汰老舊二行程機車、推動使用中汽油車保檢合一制度、推動使用中柴油車維修保養制度等。

(3)潔淨燃料推動包括車用汽柴油管制標準、徵收車用油品空污費、取締非法油品、推動增加油氣雙燃料車及加氣站補助液化石油氣氣價等。

(4)低污染車輛推廣包括推廣使用電動機車、電動汽車及電動公車、推動建置電池交換營運系統、補助購買電動輔助自行車、電動自行車等。

(5)交通管理措施包括鼓勵使大眾運輸系統、推廣環保駕駛、推動停車熄火措施等。

3.電動機車電池交換系統推廣之必要性及補助作法說明如下：

推廣必要性：

(1)降低電動車輛購置價格，藉由加入交換系統成爲會員，不需購置第二顆以後的電池。

(2)快速更換電池，節省電動車輛電池充電時間，須在 3 分鐘內完成交換。

(3)延長電動車輛續航里程。

(4)做到像機車加油一樣的方便性。

(5)透過專業管理，降低電池損耗及不當使用風險。

(6)提高電池使用率，將汰換之電池移作如電網儲能知其他用途，達到節能減碳之目的。

補助作法：

(1)研擬「電動機車電池交換系統補助辦法」及「電動機車電池交換費用補助辦法」。

(2)充實電池交換系統主系統與子系統之軟硬體內涵。

(3)補助方式以設置 30 個交換站，服務 5,000 輛電動機車爲基準，每站最高補助金額爲新臺幣 150 萬元。補助對象不超過兩個交換主系統（北部及南部各 1 個主系統），以維護電動機車使用者交換電池之最大方便性與成本效益。

4.移動源管制之願景：結合低碳社區及低碳城市，推動低碳運輸，打造以人爲本的行車環境，積極改善車輛污染排放，共創美好未來。

(二) 康乃迪克州 University of New Heaven 李昌鈺教授的鑑識科學實驗室

（6 月 1 日，參加人員：阮所長國棟、莊簡任技正訓城。）

參觀位於康乃迪克州 University of New Heaven 李昌鈺博士的鑑識科學實驗室，該實驗室耗資 1400 萬美元，兼顧實務及學習用途，其三個部門分述如下：

1.鑑識科學中心：多間實驗室分設如犯罪現場虛擬模組、地面透視雷達、模擬彈道用的高強度雷射，及電訊鑑識網路衛星系統等先進器材。

2.互動學習中心：舉辦鑑識相關活動，開放民眾實際操作鑑識器材。

3.鑑識危機管理指揮中心:各級犯罪調查機關可透過衛星彼此聯繫,分享即時情報。

李昌鈺博士憑借精密超群的偵勘手段和精湛獨到的鑒識技術，屢破奇案，贏得各方的尊重與高度信賴。由他偵辦過的許多刑案，都成爲國際法庭科學界與警界的教學範例。茲將其破案的設備、技術及技巧等說明如下：

1.精密儀器設備：

透過地面透視雷達、電訊鑑識網路衛星系統及高強度雷射等先進器材進行分析、模擬。

2.破案技術及技巧

李昌鈺博士的人生信念是「永遠不要說『不』。要知難而上，知其不可爲而爲之。這樣你才能成功。」他認爲，這一輩子實際上只做了一件事，就是使不可能成爲可能。強調在刑事鑑識上只重視物證，關注證據本身，有多少物證就講多少話，不能多也不能少。

3.微物證據

(1)wood chipper 案

李昌鈺博士於康州鄉間、被白雪覆蓋的林地，找到一具遭人分解女屍，最終

經由碎木機（wood chipper）上少量的人類遺骸，讓他的丈夫在 1985 年被判了罪。

(2)文森・福斯特自殺案

經由李昌鈺博士抽絲剝繭、釐清各處疑點後，透過死者的眼鏡上的微證物,最終文森・福斯特被判定爲自殺。

(3)辛普森殺妻案

1995 年美國足球明星辛普森殺妻案更因爲李昌鈺博士一個「血手套」,辛普森戴不下，而讓案情大逆轉！

(4)甘乃迪總統孫子性侵案

甘迺迪家族成員涉嫌強姦案,也因透過他而獲得平反,而挽救甘迺迪家族聲譽。

(三)康州大都會區（Hartford）自來水廠

（6 月 1 日，參加人員：阮所長國棟、莊簡任技正訓城。）

參訪的自來水廠在 Farmington Avenue（Roult4），West Hartford, CT。最早於 1922 年開始運作，每天提供超過 50 百萬加侖的自來水，最大特色爲使用慢砂濾池（slow sand filtration system），目前供應 40 萬人口使用。慢砂濾池比快砂濾池可得到更佳的水質，參訪時剛好進入龐大的洗砂作業，工程繁瑣，費時費力，屬於較傳統之設計，也是不易親眼見到的工程操作重要的一環。

(四)美南國建協進會綠色環保之旅（詳如附件二）

（6 月 3 日，參加人員：阮所長國棟、莊簡任技正訓城、美南國建協進會會長鍾宜秀及休士頓固體廢棄物管理局副局長陳天生等與會人士。）

由美南國建協進會、休士頓科技組及休士頓市政府共同主辦的「綠色環保之旅」環保巴士，3 日在會長鍾宜秀及休士頓固體廢棄物管理局副局長陳天生等人率領下，出發前往休士頓地區幾處著名且具教育意義的地點參訪，整天的綠色環保之旅，參觀團員皆感機會難得獲益良多。

1. Waste Management Recycling 爲全球最大的廢棄物管理回收公司，位於西南區的垃圾回收工廠，參觀價值 1500 萬元、約有三層樓高的垃圾自動分類機。陳天生表示，這是該公司首次對外公開這套全美最先進的設備。解說員指出，垃圾經過輸送帶進入分類機後，就自動分成塑膠、紙類、鐵罐類等數大項，出來後的成品就是已壓縮成數呎見方的大方塊，集中擺放，等待卡車運送前往下一站再利用。眾人看過後無不嘖嘖稱奇。該廠的教育中心所有的裝飾品全是廢棄物再利用，團

員們均讚嘆設計者的巧思。參觀團員之一的僑務委員王秀姿表示，今年的設備前所未見，足見休士頓市政府很有效率。

2.參觀海灣廢水處理局（Gulf Coast Waste Disposal Authority）工業廢水的處理過程。Gulf Coast 爲石化業重鎮，石化廢水的處理具一定指標意義，附件三爲參訪行程中的一站，可供國內參考。

3.下午認識電腦回收的程序並參觀英國石油公司（British Petroleum, BP）於休士頓的辦公大樓「海勒斯大樓」（Helios Plaza），該大樓爲休士頓首座榮獲白金級能源與環保領導性設計認證（Leadership in Energy and Environmental Design, LEED）之環保建築。

(五)拜會美國環保署資深官員

（6 月 6 日，我方出席人員：阮所長國棟及莊簡任技正訓城。對方接待人員：Ms. Depass 美國環保署助理署長、Director Jean Nishida 科長及 Justin Harris 台美雙邊合作計畫經理人等。）

1.上午拜會美國環保署助理署長 Ms. Depass，科長 Director Jean Nishida 及台美雙邊合作計畫經理人 Justin Harris 等人，他們對 6 月 13 日即將在台舉辦的區域環保活動都讚譽有加，認爲終於完成多年來將台美雙邊合作計畫拓展爲區域合作的理想。

2.下午拜會 OEI (Office of Environmental Information) 部門，與 6 位美國官員簡報環境檢驗所檢驗能力及特色，討論雙邊合作港口空污計畫之執行等，雙方充分交換意見 1 小時。

四、結語與建議

(一)國際人士對我國環保工作的措施及成效都有高度興趣及相當肯定：這次在研討會上介紹我國移動污染源的管制措施，以及科學園區高科技產業廢水回收率必須達到 85% 等世界獨特的成功經驗，引起廣泛討論及迴響。本署應積極主動參與國際活動與會議，進行意見交換與技術資訊交流，以利收集國外相關經驗，有助於未來國際合作與交流。

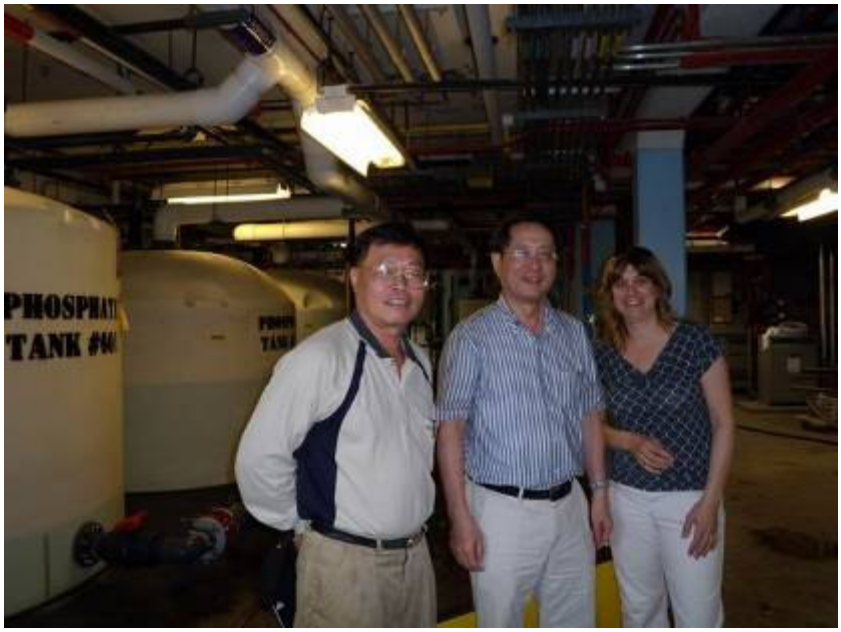
(二)我國與美國環保署的台美環保科技合作計畫，已執行 16 年，最近成功拓展爲區域議題的合作，強調台灣經驗的擴散，甚獲美方支持及肯定，也符合他們的主流價值，能有嶄新發展局面，更值今後珍惜及認真推動。

五、附件

附件一 照片

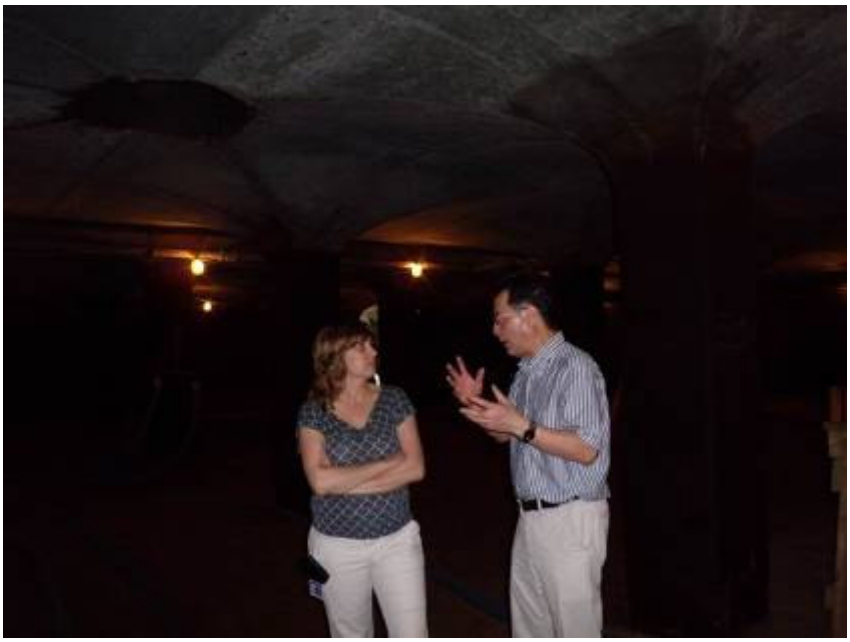
參觀康乃迪克州 University of New Heaven 李昌鈺教授的鑑識科學實驗室。

參觀康乃迪克州 University of New Heaven 李昌鈺教授的鑑識科學實驗室。



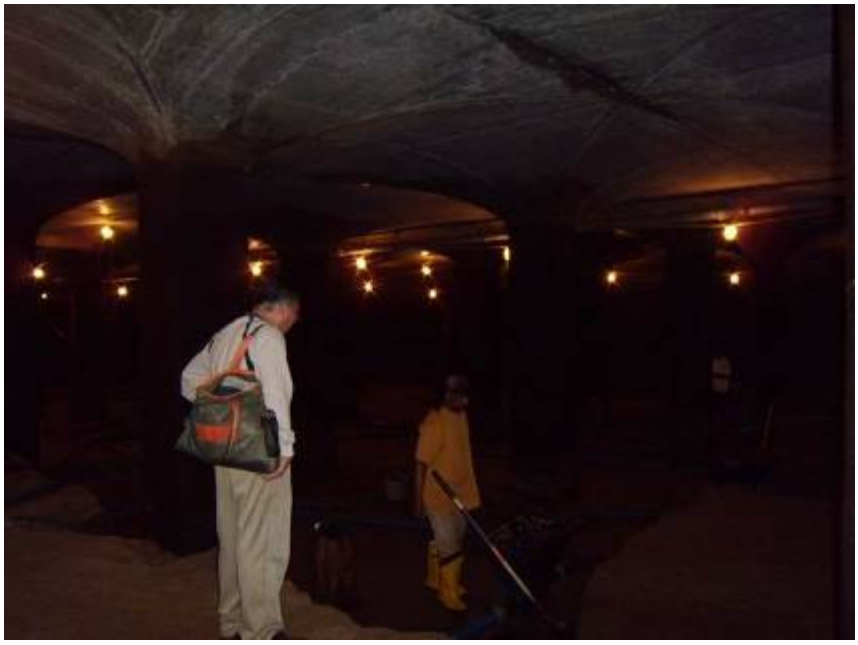
參觀康州 Hartford 地區的都會區水處理廠。

（Water Treatment Plants at The Metropolitan District）



參觀康州 Hartford 地區的都會區水處理廠。

（Water Treatment Plants at The Metropolitan District）



參觀康州 Hartford 地區的都會區水處理廠，工人正進行洗砂作業。

（Water Treatment Plants at The Metropolitan District）

參觀康州 Hartford 地區的都會區水處理廠，工人正進行洗砂作業。

（Water Treatment Plants at The Metropolitan District）

Waste Management Recycling 自動垃圾分類回收設施。

Waste Management Recycling 教育中心展示許多以廢棄物回收做成的藝術品。
（如回收的瓶蓋做成的椅子及廢光碟拼貼成天花板等）。

Waste Management Recycling 教育中心。

（回收瓶罐及電路板等廢棄物拼貼成牆壁）。

Waste Management Recycling 教育中心。

（回收廢光碟拼貼成天花板）。

莊簡任技正訓城出席會議。

莊簡任技正訓城擔任課程主講人。

莊簡任技正訓城擔任課程主講人。

阮所長國棟擔任課程主講人。

阮所長國棟擔任課程主講人。

陳處長方正 (右 1)與阮所長國棟 (中間)及莊簡任技正訓城 (左 1)合影。

附件二：2011 SETS 大會議程

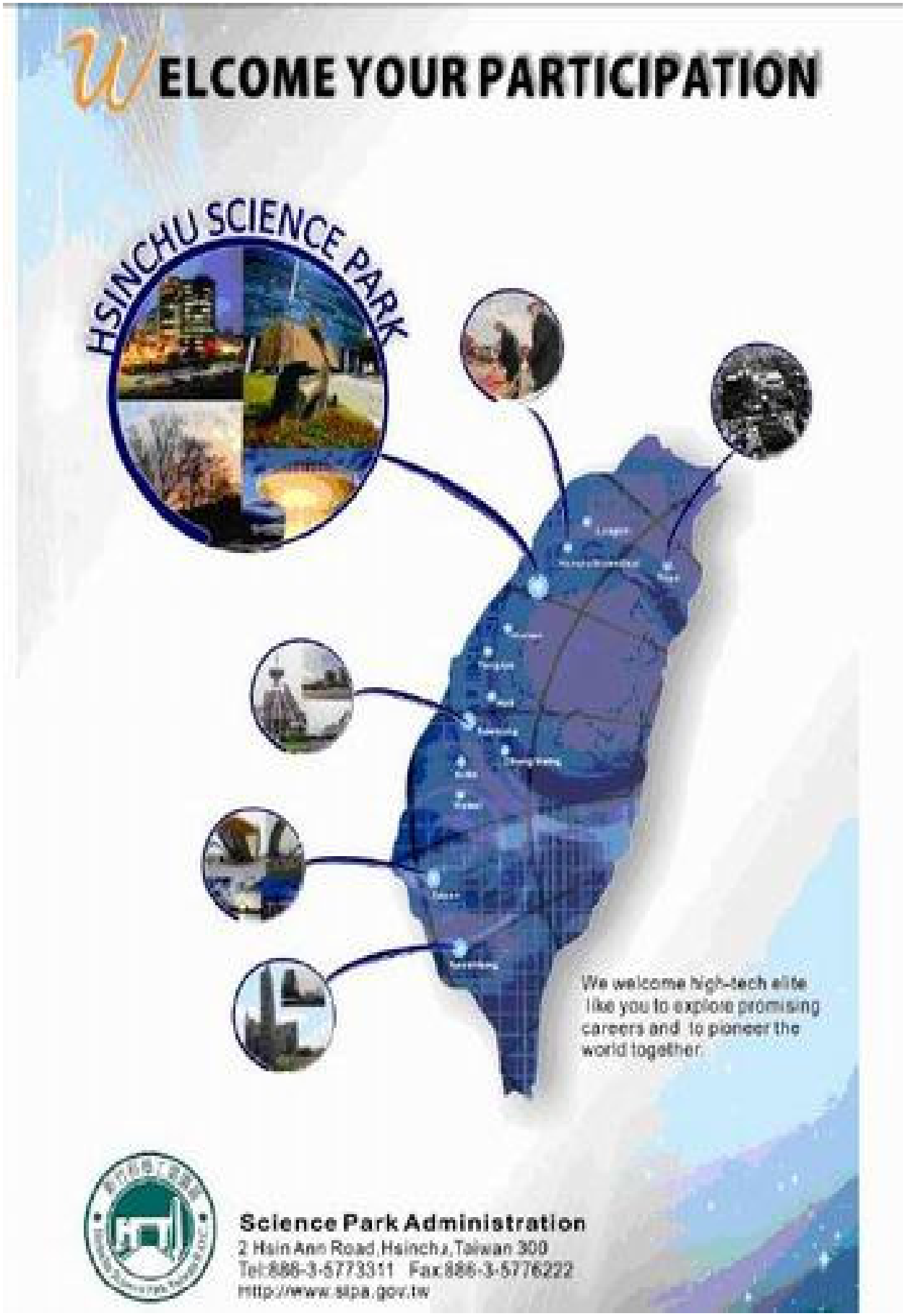

WELCOME YOUR PARTICIPATION
HSINCHU SCIENCE PARK
We welcome high-tech elite like you to explore promising careers and to pioneer the world together.
Science Park Administration
2 Hsin Ann Road,Hsinchu,Taiwan 300
Tel:886-3-5773311 Fax:886-3-5776222
http://www.sipa.gov.tw

Table of Contents

	Page
A Welcome Message from the President of ACAP, Janet Chung	1
Greeting – Al Green, Member of Congress, 19th District of Texas	2
Greeting – Pete Olson, Member of Congress, 22nd District of Texas	3
Greeting – Annise Parker, Mayor of the City of Houston	4
Program-at-a-Glance, Morning Sessions	5
Conference Center Floor Plan – Morning Sessions	6
Program-at-a-Glance, Afternoon Sessions	7
Conference Center Floor Plan – Afternoon Sessions	8
Session Information	9
Honorable Guest – Joseph F.C. Chen, Director-General, TECO	20
Keynote Speaker – Gwo-Dong Roam, Ph.D., P.E., Director, Environmental Analysis Laboratory, EPA, Executive Yuan, Taiwan, ROC	21
Distinguished Achievement Award – Edward T. Chen, Deputy Director, Solid Waste Management Department, City of Houston	23
Outstanding Service Award – Patricia Liu, Science and Technology Division, TECO	24
Leadership/Community Service Scholarship Recipient – Clint Wu, Bellaire High School	24
Leadership/Community Service Scholarship Recipient – Stiffi Hu, Clements High School	25
Acknowledgement	26
ACAP Officers and Staff, ACAP Board of Directors, ACAP Control Councilors and ACAP Advisors	27
SETS Conference Committee, SETS Collaborating Organizations & Presidents and SETS Conference Session Chairs	28
The Association of Chinese American Professionals - Fact Sheet	29
ACAP Membership Application Form	30

A Welcome Message from the President of ACAP

Janet Chung 鍾宜秀

Dear all,

Welcome to the 33rd annual Science, Engineering and Technology Seminar (SETS, 科學工程技術研討會)! The Association of Chinese American Professionals (ACAP, 美南國建協進會) has hosted SETS every year since the organization's inception in 1978. We are proud to continue our tradition with a day long exciting programs that we are sure you will benefit from.

This year theme is "Technology, Medicine, Business Management and Education." Our keynote speaker is Dr. Gwo-Dong Roam (Director of the Environmental Analysis Laboratory, EPA, Executive Yuan, Taiwan, ROC), who will give a talk about "Nitrogen and Phosphorous Recovery from Municipal and High-tech Industrial Waste Streams". Today's seminars will address the most significant and engaging topics, including: Nano Technology, Environmental Protection, Petroleum Production, Alternative Energy, Better Living, Financial Management, Education, Computer Technology and Health.

We believe this conference will offer you ample opportunity to gain new insights about the latest technology development on environment, nano, alternative energy, computer and others and network with fellow participants. We strive to make each year's conference interesting and relevant to you. Please give us your feedback and share ideas with the session chair(s).

In addition to SETS, ACAP also organizes an annual diversity summit conference. The Diversity Summit (DS, 多元化高峰會議) offers a full day of seminars and network opportunities for employers and professionals seeking to maximize their effectiveness in today's diverse workplace. Over 400 professionals from business, government, community and academic sectors attended.

This year, we hosted the 11th Diversity Summit on May 20, 2011. The theme was "Embracing Diversity and Inclusion in the New Economy" Keynote speakers were George Greanias (President/CEO, METRO), Irma Diaz-Gonzales (President/CEO, Employment Training Centers and Chairwoman, Houston Hispanic Chamber of Commerce), Dr. Michael Williams (Trustee District IV, Houston Community College) and Jason Jew (President, Reliant Energy) as the lunch keynote speaker.
It has been an honor serving as the 33rd president of ACAP, and on behalf of the organization, I would like to thank our volunteers, sponsors and partners for their dedication and support, without which SETS and DS would not be possible. We are sincerely grateful to all for their ongoing commitment to ACAP.

We are delighted you are here and hope you will find today's conference informative and enriching. We have been looking forward to the day with great anticipation, so let's get started.

Enjoy!

HOUSE OF REPRESENTATIVES
WASHINGTON, D. C. 20515

AL GREEN
9TH CONGRESSIONAL DISTRICT
HOUSTON, TEXAS

June 4, 2011

Dear Friends:

It is with great pleasure that I take this opportunity to welcome the attendees of the Association of Chinese Professionals (ACAP) 2011 Annual Conference and Science, Engineering and Technology Seminar (SETS). I salute all the organizers and participants on their commitment to making this a memorable event.

As Congressman of the Ninth Congressional District of Texas, I commend the Association of Chinese American Professionals for their dedication to foster professional development and leadership within its membership. The invaluable role it plays in promoting science, engineering and engineering is admirable.

I look forward to working with the Association of Chinese American Professionals on future endeavors and serving you well as a Member of Congress. Best wishes to all for an exciting and enjoyable event.

Sincerely,

Al Green
Member of Congress

PETE OLSON
22nd District, Texas

COMMITTEE ON
ENERGY AND COMMERCE

Congress of the United States
House of Representatives
Washington, DC 20515

June 4, 2011

美南國建協進會

The Association of Chinese American Professionals
Annual Science, Engineering, and Technology Seminar (SETS).

敬愛的
Dear Friends,

On behalf of the residents of the 22nd District of Texas, I would like to personally welcome and congratulate the Association of Chinese American Professional on your 33rd Annual Science, Engineering and Technology Seminar. It is with great honor that I welcome you to Sugar Land Texas for this gathering.

The Chinese American Professional Community is vital to the economic success of the Houston area; you are deserving of recognition. Since 1978 ACAP has worked hard to bring together Chinese American Professionals to share experiences, information and ideas with an emphasis on Science, Engineering and Technology. As a member of the Energy and Commerce Committee in the U.S. House of Representatives, I understand how important our critical energy sector is in the Houston area; it is professionals like you that drive the success of that sector.

Again thank you for giving me the opportunity to recognize your worthwhile organization and its contribution to our community.

It is an honor to represent you in the United States House of Representatives.

順頌鈞安
Respectfully,

Pete Olson

Pete Olson
Member of Congress

CITY OF HOUSTON
Office of the Mayor

Annise D. Parker
Mayor
P.O. Box 1562
Houston, Texas 77251-1562

June 4, 2011

Greetings,

As Mayor of Houston, I congratulate the **Association of Chinese American Professionals (ACAP)** on its 32nd anniversary and for hosting its annual **Science, Engineering, and Technology Seminar (SETS).** **SETS** provides a platform for bringing together many scientific, medical, business, and educational communities.

ACAP works with various peer organizations to offer sessions ranging from nano and composite technology, petroleum production, environment protection service, medical, teaching opportunity and advancement, business management and tax planning, business information management, cancer research and better living at the event.

I commend those who have worked diligently at **ACAP** and extend best wishes to all for a successful event. I am confident your business will continue to make a significant impact in our community for years to come.

Sincerely,

Annise D. Parker
Mayor

二零一一年年會暨科學工程技術研討會
2011 Science, Engineering and Technology Seminars (SETS)

Sugar Land Marriott Hotel
Saturday, June 4, 2011

Program-at-a-Glance
Morning Sessions

7:30am | 8:30am	Speakers and Chairs Breakfast (Sugar Land Ballroom VI)		
8:00am | 9:00am	Registration (Ballroom Foyer)		
8:30am | 12:00pm	Nano Technology Session 【奈米科技講座】	Sugar Land Ballroom VII	Nano & Composite Technology 奈米及複合技術 Co-Chairs : Dr. Su-Seng Pang and Dr. Howard Paul 主持人：彭樹成博士, 潘浩倫博士
9:00am | 12:00pm	CPA- Financial Management Session 【專業會計師 - 財務管理講座】	Magnolia I - III	From Tax Return to Financial Planning 所得稅報稅規定與財務規劃 Co-Chairs : Eileen Chin, CPA and Stella Kim, CPA 主持人：林威珍會計師, 張欣美會計師 休士頓美會計師協會協辦
	Education Session 【教育講座】	Cane I – III	Education Profession in the Twenty-First Century Chair : Dr. Hsin-Hui Grace Lin and Dr. Irene Linlin Chen 主持人：林欣慧博士, 陳琳琳博士
	Environmental Science Technology Session 【環保科技講座】	Sugar Land Ballroom VIII	Environmental Sustainable Development 永續環保發展 Chair: Edward Chen 主持人：陳天生 美南環保協會協辦
	Petroleum Technology Session 【石油技術講座】	Sugar Land Ballroom IX	Technology and Soft Skills of the Petroleum Industry Co-Chairs : Dr. Tai-Chang Shih and Dr. Chia-Hao Ko 主持人：史大器博士, 葛家豪博士 美國華人石油協會協辦

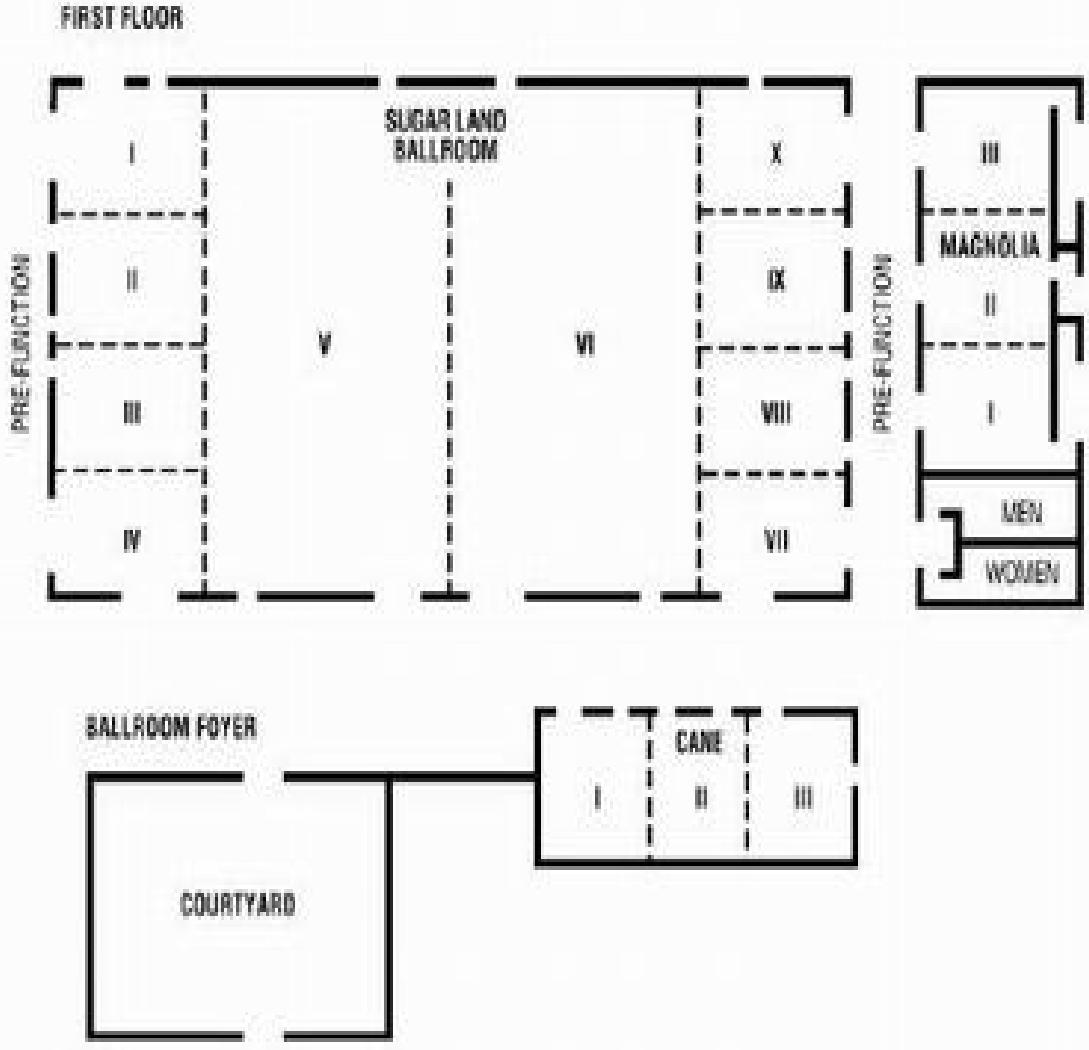
二零一一年年會暨科學工程技術研討會

2011 Science, Engineering and Technology Seminars (SETS)

Sugar Land Marriott Town Square

June 4, 2011

Conference Center Floor Plan



All activities are located on the first floor.

二零一一年年會暨科學工程技術研討會

2011 Science, Engineering and Technology Seminars (SETS)

Sugar Land Marriott Hotel
Saturday, June 4, 2011

Program-at-a-Glance
Afternoon Sessions:

12:00pm – 2:15pm	Luncheon and Keynote【午餐及專題演講】(Sugar Land Ballroom VI) • Welcome Remark : Joseph Fong-Cheng Chen, Director-General, Taipei Economic and Cultural Office in Houston 駐休士頓台北經濟文化辦事處陳方正處長 • Proclamations Presentation : Alice Chen (陳秋曉) for US Congressman Al Green Edward Chen (陳人士) for City of Houston Mayor Annise Parker • Keynote Speaker : Gwo-Dong Roam, Ph.D., P.E., Director, Environmental Analysis Laboratory, EPA, Executive Yuan, Taiwan, ROC 中華民國 行政院環境保護署環境檢驗所 阮國棟所長 Topic: Nitrogen and Phosphorous Recovery from Municipal and High-tech Industrial Waste Streams 半導體高科技工業廢水氮磷回收 • Award Presentation : Chi-Chung Chang (張啓中) Distinguished Achievement Award : Edward T. Chen (陳人士), Deputy Director, Solid Waste Management Department, City of Houston Outstanding Service Award : Patricia Liu (劉梅明), Science and Technology Division, TECO • Leadership Community Service Sholarship Presentation : Judy Wen (文 平) Scholarship Recipients : Steffi Hu (胡瑞欣), Clements High School Clint Wu (吳皓彥), Bellaire High School		
2:30pm – 5:30pm	Alternative Energy Session 【替代能源議題】	Sugar Land Ballroom VII	From LED Lighting to Electric Car Chair : Dr. Steven Pei 主持人：白光復博士
	Better Living - GFCBW Session 【生活議題】	Cane I- III	Better Living 生活議題 Co-Chairs : Lilly Wei and Annie Jow 主持人：魏麗莉, 周秀美 世界華人工商婦女企管協會美南分會協辦
	Computer Technology Session 【電腦科技議題】	Sugar Land Ballroom VIII	Social Networking and Mobile Computing Chair : Sherry Teng 主持人：丁幼萍 華人電腦協會協辦
	Health Session 【健康議題】	Magnolia I - III	New Development in Contemporary Cardiology 心血管疾病醫療新知 Co-Chairs : Karl K. Chen, M.D., Ph.D. and Grace Chen, Ph.D., R.N. 主持人：陳慶元醫師, 陳玉娟博士

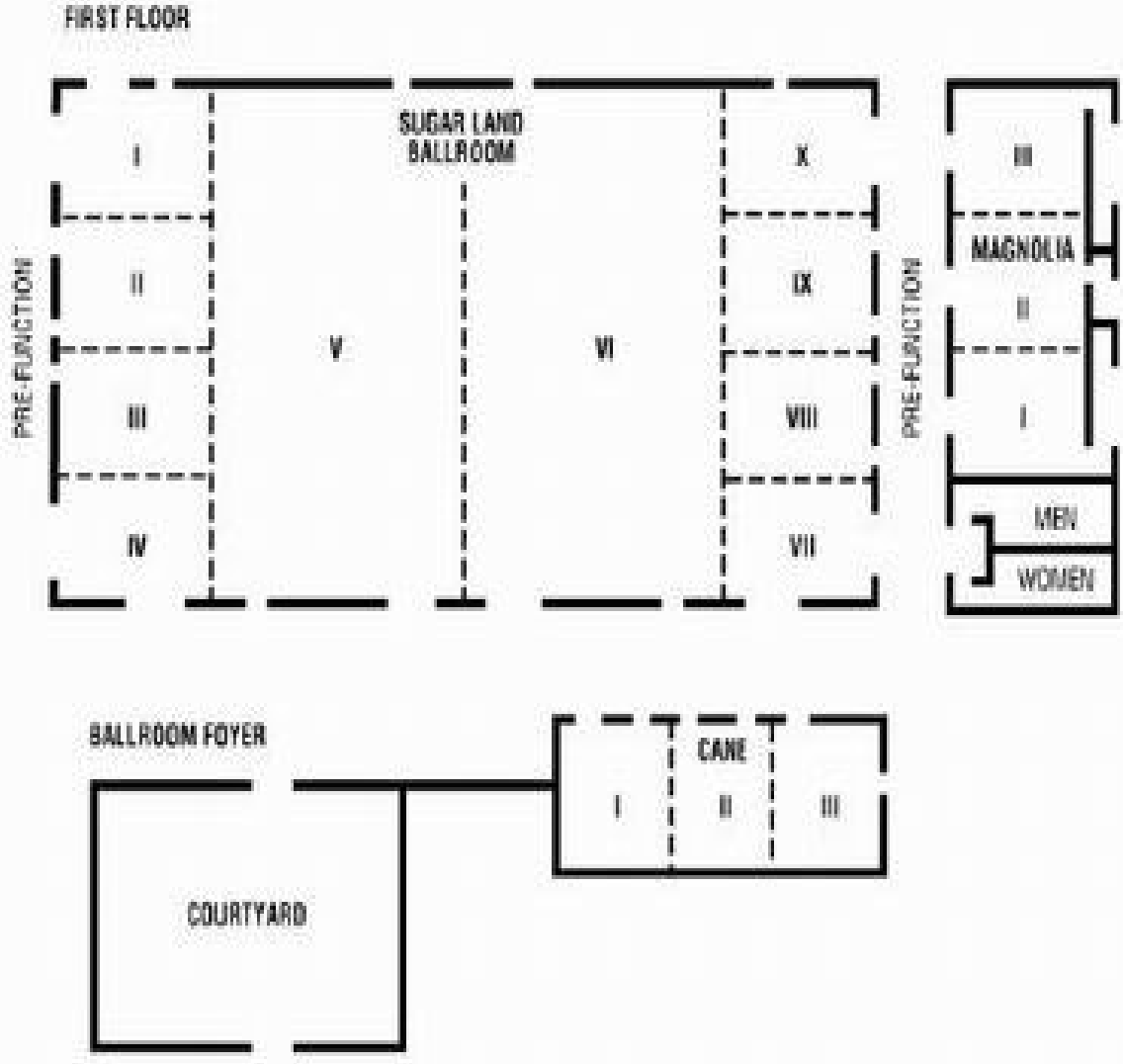
二零一一年年會暨科學工程技術研討會

2011 Science, Engineering and Technology Seminars (SETS)

Sugar Land Marriott Town Square

June 4, 2011

Conference Center Floor Plan



All activities are located on the first floor.

Session Information

Time	Session — Room: Sugar Land Ballroom VII
8:30am-12:00pm	**【Nano Technology Session】【奈米科技講座】** **Co-Chairs : Dr. Su-Seng Pang (彭樹成), Louisiana State University** **Dr. Howard Paul (浦海德), P.E. ACAP Former President** **Theme : Nano and Composite Technology　　主題：奈米及複合科技** **Speaker: Dr. Dmitri Lapotko, Rice University** Topic: Nanotechnology for Treating Cancers **Speaker: Dr. Shin-Shem Steven Pei (白先儒), Professor, University of Houston** Topic: Graphene: The Next Generation Display and IC Technology? (Co-authors: Wei Wu, Qinghai Yu, and Jiming Pao) **Speaker: Dr. Guoqiang Li (李國強), Joint Associate Professor,** Southern University/Louisiana State University Topic: A Bio-Mimetic Self-Healing Composite **Speaker: Dr. M.A. Wahab, Associate Professor, Louisiana State University** Topic: The Degradation of Shape Memory Polymer due to Immersion in Fluids (Co-authors: M.N.H. Nahid, M.A. Wahab, Kun Lian, and Su-Seng Pang) **Speaker: Dr. Kun Lian(連昆), Senior Visiting Professor, Southern University** Topic: Unique Cu-C Core-Shell Nanoparticles – Fabrication and Properties **Speaker: Dr. Kaiyang Wang (王開陽), Research Associate, Louisiana State** University Topic: Deposition of Silicide Based Protective Coatings on C-103 Niobium Alloy (Co-authors: Kaiyang Wang and Shengmin Guo) **Speaker: Dr. Zhenyu Ouyang (歐陽震宇), Assistant Professor, Southern University** Topic: An New Pure Mode-I Fracture Test Method of Hybrid Joints **Speaker: Dr. Su-Seng Pang (彭樹成), Professor, Louisiana State University** Topic: Effect of Piezoelectric Actuation on a Loaded Circular Beam (Co-authors: Calicia Johnson, Amit Maha, Jones Nji, and Su-Seng Pang) **Earn up to 3.5 hours of Professional Development Hours (PDH) by attending this session. Certificate will be issued after conference.**

Time	Session	Room: Magnolia I - III
9:00am-12:00pm	**【CPA - Financial Management Session】** **【專業會計師 - 財務管理講座】** 休斯華美會計師協會協辦 **Co-Chairs : Eileen Chiu, CPA (林建玲會計師)** **Stella Kim, CPA (張欣美會計師)** **Theme : From Tax Returns to Financial Planning** **主題：所得課稅規定與財務規劃** **Speaker: Andy Jan, CPA 詹炳彰 會計師** 講座題目：健保法的影響 • Impact of Health Care Reform • Healthcare Credit for Small Business On March 23, 2010, the Patient Protection Affordable Act was signed by President Obama. The impact of this act is now beginning to be felt by individuals. This presentation will focus on what changes there will be. **Speaker: Bonnie Feng, CPA/PFS, CFP, 馮波 會計師 財務規劃師** 講座題目：稅務規劃，遺產及贈與稅實例研討，企業繼承方案， 國際稅務-轉讓定價及其他。 • Tax Rate Shifting Strategies • Estate & Gift Planning for 2011 + 2012 Case Studies • Business Succession Planning • International Tax Issues – Transfer Pricing and Other How an analysis of tax return and other tax strategies helps retain clients and improve client satisfaction. 依照美國會計師協會之規定，專業會計師執照持有人每年需進修若干小時，本課程與下午電腦講座綜合予美國會計師協會之規定，可算八小時進修學時。	

Time	Session	Room: Cane I – III
9:00am-12:00pm	**【Education Session】【教育講座】** **Co-Chairs : Dr. Hsin-Hui Grace Lin (林欣慧), University of Houston –Victoria, ACAP Life Member** **Dr. Irene Linlin Chen (陳琳琳)** **Theme : Education Profection in the Twenty-First Century** **Speaker: Dr. Irene L. Chen (陳琳琳)** Topic: Applying Technology in the classroom The workshop will demonstrate useful tips to allow teachers make effective integration of technology in classrooms. Focus will be on PowerPoint animations, action buttons, hyperlinks and move on to Web 2.0 tools for teaching and learning. **Speaker: Dr. Hsin-Hui Grace Lin (林欣慧), and Dr. Lynn S. Freeman** Topic: E-Professional Educator Portfolio This workshop will demonstrate how to compose an e-portfolio that will demonstrate your most relevant teaching skills and experiences. You'll see examples of outstanding portfolios and learn shortcuts and hints that may make your portfolio stand out from the others. An e-portfolio is a valuable recruiting and promotion tool. **Earn Credit of Continuous Education by attending Education Session. Certificate will be issued after conference.**	

Time	Session Room: Sugar Land Ballroom VIII
9:00am-12:00pm	**【Environmental Science Technology Session】【環保科技講座】** **Chinese-American Society of Environmental Protection and Safety (CASEPS) 美南環保協會協辦** **Chair：Edward Chen (陳天生), City of Houston, CASEPS President** **Theme：Environmental Sustainable Development 主題：永續環保發展** **Speaker: Vance Nobe, CEO, Akuri Energy** Topic: Clean Energy – A Sustainable Development **Speaker: Henry Chiu, Assistant Manager, Gulf Coast Waste Disposal Authority** Topic: Industrial Waste Disposal **Speaker: Alan Bachrach, Director of Recycling Operations – South Texas Area – Waste Management** Topic: Recycling Today at Waste Management **Speaker: Clive Hess, Vice President, Computer Cycle** Topic: Electronic Recycling – Responsible Recycling (R2) Certification **Speaker:** S.C. Chuang (莊樹城), Senior Specialist, Department of Air Quality Protection and Noise Control, EPA, Taiwan , ROC Topic: 我國移動污染源管制策略

Time	Session Room: Sugar Land Ballroom IX
9:00am-12:00pm	**【Petroleum Technology Session】【石油技術講座】** **Chinese American Petroleum Association 美國華人石油協會協辦** **Co-Chairs：Dr. Tai-Chang Shih (史大昌), Consultant** **Dr. Chia-Hao Ko (葛家豪), SBM Atlantia Inc., ACAP Life Member** **Theme：Technology and Soft Skills of the Petroleum Industry** **Speaker: Dr. Tai-Chang Shih (史大昌), Consultant** **Topic: The "Soft" Skills in E&P 探勘生產之柔性技** **Speaker: Mark Chang (張永綱)** **Topic: Recent Advancements in Marine Seismic Acquisition** **Speaker: Dr. Eddy Lee (李伯逸), Sr. Seismic Interpreter, Shell** **Topic: Visualization Techniques for Assessment of a Channel System as a Potential Geohazard** **Speaker: Dr. Chia-Hao Ko (葛家豪), Structural Engineer, SBM Atlantia Inc.** **Topic: An Overview of FPSO Design and Application**

Time	Session	Room: Sugar Land Ballroom VI
12:00pm – 2:15pm	**【Luncheon and Keynote】【午餐及專題演講】** Mistress of Ceremony: **Betty Tung**, ACAP President-Elect 鄧寶印準會長 • **Introduction: Janet Chung**, ACAP President 鍾宜秀會長 • **Welcome Remarks: Joseph Fong-Cheng Chen**, Director-General, Taipei Economic and Cultural Office in Houston 駐休士頓台北經濟文化辦事處 陳方正處長 • **Proclamation: Presentation:** **Alice Chen (譚敏晴)** for US Congressman Al Green **Edward Chen (陳天生)** for City of Houston Mayor Annise Parker • **Lunch** • **Keynote Address:** Speaker: **Gwo-Dong Roam**, Ph.D., P.E., Director, Environmental Analysis Laboratory, EPA, Executive Yuan, Taiwan, ROC 中華民國 行政院環境保護署環境檢驗所 阮國棟所長 Topic: **Nitrogen and Phosphorous: Recovery from Municipal and High-tech Industrial Waste Stream:** 市鎮及高科技工業廢水氮磷回收 • **Award Presentation: Chi-Chung Chang (張濟群)** • ACAP 2011 Distinguished Achievement Award: **Edward Chen (陳天生)**, Deputy Director, Solid Waste Management Department, City of Houston • ACAP 2011 Outstanding Service Award: **Patricia Liu (廖雅明)**, Science and Technology Division, TECO • **Leadership/Community Service Scholarship Presentation: Judy Wen (文羊)** • Formosa Plastics Corporation Scholarship - **Steffi Hu (胡琬筱)**, Clement High School • Lovett Homes Scholarship - **Clint Wu (吳格嘉)**, Bellaire High School

Time	Session	Room: Sugar Land Ballroom VII
2:30 pm- 5:30 pm	**【Alternative Energy Session】【替代能源講座】** **Chair：Dr. Steven Pei (裴先慎) - University of Houston** **Theme：From LED Lighting to Electric Car** **Speaker: William Yang (楊伯興)** Topic: LED – Light for the Future Light-emitting Diode (LED) is an emerging technology that promises to fundamentally alter lighting in the future. It offers tremendous potential to save energy and enhance the quality of lighting in building environments. This presentation will discuss the basics of LED technology, how LEDs work, technical issues related to LED, LED applications, LED market barriers, and US government's efforts to facilitate advances in LED technology and bring it to the market. Also discussed will be the comparison between LED and other lighting technologies, and the potential energy savings of LEDs. Several LED lighting products will be shown in this presentation. **Speaker: Dr. Debbie Chin (陳曉曦), Global Director of Research and Development, Dow Chemical** Topic: Global Trend and Opportunity for Lithium-Ion Battery The Lithium-Ion battery market is poised to play a major role in the emerging "clean tech" economy. Few new technologies have received as much focus and hype over the past several years about its multiple uses and transformative ability. Lithium-Ion technology has seen a rare convergence of support from the business community, political leaders, researchers, and investors in the US, China, EU, as well as the other major industrial countries. It is thought to be so crucial to the future economy that in the US president, President Obama, called the creation of domestic manufacturing capacity of Lithium-Ion batteries a "national security issue." In an unprecedented move, the US invested over $1.5 billion in research and manufacturing. China is also in the process of spending billions to develop this market and the Europeans are beginning to turn the corner and invest heavily in this segment as well. The market for lithium-ion batteries has become substantial, not only for the cells and batteries but also for the raw materials that go into the cell components. Lithium-ion batteries offer several advantages over other types of secondary batteries, including lighter weight and higher energy density. These advantages make them ideal for use in portable electronic devices. Due to their success in these applications, they are under development for other applications, such as electric vehicles (EVs), hybrid-electric vehicles (HEVs) and specialty battery applications.

Speaker: Dr. Phil Chou (周大和), Regional Manager, AVC
Topic: Lithium-Ion batteries for world EV/PHEV/HEV market and technology overview

Electric vehicles will reach 3% of world new car market in 2015 and 5% in fast-emerging China market by 2012. Among them, 35% will be with Lithium-Ion batteries. The presentation will discuss from basic of Lithium-Ion battery (Cathode, anode, separator, and electrolyte) and performance indexes (energy density, power density, life cycle, and safety).

It will also show the diversities of performance requirement and battery selections among HEV (Hybrid Electric Vehicles, PHEV (Plug-in Hybrid Electric Vehicle), and EV (Electric Vehicle).

Speaker: Mike Lin (林明村), Delta Products Corp.
Topic: Green Energy Solutions and Applications in US

Time	Session	Room: Cane I – III
2:30 pm- 5:30 pm	**【Better Living Session】【生活講座】** **GFCBW 世界華人工商婦女企管協會美南分會協辦** Co-Chairs : **Lilly Wai (魏麗莉)** **Annie Jow (鄭秀美)** Speaker: **Jean Lin (林琬貞)** Topic: Prevention of Sports and Dance Injuries Everyone knows that exercise is important to the health. More and more sign up for membership at gyms and health clubs. Dancing has become more popular, especially among Chinese. Aching part of or all of the body, even though exercising regularly is not uncommon. To gain maximum benefit of exercises, one needs to know how to prevent injuries. The objectives of this seminar are to understand sports and dance injuries, choose right kind of exercise, ergonomics and body mechanics, and prevent sports and dance injuries. Speakers: **Katy Chen (陳台煌) and Vilma Gonzalez** Topic: Zumba Fitness It's Cha-Cha, it's Salsa, it's Hip-hop ... it's dance fitness. Kick off your heels, put on your tennis shoes and enjoy what's the most talk in town, Zumba. Let the music moves you.	

Time	Session Room: Sugar Land Ballroom VIII

2:30 pm-5:30 pm	**【Computer Technology Session】【電腦科技講座】**
	
	華人電腦協會協辦
	
	Chair：Sherry Teng (丁的珍)
	
	Theme：Social Networking and Mobile Computing 主題：社交網路與移動計算
	
	Speaker: John Fwu (符濟群)
	Topic 1: The Impact of Social Networking on Society 社交網路對社會的衝擊
	From finding the lost child to overturn the dictator, social networking impact to everyone's life – with few case studies.
	從尋找失落的孩子到推翻獨裁者，由幾個例子來看社交網路對今日人們的衝擊。
	Topic 2: Survival Guide: Online Social Networking 社交網路入門
	From personal to business-oriented social networking - Facebook, Twitter, LinkedIn. Networkings that connect Customers and business owner - Yelp, Google.
	由個人到商業上的社交網路服務 - 臉書，推特， LinkedIn； 聯繫客戶及業主的網絡 - Yelp, 谷歌
	
	Speaker: Jessie Wang (汪乃強)
	Topic: Mobile Computing – A Smart Evolution 移動計算之演變
	Smartphones and tablet computers have been commercially available for a long time, but when it comes to network computing, only until recently had they become mainstream. In this seminar we will discuss the recent development in both markets and what makes them so popular.
	智慧型手機和平板電腦已經被商業化了很長時間，但是當涉及到網絡計算，直至最近它們成為主流。在這個研討會，我們將討論在這兩個市場的最新發展，以及是什麼讓他們如此受歡迎。
	Specific Topics:
	• Cloud Computing and Server Virtualization
	• Mobile vs. Desktop Computing
	• Mobile Computing – Case Studies & Demo
	  • 3G vs.4G
	  • iPad2, Kindle,
	  • Tablets - Microsoft, RIM, Motorola Xoom, Samsung Galaxy and iPad/iPad2
	• iPad & iPhone
	  • Verizon vs. AT&T
	  • 3G vs. 4G
	  • Mobile computing with iPhone, iPad and laptop
	• Recent Trend
	• Discussion

Time	Session	Room: Magnolia I - III
2:30 pm- 5:30 pm	**【Health Session】【健康講座】** **Co-Chairs：Karl K. Chen, M.D., Ph.D. 陳康元醫師** **Grace L Chen, Ph.D., R.N. 陳王琳博士** **Theme：New Development in Contemporary Cardiology** **主題：心血管疾病醫療新知** **Speaker: Dr. Sherman Tang (唐紹賢醫師), M.D. FACC, FSAI** Topic: Therapeutic Intervention in Contemporary Cardiology 現今心血管疾病之最新療法 This presentation will provide an overview of current treatment options in cardiovascular disease in a layman level, including carotid stenting, coronary intervention via transradial approach, transcatheter aortic valve implantation, endovascular aortic aneurysm repair and peripheral intervention. **Speaker: Dr. Hue-Teh Shih (施惠德醫師), M.D., FACC, FAHA, FHRS** Topic: New Development in Cardiac Electrophysiology 心電生理學之簡介與新知 Various aspects of interventional cardiac electrophysiology and devices will be introduced, including monitors, pacing, defibrillation, heart failure treatment such as cardiac resynchronization and contractility modulation, as well as cardiac imaging, ablation modalities, and safety measures. **Speaker: Dr. Karl K. Chen (陳康元醫師), M.D.,Ph.D.** Topic: Lifestyle, Emotion, and Cardiovascular Fitness 生活模式，情緒，和環境對心血管健康之影響與控制 Criteria for blood pressure, cholesterol, body mass index and blood glucose will be introduced with discussion to follow on how to improve the health and fitness of your heart and blood vessels, including lifestyle changes involving diet, exercise and quit smoking.	

Honorable Guest

Joseph F. C. Chen

Director-General, Taipei Economic and Cultural Office in Houston

駐休士頓台北經濟文化辦事處 陳方正處長

Director-General Joseph F.C. Chen graduated from Soochow University, Taipei, Taiwan in 1970 with a LL.B. degree. He joined the Ministry of Foreign Affairs (MOFA) in 1972. He has served overseas as the Deputy Representative of the Taipei Economic and Cultural Representative Office in India. Other assignments abroad have taken him to Panama, New Zealand and Washington, D.C. Before coming to Taipei Economic and Cultural Office in Houston (TECO- Houston) in March 2008, he was the Deputy Director-General of General Affairs for MOFA.

陳方正處長畢業於私立東吳大學法律學系，于民國 61 年進入中華民國外交部工作。陳處長是外交領事人員第 14 期訓練班畢業，並通過 57 年普考外交行政人員及 69 年外交特考。陳處長曾任外交部駐印度代表處副代表，並曾服務於駐美國代表處、駐紐西蘭代表處、駐巴拿馬共和國大使館。陳處長在接任駐休士頓台北經濟文化辦事處處長前是擔任外交部總務司副司長。

主要經歷：
外交部總務司副司長
駐印度代表處組長、副代表
外交部總務司副司長
駐美國代表處簡任一等秘書、副組長
外交部總務司科長
駐紐西蘭代表處秘書
外交部國際組織司薦任科員
駐巴拿馬共和國大使館主事
外交部總務司科員

Keynote Speaker

Gwo-Dong Roam, Ph.D., P.E.
Director, Environmental Analysis Laboratory
EPA, Executive Yuan, Taiwan, ROC
中華民國 行政院環境保護署環境檢驗所 阮國棟所長

As a professional engineer and senior government official, **Dr. Gwo-dong Roam** has been working in the environmental engineering and management field. In 1973, after finishing graduate school, Dr. Roam began working for the Industrial Technology and Research Institute, one of the largest nonprofit R&D institutions in Taiwan, to develop pollution abatement technology and offered technical assistance to industries.

His specialties include: anaerobic biological phenomena, advanced oxidation processes, hazardous waste treatment and groundwater remediation. His know-how and patents on the UASB (Upflow Anaerobic Sludge Bed) process have been commercialized full-scale and applied in hundreds of facilities in various industries worldwide.

Dr. Roam joined the Taiwan Environmental Protection Administration (TEPA) in 1989 after passing the senior civil service examination. He has been continually and extensively involved in various TEPA's polices and implementation projects. He has served as director general in four TEPA departments (Environmental Monitoring & Information, Environmental Sanitation & Toxic Substance Control, Water Quality Protection, Office of Science & Technology Advisors). During his tenure, he has offered innovative approaches and proposed response plans for long-term unresolved environmental problems. He has also endeavored to acquire budget allocations, helped to revise outmoded regulations and expand personnel and the organization. Proposing the pig farming prohibition and compensation project in five major river basins when serving as Director General of the Water Quality Protection Department (1995-2001) was one of his salient achievements. The project involved three years of planning, two years of negotiating with stakeholders, and finally two years of implementation. He has earned the reputation as a problem-solver.

From 2001 to 2002, Dr. Roam served as Lead Shepherd for the APEC Marine Resource Conservation Working Group. He was the overseer of two APEC projects (1998-2003): Ocean Model and Information System in the APEC Region, Development and Validation of Phycotoxin Analytical Methods, Standards and Reference Materials for Seafood Product Certification and Safety. He was also the editor-in-chief of *Environmental Policy Monthly*, TEPA's English publication.

Dr. Roam has been a visiting professor in the Graduate School of Environmental Engineering at the National Chiao-Tung University and the National Central University for 23 years. He offers a 3-credit course each year and serves as the dissertation advisor for graduate students.

Dr. Roam has 2 patents, edited 5 books and published and presented more than 200 technical papers, all in the field of environmental control and convergent technology.

Dr. Roam is married with three kids. He enjoys reading science and technology-related books, e.g., molecular biology, nanotechnology, jogging, hiking, and tennis.

Keynote Address

Nitrogen and Phosphorous Recovery from Municipal and High-tech Industrial Waste Streams

市鎮及高科技工業廢水氮磷回收

Gwo-Dong Roam, Ph.D., P.E. 阮國棟所長

Director, Environmental Analysis Laboratory,
EPA, Executive Yuan, Taiwan, ROC
中華民國 行政院環境保護署環境檢驗所

Tel: 886-3-491-1006
Fax: 886-3-491-5460
Email: gdroam@mail.niea.gov.tw
Website: www.niea.gov.tw

To be delivered on behalf of Taiwan EPA Minister Dr. Stephen Shu-hung Shen, the presentation will include some major recent events that could have a long-term effect on Taiwan's future environmental policy. The Ministry of Environment and Natural Resources will be established on 1 January 2012 to encompass water, land, forest and mineral resource in order to integrate environmental protection and ecological conservation. Another political tipping point on the economy vs. environment balancing act is the announcement made by President Ma Ying-Jeou regarding his decision to ask the state-owned CPC Corporation to withdraw its investment in the naphtha cracking complex, known as Kuokuang Petrochemical Project. We anticipate the positive long-term effect of this decision. Without a doubt, EPA Minster Stephen Shen has already made great strides in making Taiwan cleaner and greener, but there is still much to be accomplished for the country to become a "beautiful and low-carbon island."

Nowadays, resource recovery from wastewater has become more and more important. Progress in the high-tech and emerging industries, such as wafer, semiconductor, and TFT-LCD (thin-film transistor liquid crystal display) is promising in Taiwan. However, wastewater discharge from these industries remains a major concern. For municipal wastewater, the traditional biological aerobic and anaerobic process can enhance the nitrogen and phosphorus recovery from 40% to as high as 90%. Fluidized bed crystallization unit follows the traditional biological process is recommended. For industrial wastewater, magnesium salts have low reactivity with fluoride, therefore, can be a good separator for phosphorus from fluoride ions. Selective precipitation of phosphorus from semiconductor and TFT-LCD waste streams as the forms of magnesium phosphate precipitates seems a promising approach.

Distinguished Achievement Award

Edward T. Chen 陳天生

Deputy Director, Solid Waste Management Department
City of Houston, Houston, Texas, U.S.A.

As Deputy Director of the Houston's Department of Solid Waste Management Department, **Mr. Chen** leads the South Operations, as well as the totality of municipal recycling. These responsibilities include management and oversight of an operation consisting of more than 230 FTE's and an annual budget of $12 million.

Those operations consist of automated garbage collection, heavy trash/ tree waste collection, and bio-bag yard waste, curbside/drop-off recycling and household hazardous waste (HHW), as well as leadership of all Houston's recycling and environmental resources program. Mr. Chen has more than 35 years experience in environmental pollution control with emphasis on municipal solid waste collections, recycling, waste minimization/prevention, waste to energy, landfill disposal, household hazardous waste, end user markets, recycled products procurement, waste audit, material recovery facility (M.R.F.), biomass, and CO2 reduction. The award-winning public-private recycling partnership Mr. Chen developed many recycling programs has saved Houston millions of dollars, which were used to implement comprehensive recycling program. He also organized the Houston Environmental Summit.

Mr. Chen has represented the City of Houston at numerous State and Federal conferences. In 2002, he was appointed by the Mayor of Houston to be Environmental Protection Coordinator and Advisor to the Shanghai (China) Municipal Government. In 2004, he received Honorable Mention and President's Award from the Recycling Alliance of Texas for outstanding leadership in solid waste and recycling. In 1993, he received the U.S. Conference of Mayor's Municipal Solid Waste Management Association National Fellowship Award, given in recognition of outstanding contributions in the field of solid waste. In 1998, he received the Chairman's Award for his outstanding leadership in Houston's recycling efforts from the Houston Corporate Recycling Council. In 1999 and 2002, as mayoral appointee, he was a delegate of the Mayor's Business Development Mission to Asia to promote business development in the area of environmental protection. He was a keynote speaker at "Contamination Clean Up 07," an industry summit held in Australia in June of 2007, and a keynote at "International Conference on Waste Management and Technology" hosted by Tsinghua University, China in 2009.

Mr. Chen holds a B.S. in Biology and Chemistry from Northwestern Oklahoma State University, and an M.S. in Environmental Health from the University of Arkansas. He has taught college courses in solid waste management and environmental health as an adjunct faculty member.

Outstanding Service Award

Patricia Liu 莊維明

Patricia Liu started her involvement in the registration at SETS when her husband, Billy, was the Executive Secretary of ACAP in 1989. Since then, she has been in charge of the registration at SETS for 22 years and at the Diversity Summit for 11 years. Her devotion to the ACAP is noticeable whenever you approach the registration table. Don't be surprised to hear your name before you even introduce yourself. Patricia also actively assists the ACAP by obtaining the cooperation of various agencies in Taiwan through the creation of joint seminars. She received the Distinguished Service Award from the ACAP in 1996.

Patricia received her Bachelor of Arts in Chinese Literature from Tamkang University and her Master of Business from the University of St. Thomas. Patricia currently works at the Science & Technology Division at the Taipei Economic and Cultural Office (TECO) in Houston.

Leadership/Community Service Scholarship Recipient

Clint Wu 吳恪霖

Clint Wu is a senior at Bellaire High School and is ranked 27 out of 755. He has completed the International Baccalaureate program while still taking Advanced Placement classes. Since 8th grade, he's been training martial arts: Shaolin, 8-step Praying Mantis, and Modern Wushu, and he earned 1st in multiple categories at the national level in Washington DC for the ICMAC Circuit. Within school, he serves as the President of the Bellaire International Student Association, and is also an active member within Model United Nations, National Honor Society, Bellaire Ultimate Frisbee, and more. He also acted as a research member of Bellaire's Lunar Research Team for the NASA Lunar Science Institute studying crater chains on the moon. Over the summer, he volunteered for the Overseas Youth English Teaching Volunteer Service Program in Taiwan to help disadvantaged elementary children learn English. In the future, he plans to study Computer Science at the University of Texas as a Turing Scholar.

Leadership/Community Service Scholarship Recipient

Steffi Hu 胡瑞欣

Steffi Hu was born and raised in Houston, Texas to parents Stephen and Sylvia Hu. She is eighteen years old and a recent graduate of Clements High School. She has two older brothers and a sister-in-law. Steffi enjoys listening to music and dancing. She has been playing the piano since the age of seven and is currently on the 8th level of the European Piano Conservatory. She has been learning to dance from J&H Dance School (formerly known as J&L Dance School) since the age of five and has earned the Certificate of Completion up to level 13 from the Beijing Dance Academy. As a dancer, Steffi has gotten the chance to perform at various events across Houston – the annual Houston International Festival, the Rockets half time show, and many fundraisers throughout the city. She competed in the Showstopper's Competition in February of 2010 and won first place. Steffi also won platinum and diamond awards at the National Fire and Ice Dance Contest. When she competed in the National American Miss state and national pageants, Steffi was awarded with State Ambassador and placed 5th in the Talent Competition. With these experiences, Steffi was given the opportunity to perform at the Shanghai World Expo in July of 2010 at both the Shanghai and USA pavilions. Steffi also represented the city of Houston at the International Youth Summit on Energy and Climate Change which also took place at the Shanghai World Expo. She was designated as a Green Ambassador of Houston by Mayor Annise Parker prior to attending the summit through her work with the environmental organization Green Team America. As a member of the Green Team America student council, Steffi initiated several projects at her school including Project GLOW which was dedicated to spreading energy saving CFL light bulbs. Along with these honors and awards, Steffi is the current president of Generation which is a large youth humanitarian organization sponsored by the Sugar Land Memorial Hermann Hospital. She also held the position of Vice President of Communications in her school's English Honor Society as well as Treasurer in the school's Science National Honor Society. As a devoted volunteer, Steffi has accumulated over six hundred hours of community service work in the past four years, yet she still had time to continue pursuing her passions in life. In the future, Steffi aspires to become a specialist in infectious disease, and this coming fall she will be attending Rice University studying Biochemistry.

二零一一年年會暨科學工程技術研討會
2011 Science, Engineering and Technology Seminars (SETS)

ACKNOWLEDGEMENT

美南國建協進會

感謝下列社團共同策劃

美南環保協會
華人電腦協會
美國華人石油協會
世界華人工商婦女企管協會美南分會
休市華美會計師協會

感謝下列單位的贊助與協助

中華民國國家科學委員會
中華民國 國家環境保護署
中華民國僑務委員會
駐休士頓台北經濟文化辦事處
駐休士頓台北經濟文化辦事處科技組
駐休士頓台北經濟文化辦事處商務組
駐休士頓台北經濟文化辦事處文化組
休士頓華僑文教服務中心
中國石油公司 OPICOIL HOUSTON, INC
Lovett Homes
Formosa Plastics Corporation, Texas
FOXCONN
LCY Elastomers LP

會長　鍾宜秀　　會議主席　閻寶印

二零一一年年會暨科學工程技術研討會

2011 Science, Engineering and Technology Seminars (SETS)

ACAP 2010 - 2011 OFFICERS AND STAFF

President	Janet	Chung	鍾宜秀
President-Elect	Betty	Tung	闕寶印
Vice President	Jim	Hsu	許大俊
Board Secretary	Chi-Hao	Ko	葛家豪
Treasurer	Sheree	Cheng	周　圓
Diversity Summit Executive Director	Cecil	Fong	方宏泰
Activity Committee	Howard	Paul	潘浩德
Award Committee	Chi-Chung	Chang	張濟群
Investment Committee	Bill	Chien	錢懋曾
Media Coordinator	Jennifer	Wen	趙全峰
Membership Committee	Betty	Tung	闕寶印
Nomination Committee	Hsing-wei	Chu	朱幸為
Public Relation Committee	Michael	Liu	劉志強
Scholarship Committee	Judy	Wen	文　芊
Web Site Committee	Stephen	Huang	黃壽萱
Web Page Master	Frank	Lin	林國強
Web Server	James	Chen	陳建中
Young Professionals Committee	Jenny	Yang	陳津源
	Chia-Hao	Ko	葛家豪

ACAP 2010 - 2011 BOARD OF DIRECTORS

Kathlie Jeng-Bulloch	鄭秋吟	Jim Hsu	許大俊	Yi-Lung Mo	莫詒隆
Chung-Che(Jeff) Chang	張崇哲	Chia-Hao Ko	葛家豪	Betty Tung	闕寶印
Daniel H. Chen	陳鴻丹	Hsin-Hui Lin	林欣慧	C.C. Wang	王家穗
Janet Chung	鍾宜秀	Michael Liu	劉志強	Keh-Han Wang	王克漢
Stephen Huang	黃壽萱	Yaw-Hwa(Billy) Liu	劉燿華	Judy C. Wen	文　芊

ACAP 2010 - 2011 CONTROL COUNCILORS

Edward Chen	陳大生	Frank Lin	林國強	Jenny Yang	陳津源

ACAP 2010 - 2011 ADVISORS

Benjamin Chang	常台安	Ben Ho	何明進	Simon Tung	董元慶
Chi-Chung Chang	張濟群	Stephen Huang	黃壽萱	Jenny Yang	陳津源
Theresa Chang	張文華	Sam Hwong	黃泰生	Robert Yuan	袁立人
Edward Chen	陳大生	Frank Lin	林國強	Joseph F.C. Chen	陳方正
William Chien	錢懋曾	Michael Liu	劉志強	Wei-Zan Wang	王偉瓚
Chen-Hwa Chiu	邱震華	Howard Paul	潘浩德	Louis L.J. Huang	黃立正
Hsi Frank Chou	周　禧	Tom Tsai	蔡忠和	Sarah Wu	吳少蓉
Hsing-we Chu	朱幸為	Kwei Tu	杜　奎		

二零一一年年會暨科學工程技術研討會
2011 Science, Engineering and Technology Seminars (SETS)

2011 SETS CONFERENCE COMMITTEE

General Chair	Janet	Chung	鍾宜秀
Conference Chair	Betty	Tung	董寶印
Award Committee Chair	Chi-Chung	Chang	張濟群
Conference Registration Committee Chair	Patricia	Liu	劉雅明
Scholarship Committee	Judy	Wen	文　華
	David	Kuo	郭　杰
Technical Committee Chair	Frank	Lin	林國強
Conference Program Editor	Betty	Tung	董寶印
	Frank	Lin	林國強
	Chia-Chung	Wang	王家聰
Photographer	Charles	Lin	林昌曙
Online Registration	James	Chen	陳曙中

2011 SETS COLLABORATING ORGANIZATIONS & PRESIDENTS

美南環保協會	Edward	Chen	陳天生
華人電腦協會	Sherry	Teng	丁的珍
美國華人石油協會	Yu	Li	李　玉
世界華人工商婦女企管協會美南分會	Lilly	Wai	蘇麗莉
休士華美會計師協會	Eileen	Chiu	林曙珍

2011 SETS CONFERENCE SESSION CHAIRS

Alternative Energy Session	Steven	Pei	白先慎
Better Living Session	Lilly	Wai	蘇麗莉
	Annie	Jow	摩秀美
Computer Technology Session	Sherry	Teng	丁的珍
CPA – Financial Management Session	Eileen	Chiu	林曙珍
	Stella	Kin	張秋英
Education Session	Hsin-Hui	Lin	林欣慧
	Irene Linlin	Chen	陳琳琳
Environmental Science Technology Session	Edward	Chen	陳天生
Health Session	Karl	Chen	陳康元
	Grace	Chen	陳王琳
Nano Technology Session	Su-Seng	Pang	彭樹成
	Howard	Paul	潘浩德
Petroleum Technology Session	Tai-chang	Shih	史大昌
	Chia-Hao	Ko	葛家豪

美南國建協進會
The Association of Chinese American Professionals

ACAP is an association of Chinese American professionals with a wide variety of expertise including engineering, science, health care, business, humanity, and arts and culture. Founded in 1978, and currently with a total membership of approximately 300, the ACAP recruits its members from, but not limited to, the states of Texas, Louisiana, Mississippi, Arkansas and Oklahoma.

In 2001, the ACAP, in collaboration with JPMorgan Chase, Shell Oil Company and Marathon Oil Company, organized the inaugural Diversity Summit annual conference. This annual conference has since gained wider support and attendance from other major corporations and organizations in the greater Houston area.

As a non-profit organization, the ACAP strives to foster the professional development and fellowship among its members, to facilitate the development of leadership skills of Chinese Americans professionals, and to address various issues that Chinese American professionals faced in the workplace.

In order to encourage professional advancement of the members, the ACAP regularly hosts technical seminars and workshops with various professional disciplines throughout the year. The flagship activity is the Science, Engineering and Technology Seminars (SETS) held in Houston in the spring/ summer of each year. SETS usually draw 400 to 600 participants. These seminars, workshops and conferences are multidisciplinary, and often involve guest speakers from other states and foreign countries.

THE ASSOCIATION OF CHINESE AMERICAN PROFESSIONALS (ACAP)
10303 Westoffice Drive, Houston, Texas 77042
http://www.acap-usa.org

MEMBERSHIP APPLICATION FORM

Name: Mr./Mrs./Ms./Dr. _____ (Chinese) _____
Last First Middle

Spouse:_____(Chinese)_____ ACAP Member: ___Yes ___No

Mailing Address: ____Home or _____ Business _____

_____

Phone: Home_____ Work_____ Fax: Home _____ Work_____

E-mail: Home _____ Work_____

Education: Degree University/Institute Major Field

_____ _____ _____

_____ _____ _____

Currently enrolled at (University): _____ Expected Degree/Date:_____

Employer: _____

Other Chinese Society Membership: _____

Division Preference (Please Check):

___ Architecture Engineering	____ Education	___ Law	___ Polymer symposium
___ Biomedical Science	____ Electrical Engineering	___ Literature and Art	___ Political Science
___ Business	____ Environmental	___ Mechanical Engineering	___ Social Science
___ Chemical Technology	____ Industrial Engineering	___ Medical & Health Science	___ Space Technology
___ Civil Engineering	____ Information Technology	___ Petroleum Technology	___ (Other) _____

Field of Specialization: _____

Membership Type and Fee (Please Check One):
_____ Life Member - $200 (one-time payment)
_____ Regular Member - $30/annual (January through December)
_____ Student or Senior Citizen Member - $5/annual (Jan. through Dec.)

ACAP Function and Program Interests:

___Continuing Education	___ Budget and Finance	___ Fund Raising	___ Membership Drive	___ Mentoring
___Newsletter	___ Public Relations	___ Student Liaison	___(Others)_____	

Comments/Suggestions: _____

Member Signature: _____ Date: _____

Make check payable to: ACAP

Mail to: ACAP Membership Drive
10303 Westoffice Drive, Box 194
Houston, Texas 77042

服務項目：

1.協助國科會等國內科技單位與服務區學術及研究單位建立科技交流及合作

2.協助高科技移轉及科學園區投資計畫

3.協助學人團體舉辦學術研討會及年度聯誼活動

4.協助或推薦學人返國服務

5.建立海外學人專長資料檔

6.協助安排國內及海外科技人員訪問活動

7.協助國內科技單位參與學術會議蒐集科技資料等

8.協助行政院於服務地區舉辦延攬海外科技人才活動、協助國科會等推動延攬海外資深科技人才計畫(伯樂計畫)、科技台灣探索(候鳥計畫)、及人才培育計畫等

服務地區包括下列十四州：

Texas、Arkansas、Louisiana、Mississippi、Oklahoma、Colorado、Kansas、Missouri、Nebraska、North Dakota、South Dakota、Iowa、Minnesota、Wisconsin

駐休士頓台北經濟文化辦事處科技組聯絡資料:

11 Greenway Plaza, Suite 2018, Houston, TX 77046
Tel: (713)963-9433
Fax:(713)622-4269
E-mail: sdhou@scienceh.org
Website: http://houston.nsc.gov.tw or http://www.scienceh.org

China Airlines Total e-Services - We Treasure Each Encounter, in person and on-line

China Airlines stays ahead of the technology curve with the latest in e-Services for total convenience. Complete Online Booking, e-Check in, e-ATM payment, reserve Duty Free e-Shopping, and even select your in-flight meal via our e-Menu service from our website at your leisure, then speed through the airport with our self check-in KIOSK on the day of your flight. Once aboard, you'll also appreciate our CBB wireless broadband Internet access to keep you connected miles above the earth.

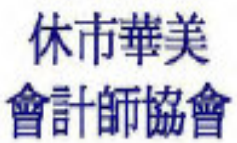
For instance, our e-Services network allows you to place your order for duty-free merchandise in advance, to be delivered right to your seat in the air. It doesn't get more convenient than that!

Come on line and take China Airlines' full menu of e-Services for a ride.

*See www.china-airlines.com for full e-Service operation methods and procedures.
*CBB is currently provided on SFO-TPE v.v. route.

CHINA AIRLINES

2011 SCIENCE, ENGINEERING AND TECHNOLOGY SEMINARS (SETS)
二零一一年年會暨科學工程技術研討會



世界華人工商婦女
企管協會美南分會

附件三：Green Houston Tour

附件四：Gulf Coast Waste Disposal Authority Bayport Facility

GULF COAST WASTE DISPOSAL AUTHORITY
BAYPORT FACILITY
10800 BAY AREA BOULEVARD
PASADENA, TEXAS 77507

Gulf Coast Waste Disposal Authority's (GCA) Bayport Facility, located on 113 acres in the Bayport Industrial District of Harris County, Texas, was designed to treat industrial wastewater generated by companies in the Bayport Industrial Complex. It currently treats wastes from fifty-four industrial manufacturing plants and two municipalities (Users). These wastes are accepted dependent upon compliance with requirements of GCA's EPA approved Pretreatment Program. These requirements are outlined in GCA's Pretreatment Rule. The facility is extremely flexible and contains several operational configurations. These configurations allow optimization of energy use and are changed as required by variations in flow, loading, and weather conditions. Twenty-four hour composite samples are taken at each User outfall, at points in the treatment process, and at each of two permitted outfall locations. These samples are then analyzed daily in the GCA Central Laboratory utilizing methods specified in 40 CFR 136. The facility design was based on a daily average loading of 110,000 pounds per day of Biochemical Oxygen Demand (BOD) and 76,500 pounds of Total Organic Carbon (TOC) and a daily maximum loading of 132,000 pounds of BOD and 91,000 pounds of TOC. The facility is currently permitted for an average flow of 25.0 MGD and a maximum flow of 30.0 MGD.

COLLECTION SYSTEMS

Wastewater enters the facility through two parallel collection systems which extend 2.25 miles into the manufacturing complex. One system is an open concrete channel and carries low strength wastes meeting the Local Limits specified in GCA's Pretreatment Rule. These wastes, referred to as Clean Stream wastes do not require significant biological treatment. The other system is an aboveground pipeline that carries process wastewater and contaminated storm water runoff averaging approximately 800 mg/L BOD and 600 mg/L TOC. The open concrete channel that carried process wastewater prior to completion of the aboveground pipeline has been left in place for emergency use.

The Users pump their individual waste streams to the collection systems through pipelines. A twenty-four hour flow weighted refrigerated composite sampler and a flow measuring/recording device is located at the point each waste stream discharges into the collection system. The composite samples are collected daily for laboratory analysis. Grab samples are also analyzed for parameters such as pH, TOC, and Ammonia. Users are notified immediately should their waste streams fail to comply with limits specified in GCA's Pretreatment Rule. Additionally, the collection systems are monitored by plant operators on a twenty-four basis to ensure that no unacceptable wastes are being discharged. Process pH meters measure and record the pH in both systems and allow early detection and correction of unacceptable pH values.

EQUALIZATION/FIRST STEP BIOTREATMENT AND EMERGENCY HOLDING

The plant pumping and piping schemes provide significant flexibility in the handling of variations in flow and loading. Normal variations are minimized through the use of three equalization/first step biotreatment tanks. The tank volumes are 1.75 million gallons each. They utilize subsurface jet aerators and blowers to provide mixing and oxygen. The mixed liquor concentration is maintained at approximately 5,000 mg/L.

SECONDARY TREATMENT

A 12.5 million gallon second step activated sludge system provides aerobic biological treatment of the process wastewater. After equalization and first step treatment, the wastewater flows by gravity into the second step system. Mixing and dissolved oxygen are provided by a jet aeration system similar to that used in the first step system. Following treatment, the mixed liquor flows by gravity to clarifiers for separation of the biomass. The clarified water is then disinfected with sodium hypochlorite and discharged into polishing ponds where it mixes with stabilized Clean Stream wastewater. In the unlikely event that treated wastewater is unsuitable for discharge because of a plant upset, it can be diverted following clarification to either of two large holding basins.

Following clarification, the concentrated biomass is returned to the head of the treatment trains for further treatment of wastewater. Excess biomass is pumped form the clarifiers to an aerobic digester/thickener where the solids concentration is increased from 1.5 percent to approximately 3.0 percent. The thickened sludge is then transferred to the dewatering building where it is conditioned with polymer and processed through two 2.2 meter belt presses. The presses remove excess water from the sludge and concentrate the solids to approximately 20 percent. This material is then transported on conveyer belts into large trailers and hauled to a permitted landfill for final disposal. The dewatering system has a capacity of approximately 100,000 pounds per day of dry solids.

The clean stream wastes flow through three stabilization basins and mix with treated wastewater in the third pond prior to discharge into a final polishing pond where additional solids settling and biological stabilization occur.

The effluent is then pumped from the final polishing pond through a force main into the Bayport Ship Channel approximately 2.25 miles from the plant. Prior to discharge, the effluent is sampled and analyzed to assure compliance with our TPDES Permits.

GULF COAST WASTE DISPOSAL AUTHORITY
BAYPORT FACILITY PROCESS DESCRIPTIONS

LIFT STATIONS

Lift Station 1
Emergency Process Waste Lift Station
6 Pumps
Capacity: 20 MGD
Operation: Automatic Level Control

Lift Station 2
Pond 5 Pumps
2 Pumps
Capacity: 5 MGD
Operation: Manual

Lift Station 3
Pond 2/Pond 4 Transfer Station
6 Pumps
Capacity: 10 MGD
Operation: Manual

Lift Station 4
Discharge to Bay Pump Station
3 Pumps
Capacity: 30 MGD
Operation: Manual (to be upgraded to PLC control)

Lift Station 5
Main Lift Station
6 Pumps
Capacity: 30 MGD Maximum
Operation: Automatic Level Control; PLC Control

EQUALIZATION/FIRST STAGE BIOTREATMENT TANKS

Tanks 2001, 2002, 2003
3 Completely Mixed Aeration Tanks Utilizing Jet Aeration System
Volume: 3X1.75 MG; 5.25 MG Total Capacity
Diameter: 110 Feet
Height: 30 Feet
Blowers: 1750 HP Total
Pumps: 12 Recirculation Pumps; 900 HP Total
MLSS: 5,000 to 6,000 mg/L
Sludge: Plug Flow Seed Off Return Sludge System

HOLDING BASINS

Pond 2
Emergency Holding Basin
Area: 2.18 Acres
Volume: 3.5 MG
Aeration: None
MLSS: None
Liner: Synthetic

Pond 4
Emergency Holding Basin
Area: 1.16 Acres
Volume: 3.50 MG
Aeration: None
MLSS: None
Liner: Natural Clay

HOLDING BASINS (Cont'd.)

Pond 5
Secondary Emergency Holding Basin
Area: 8.52 Acres
Volume: 14 MG
Aeration: None
MLSS: None
Liner: Natural Clay

Pond 8
Secondary Emergency Holding Basin
Area: 5.54 Acres
Volume: 14 MG
Aeration: None
MLSS: None
Liner: Natural Clay

ACTIVATED SLUDGE PROCESS

B-Plant Digester
6 Parallel Aeration Bays
Volume: 3.4 MG
Aeration: Subsurface Diffused Air
Blowers: 5 - 1550 HP Total
Capacity: 2,100 lbs. Oxygen/Hr.
Clarifiers: Three 70 ft. Diameter each
Wasted Sludge: 300 percent
Liner: Bays are concrete

D-Plant
5 Completely Mixed Concrete Basins
Volume: 2.5 MG Each, 12.5 MG Total
Aeration: Jet Aeration
Aerators: 13 Blowers 3250 HP Total
Capacity: 4805 lbs. Oxygen/Hr.
Clarifiers: Three 142 ft. Diameter Each
Recirculating Pumps: Ten 75 HP @9000 GPM
Sludge Recycle: 300 percent
Liner: Synthetic

POLISHING PONDS

Pond 7
Polishing Pond
Area: 8.49 Acres
Volume: 12.9 MG
Aeration: Four 7.5 HP Surface Aerators
Liner: Natural Clay

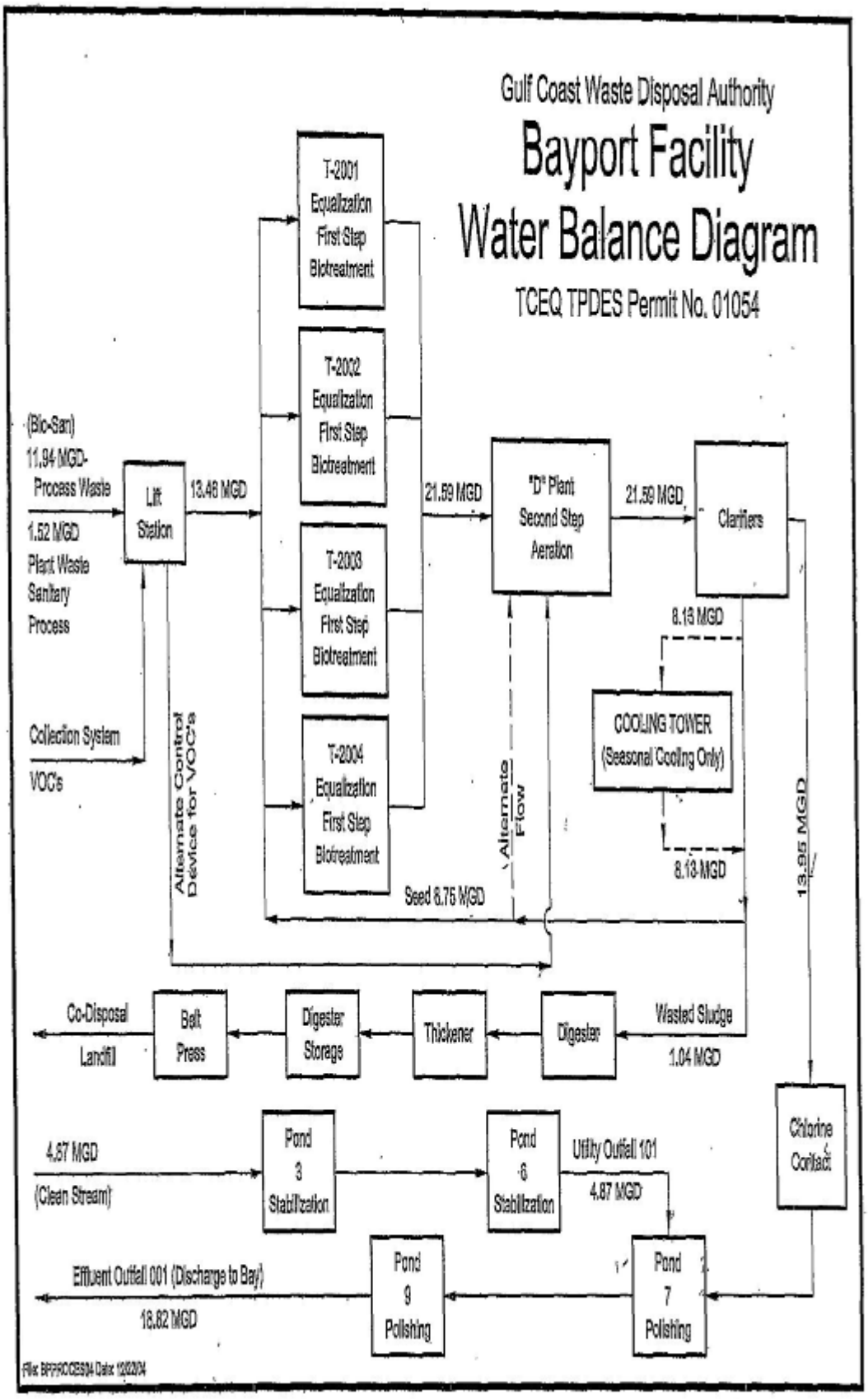
Pond 9
Final Holding Basin
Area: 5.82 Acres
Volume: 11.38 MG
Aeration: None
Liner: Natural Clay

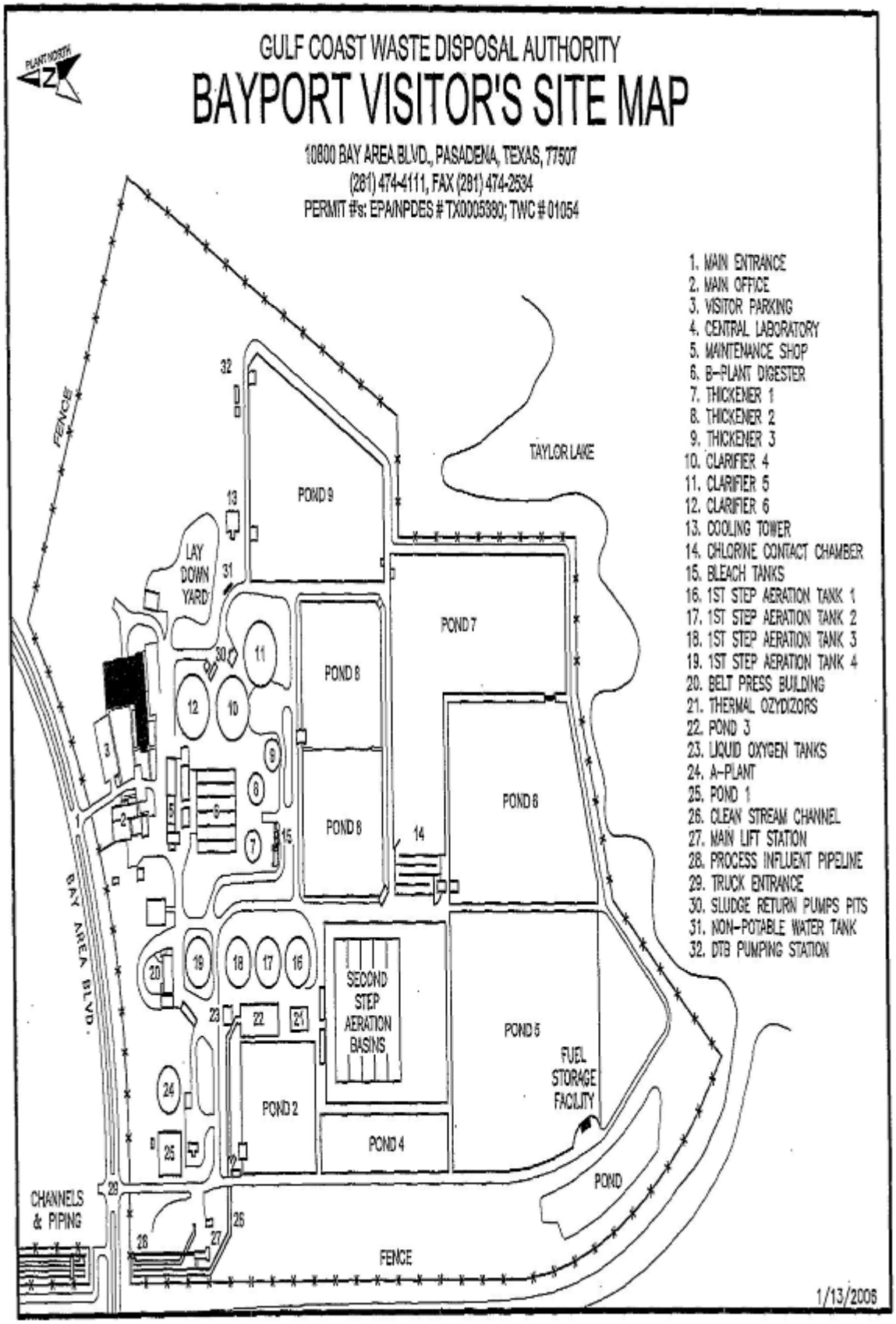
STABILIZATION PONDS (CLEAN STREAM)

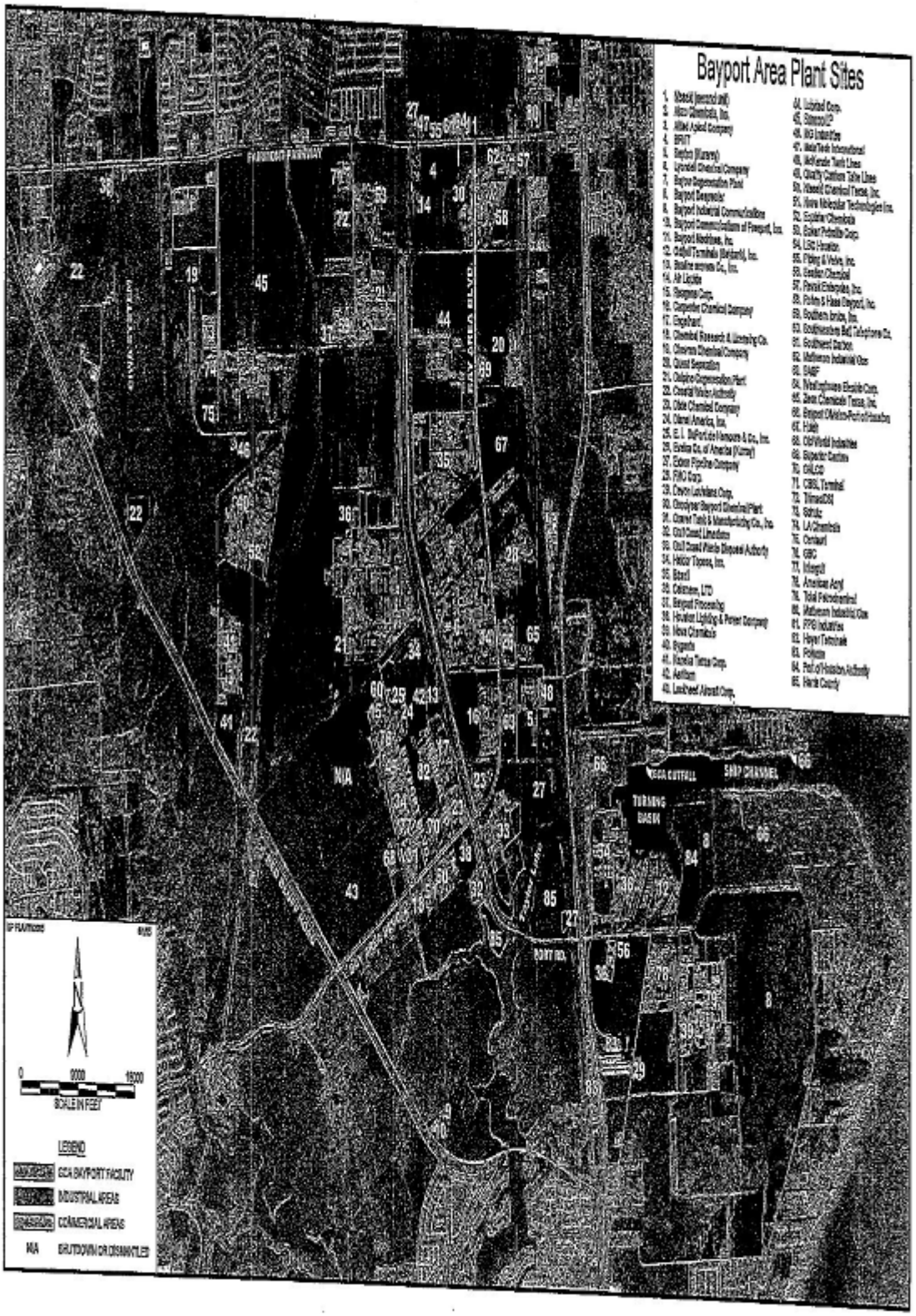
Pond 3
Area: .58 Acres
Volume: 1.13 MG
Aeration: None
Liner: Natural Clay

Pond 6
Area: 6.17 Acres
Volume: 13.39 MG
Aeration: None
Liner: Natural Clay

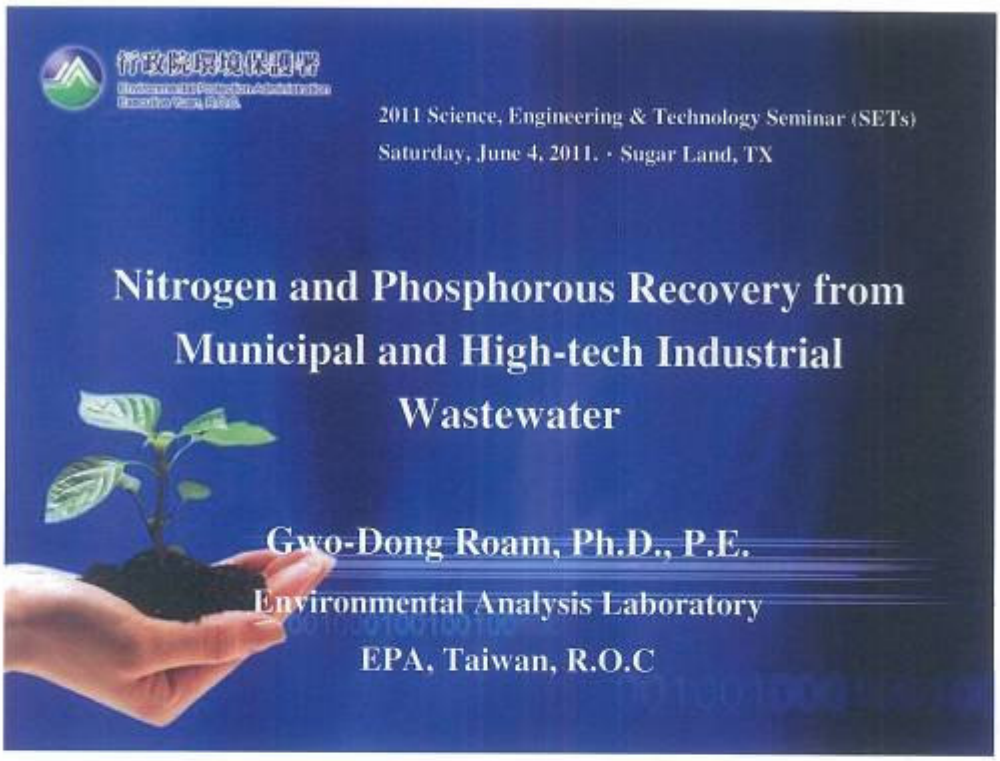
(HDOT Process Description)

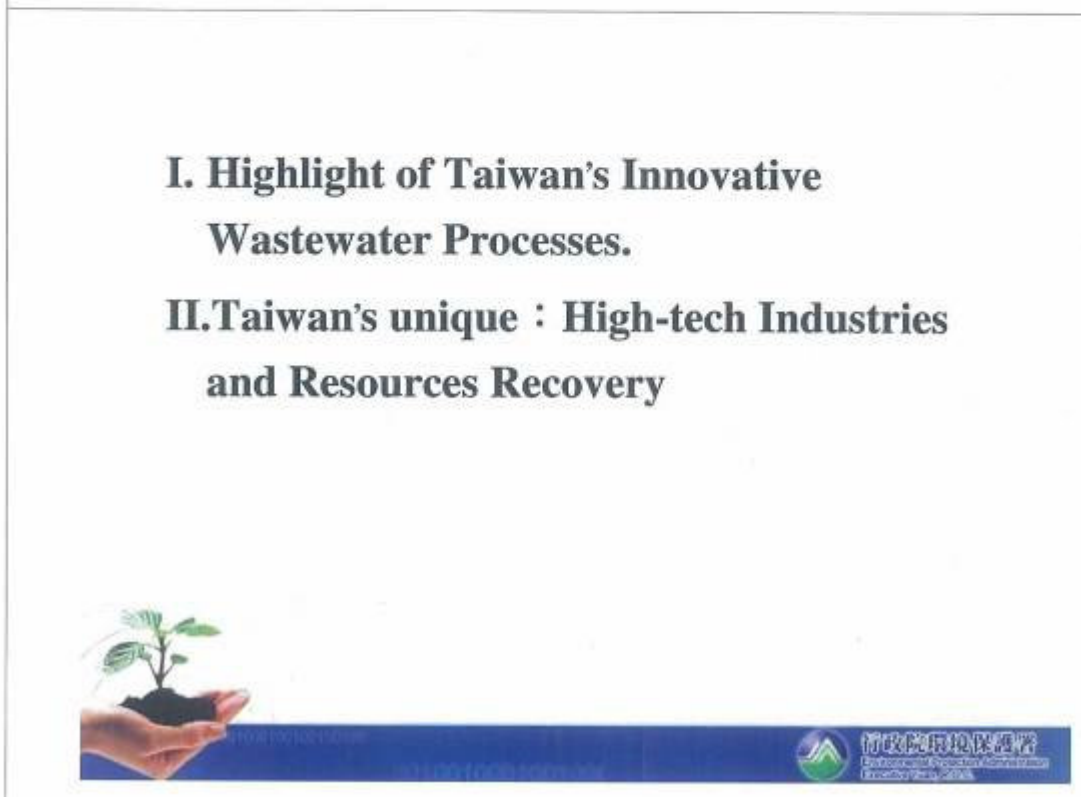

Gulf Coast Waste Disposal Authority
Bayport Facility
Water Balance Diagram
TCEQ TPDES Permit No. 01054
T-2001 Equalization First Step Biotreatment
T-2002 Equalization First Step Biotreatment
T-2003 Equalization First Step Biotreatment
T-2004 Equalization First Step Biotreatment
(Bio-San) 11.94 MGD- Process Waste
1.52 MGD Plant Waste Sanitary Process
Collection System VOC's
Lift Station
13.46 MGD
21.59 MGD
"D" Plant Second Step Aeration
21.59 MGD
Clarifiers
8.13 MGD
COOLING TOWER (Seasonal Cooling Only)
8.13 MGD
13.95 MGD
Alternate Control Device for VOC's
Alternate Flow
Seed 8.75 MGD
Co-Disposal Landfill
Belt Press
Digester Storage
Thickener
Digester
Wasted Sludge 1.04 MGD
4.87 MGD (Clean Stream)
Pond 3 Stabilization
Pond 6 Stabilization
Utility Outfall 101 4.87 MGD
Chlorine Contact
Effluent Outfall 001 (Discharge to Bay) 18.82 MGD
Pond 9 Polishing
Pond 7 Polishing
File: BPFPROCESS4 Date: 12/22/04


GULF COAST WASTE DISPOSAL AUTHORITY
BAYPORT VISITOR'S SITE MAP
10800 BAY AREA BLVD., PASADENA, TEXAS, 77507
(281) 474-4111, FAX (281) 474-2534
PERMIT #'s: EPA/NPDES # TX0005380; TWC # 01054
PLANT NORTH
1. MAIN ENTRANCE
2. MAIN OFFICE
3. VISITOR PARKING
4. CENTRAL LABORATORY
5. MAINTENANCE SHOP
6. B-PLANT DIGESTER
7. THICKENER 1
8. THICKENER 2
9. THICKENER 3
10. CLARIFIER 4
11. CLARIFIER 5
12. CLARIFIER 6
13. COOLING TOWER
14. CHLORINE CONTACT CHAMBER
15. BLEACH TANKS
16. 1ST STEP AERATION TANK 1
17. 1ST STEP AERATION TANK 2
18. 1ST STEP AERATION TANK 3
19. 1ST STEP AERATION TANK 4
20. BELT PRESS BUILDING
21. THERMAL OZYDIZORS
22. POND 3
23. LIQUID OXYGEN TANKS
24. A-PLANT
25. POND 1
26. CLEAN STREAM CHANNEL
27. MAIN LIFT STATION
28. PROCESS INFLUENT PIPELINE
29. TRUCK ENTRANCE
30. SLUDGE RETURN PUMPS PITS
31. NON-POTABLE WATER TANK
32. DTB PUMPING STATION
FENCE
TAYLOR LAKE
POND 9
LAY DOWN YARD
POND 7
POND 8
POND 8
POND 8
SECOND STEP AERATION BASINS
POND 5
FUEL STORAGE FACILITY
POND 2
POND 4
POND
BAY AREA BLVD.
CHANNELS & PIPING
FENCE
1/13/2006


Bayport Area Plant Sites
1. Mobil (permit still)
2. Rhodia, Inc.
3. Allied Signal Company
4. BP/OT
5. Baytank (Formerly)
6. Lyondell Chemical Company
7. Bayport Cogeneration Plant
8. Bayport Terminal
9. Bayport Industrial Communications
10. Bayport Cogeneration of Freeport, Inc.
11. Bayport Maintenance, Inc.
12. Oiltank Terminals (Bahamas), Inc.
13. Praxair services Co., Inc.
14. Air Liquide
15. Rhodia Corp.
16. Carpenter Chemical Company
17. Engelhard
18. Chemical Research & Licensing Co.
19. Chevron Chemical Company
20. Quest Separation
21. Dolphin Cogeneration Plant
22. Coastal Water Authority
23. Olin Chemical Company
24. Clariant America, Inc.
25. E. I. DuPont de Nemours & Co., Inc.
26. Evonik Co. of America (Former)
27. Ethyl Pipeline Company
28. FINA Corp.
29. Crown Lumbers Corp.
30. Goodyear Bayport Chemical Plant
31. Crowley Tank & Manufacturing Co., Inc.
32. Gulf Coast Limestone
33. Gulf Coast Waste Disposal Authority
34. Hexion Tpenes, Inc.
35. Ecrell
36. Celanese, LTD
37. Bayport Processing
38. Houston Lighting & Power Company
39. Nova Chemicals
40. Bygenis
41. Rohm & Haas Corp.
42. Aethon
43. Lockheed Aircraft Corp.
44. Intrepid Corp.
45. Stolthaven
46. IMS Industries
47. Water Tank International
48. McKenzie Tank Lines
49. Quality Coatings Tube Lines
50. Kissell Chemical Texas, Inc.
51. Nova Molecular Technologies Inc.
52. Equistar Chemicals
53. Baker Petrolite Corp.
54. LSC Houston
55. Pillar & Valve, Inc.
56. Sentex Chemical
57. Parrish Enterprise, Inc.
58. Rohm & Haas Bayport, Inc.
59. Southern Ionics, Inc.
60. Southwestern Bell Telephone Co.
61. Southwest Carbon
62. Methanex Industrial Gas
63. BASF
64. Westlayhawe Electric Corp.
65. Dow Chemicals Texas, Inc.
66. Bayport Offshore Port of Houston
67. Haldi
68. Old World Industries
69. Bayston Gastex
70. GALCO
71. CBBL Terminal
72. Trimeric
73. BP/Oil
74. LA Chemicals
75. Centauri
76. GBC
77. Integrill
78. American Acryl
79. Total Petrochemical
80. Methanex Industrial Gas
81. PPG Industries
83. Hayer Tetcotek
83. Polyone
84. Port of Houston Authority
85. Harris County
BAYPORT BLVD.
SPACE CENTER BLVD.
FAIRMONT PARKWAY
NASA CUTOFF
SHIP CHANNEL
TURNING BASIN
PORT RD.
N/A
0 5000 10000
SCALE IN FEET
LEGEND
BAYPORT FACILITY
INDUSTRIAL AREAS
COMMERCIAL AREAS
N/A SHUTDOWN OR DISMANTLED

附件五 專題演講資料－阮所長國棟

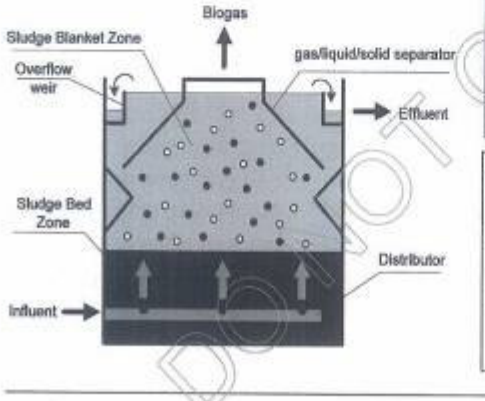




Taiwan's Innovative Wastewater Processes

- UASB（upflow anaerobic sludge bed）Technology by ITRI（Industrial Tech. Resear. Institu.）Since 1980.

Upflow Anaerobic Sludge Bed (UASB)



Features

- **Low investment cost (land requirement & construction cost)**
- **Low operating cost (power , chemicals requirement& sludge yield)**
- **Potential energy recovery (methane is usable)**

ITRI Industrial Technology Research Institute

UASB Technology

UASB Applications

Since 1988

UASB designed by ITRI in Taiwan

- more than 20 factories
- more than 50 reactors
- more than 25,000 m^3
- more than 250 million US$ investment

Total UASB in Taiwan : 35,000 m^3

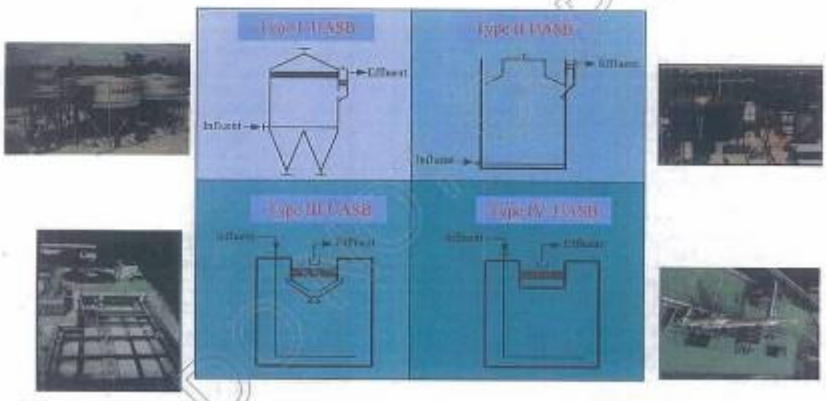
Food processing, distillery, chemical processing, pulp and paper, petrochemical industry

2

ITRI Industrial Technology Research Institute

UASB Technology

Three-phase separator developed by ITRI



3

ITRI Industrial Technology Research Institute

UASB Technology Applications

Factory name	Date of installation	Reactor Size (m^3)	Type of Wastewater	Qu.w. (CMD)	COD in (mg/l)	CODr (%)
Asia Chemical Co.	1988	1,000	Chemical processing	400	9,000	98
Yilan Wine plant, (total 7 plants)	1992	3,000	Fermentation and distillation	60-1,000	4,000-30,000	90
Hualon Toufen II	1994	600× 2	Textile industry	1,200	5,000	90
Hualien distillery	1995	1,300	Distillation	1,300	10,000	90
Hualon **Malaysia I**	1995	600× 2	Textile industry	1,200	5,000	90
Hualon **Malaysia II**	1996	600× 2	Textile industry	1,200	5,000	90
Dahin Co./Chuan Hsing plant	1996	500	Chemical processing	200	8,000	≥70
Taiwan petrochemical	1999	800	Chemical processing	124	12,000	80
Dahin Co.	1999	900	Chemical processing	400	8,000	80
President Enterprises Co. II	2002	900 x 2	Food processing	4,000	2,500	90
Der-Yien Paper Industry	2002	900 x2	Pulp and paper	3,600	7,000	80
Chang Chun Petrochemical II	2003	1,350 x 2	Petrochemical industry	2,000	3,000	≥70
Kinmen distillery	2003	1,000	Distillation	650	3,000	90

4

ITRI Industrial Technology Research Institute

UASB for TFT-LCD wastewater treatment (2004-2006)

Composition of TFT-LCD wastewater

Dimethyl Sulphoxide (DMSO) [$(CH_3)_2SO$]

Monoethanoamine (MEA) [$HOCH_2CH_2NH_2$]

Butyldiglycol (BDG) [$HO(CH_2)_2O(CH_2)_2O(CH_2)_2CH_3$]

Tetramethylammonium Hydroxide (TMAH) [$(CH_3)_4N^+OH^-$]

Detergent

Factory name	Comple-tion	Reactor size (m^3)	Type of wastewater	Flowrate (CMD)	COD (mg/L)
Toppoly Optoelectronics	2005	1,760	TFT-LCD (MEA, BDG, TMAH)	1,400	8,000
Chi Mei Optoelectronics II	2005	900	TFT-LCD (MEA, DMSO, TMAH)	1,650	1,000
Chi Mei Optoelectronics I	2006	400	TFT-LCD (MEA, DMSO, TMAH)	650	1,000

5

ITRI Industrial Technology Research Institute

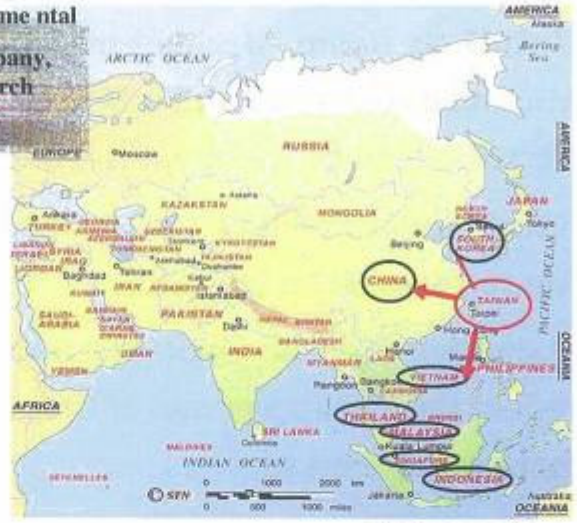
Know-how and Patents Contribution：

- Gwo-Dong Roam, Mechanisms of Anaerobic Microbial Aggregation, Ph.D Dissertation, Northwestern University, USA, 1988.
- Extracellular Polymer（ECP）and Aggregation Rates in UASB.
- Starvation Start-up Operation Mode can reduce the start-up period of time from 3 months to 3 weeks.

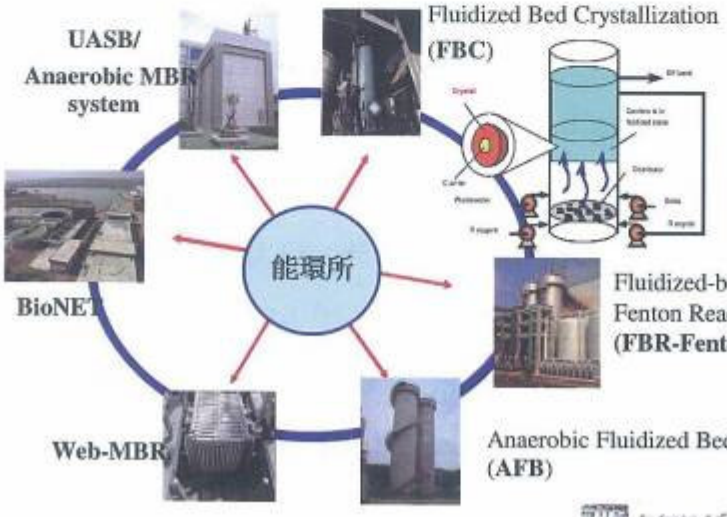
- UASB process and MBR and FBC processes have been commercialized in hundreds of facilities in various industries worldwise, especially asia.
- MBR (membrane-based bioreactor) process: Non-woven fiber MBR is the ITRI's solution to overcome the membrane fouling and the flux.
- FBC (fluidized bed crystallization) process: Distributor design operation control practices.

Target market of ITRI- Asia

Partners: Environme ntal Engineering company, University, Research Institute



Full-scale Applications of ITRI patented technologies



- **Fluidized Bed Crystallization Wastewater Treatment and Resource Recovery Technology by ITRI.**
- **7 FBC for Fluoride recovery（5 in semiconductor industry, 2 in TFT-LCD industry）2FBC for Ammonium removal（TFT-LCD）2FBC for calcium removal（1 in water softening and 1 in petrochemical wastewater reuse）**
- **1 FBC for Heavy metal removal（PCB industry）**

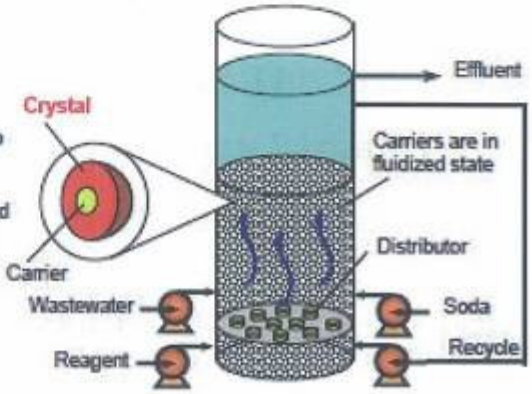
Fluidized Bed Crystallization Wastewater Treatment Technology

Introduction

Fluidized bed crystallization (FBC) uses silicate sands as carriers to recover metal salts or inorganic ions from wastewater in crystal forms. Properly controlled recycle flow provides mixing to maintain sand fluidization. Control of chemical reagent addition provides appropriate super-saturation to form crystals. Crystals are discharged when the size is grown to 1 to 2 mm in diameter.

Features

- Reactor and process control
- Influent flow distribution design
- Crystal growth control



14

Benefits
- Remove inorganic ions from wastewater
- Reduce sludge production by 75%
- Recover valuable resources in crystal form

Applications
- Fluoride-containing wastewater
- Arsenic-containing wastewater
- Water softening
- Phosphate / ammonia removal
- Heavy metal removal from wastewater

Case Examples

12 full-scale FBC plants have been constructed (capacity up to 24,000 m^3/d), of which seven are for fluoride removal (5 in semiconductor industry, 2 in TFT-LCD industry), two for ammonium removal (in TFT-LCD industry), two for calcium removal (drinking water softening and wastewater reuse), and one for heavy metal recovery (in PCB industry).

8000 m^3/d FBC water softening project for Taiwan Water Corporation

Colorful crystals discharged from FBC system for treating different wastewater

Patents
- **US** 6,235,203, 6,210,589
- **NL** 1004621, 1011688, 1014191,
- **CN** ZL96213888.6
- **TW** 088519, 122688, 143243, 161596, 189832

Taiwan's unique：High-tech Industries and Resources Recovery

1.Can you believe ?

〝As of 2011, 51% water recovery of industrial water usage in Taiwan 85% in high-tech industries。〞

High-tech firms to fight drought measures by using recycled water

TAIPEI--Taiwan's leading flat panel and wafer makers said they would make use of recycled water to cope with water rationing that is expected to be imposed in several areas across the country on May 20.

Under the second-stage of water rationing announced by Economics Minister Shih Yen-shiang on May 4, the supply of water to industrial users will be cut by 5 percent, and fountains and other non-essential users will have their supplies cut off.

AU Optronics Corp. (AUO) and Chimei Innolux Corp., Taiwan's two largest flat-panel makers, said Friday that they expected to cope with supply reductions by using recycled waste water, but they would not provide details of what more they would do beyond current recycling efforts.

The panel makers said they already recycle an average of 85 percent of the wastewater they generate at present, and Chimei Innolux said the recycling rate is as high as 91 percent at some of its factories.

AUO said its innovative Water Inter-use System, a water-saving system connecting different pieces of equipment, enables it to save 335,000 tons of water a year, enough to fill 160 standard swimming pools.

Another system that allows AUO to catch rainwater off the huge roof of one of its factories, can help it save over 25,000 tons of water per year, enough to fill 11 standard swimming pools.

Earlier this week, the country's two largest wafer foundries, United Microelectronics Corp. (UMC) and Taiwan Semiconductor Manufacturing Co. (TSMC), said they would not rule out the possibility of purchasing water in case of water shortages.

Although costs may increase as a result, the overall impact would be limited, UMC said. The company said it has experienced water rationing many times in the past and had already developed a standard operating procedure that it would follow this time as well.

TSMC said it has been saving water as early as the beginning of April in anticipation of water shortages and has already reduced water usage by 3 percent. The company estimated that its 85 percent water recycling rate would also help it meet production needs.

Second-phase water rationing measure will be introduced in cities and counties such as Taoyuan, Hsinchu, Miaoli, Taichung and Changhua.

First-phase water rationing was implemented in Hsinchu on March 18, and in Taoyuan, Miaoli, Taichung and Changhua counties and Banciao and Sinjhuang cities in New Taipei City in April.

The China Post

17

Southern Taiwan Science Park to cut water supply to cope with drought

Rebecca Kuo, Taiwan; Adam Hwang, DIGITIMES [Tuesday 10 May 2011]

The Southern Taiwan Science Park (STSP), one of the three government-developed science parks in Taiwan, plans to reduce daily water supply by 5% from 100,000 metric tons (MT) to 95,000 MT from May 23 to cope with treat of drought, according to STSP administration.

Some areas in Taiwan are also subject to risk of water shortage, according to the Ministry of Economic Affairs (MOEA). If there is no or little rain in the next two weeks, decreased water supply in these areas will be put into force on May 23, MOEA pointed out.

If drought continues, STSP administration plans to further cut daily water supply to 80,000MT from mid-June and urge enterprises stationed in the park to reduce unnecessary water consumption and recycle wastewater from manufacturing processes.

Chimei Innolux (CMI), a Taiwan-based TFT-LCD panel maker, is the largest water user in STSP. CMI has regularly recycled 85% of wastewater in manufacturing processes on average, and recently started operation of new recycling equipment which is able to recover water by 10% in addition, CMI indicated.

AU Optronics, a Taiwan-based fellow maker, has reached wastewater recycling rates of 85-90%, according to the company.

DIGITIMES

2.How to reach the goal ?

（neither cheap, nor easy）

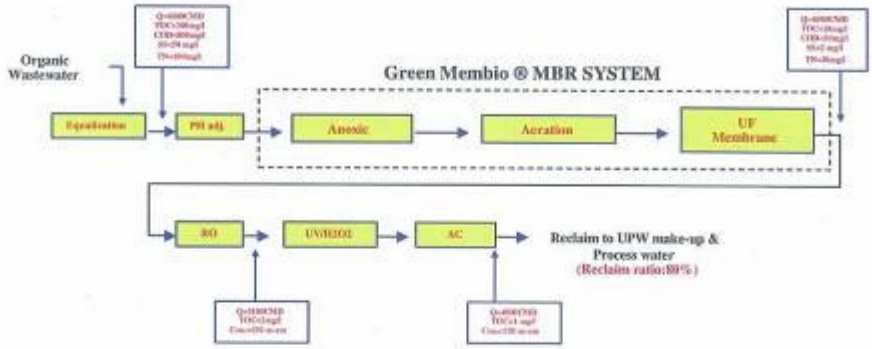
- Low Organic TFT-LCD Wastewater Treatment and Reclamation plant （6000 CMD）
- High Organic TFT-LCD Wastewater plant （5000 CMD）
- Polarizer and Color Filter Plants

Low Organic Wastewater Treatment and Reclamation Plant (6000CMD)

GETC

- Raw water capacity : 6,000CMD
- UF membrane : Zenon Zeeweed 500d
  4 Trains, 3 cassettes/each train
  44 X ZW 500d modules/each cassette
- RO+AOP's capacity : 4,800CMD
- Recovery : >80%
- Reclaim water use : Process water & UPW make-up
- Commissioning date: Aug, 2004(MBR)

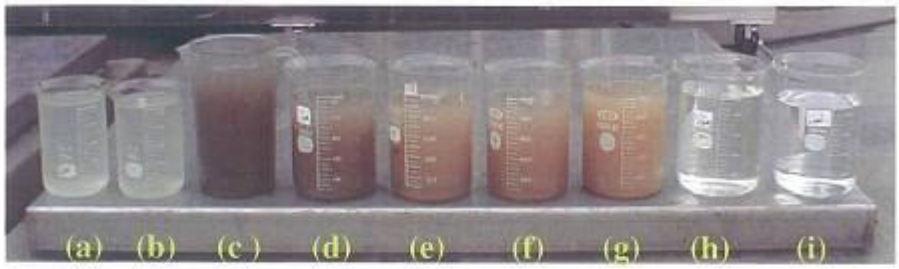
Low Organic Wastewater Treatment and Reclamation Plant(6000CMD)



Process flow for the LOWTRP

Low Organic Wastewater Treatment and Reclamation Plant (6000CMD)

Treated Water

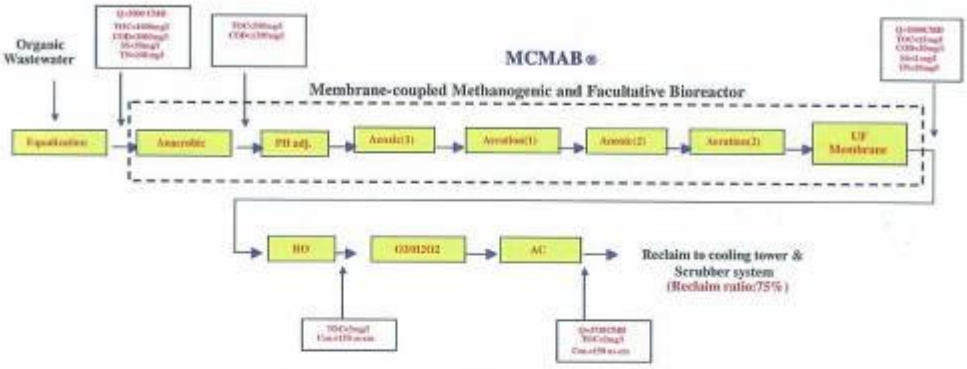


(a):raw wastewater, (b) PH adjustment, (c) anoxic tank, (d~f): aeration tank, (g):membrane tank, (h): UF permeate, (i): RO permeate

High Organic Wastewater Treatment and Reclamation Plant (5000CMD)

- Raw water capacity : 5,000CMD
- UF membrane : Zenon Zeeweed 500C
  4 Trains, 5 cassettes/each train
  22 X ZW 500C modules/each cassette
- RO+AOP's capacity : 3,750CMD
- Recovery : >75%
- Reclaim water use : Cooling tower & Scrubber
- Commissioning date: April, 2003(MBR)
  Nov., 2005(Anaerobic)

High Organic Wastewater Treatment and Reclamation Plant (5000CMD)



Process flow for the HOWTRP

MBR System (4 Trains, 5 cassettes/train)

- ZeeWeed 500c
- 4 Trains, 5 cassettes/Train
- Total 20 cassettes
- Total 440 elements

TFT-LCD High Organic Wastewater Treatment and Reclamation Plant (5000CMD)




Wastewater Treatment & Reclaim Work List in Taiwan (Opto-electronic Industry)

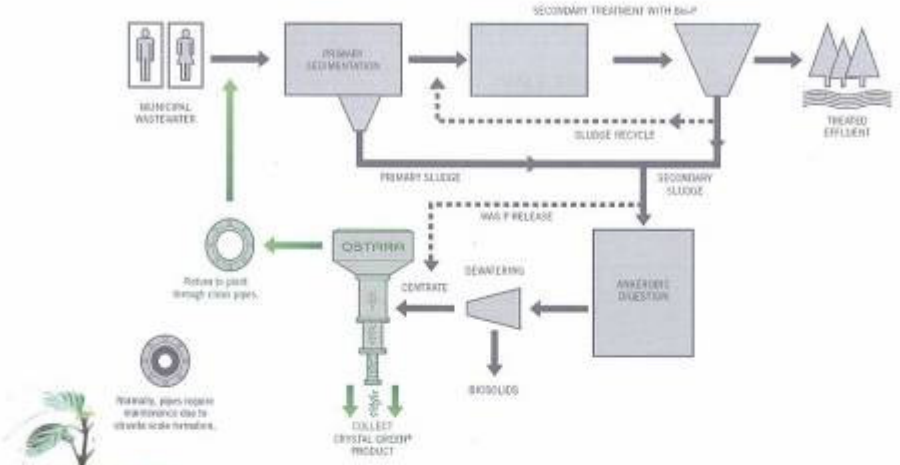
GETC

Client	Industrial Type	Capacity (CMD)	Commissioning Date.	Remarks
CPT#1	TFT-LCD(3.5G)	1,300	Dec., 2000	Org W.W. treatment for reclamation
CPT#2	PDP	800	Jan., 2002	Org W.W. treatment for reclamation
Optimax	Polarizer	600	Mar., 2004	Org W.W. treatment
CPT#3	TFT-LCD (4.5 & 5 G)	10,500	April, 2004	Inorg W.W. treatment Org W.W. treatment for reclamation Domestic WW treatment for reclamation
Optimax	Polarizer	1,500	April, 2005	Inorg W.W. treatment Low Org W.W. treatment for reclamation High Org W.W. treatment
QDI	TFT-LCD(6 G)	45,000 40000(Reclaim)	June, 2005	Rinse WW treatment for reclamation LOW Org W.W. treatment for reclamation High Org W.W. treatment Inorg W.W. treatment
CPT#4	TFT-LCD(6G)	30,000 20,000(Reclaim)	Aug, 2005	Rinse WW treatment for reclamation LOW Org W.W. treatment for reclamation High Org W.W. treatment for reclamation Inorg W.W. treatment
CPT#5	Color Filter(6G)	12,000 6,000(Reclaim)	Aug, 2005	Rinse WW treatment for reclamation Org W.W. treatment Inorg W.W. treatment

3.Combination of Phosphate and Ammonium Rich Streams for Struvite Recovery from Municipal Wastewater.

- Struvite($MgNH_4PO_4 \cdot 6H_2O$),a crystalline structure comprised of Mg^{+2},NH4-N,PO4-P, is commonly encounted in wastewater.
- The fluidized bed reactor can grow crystals to 5 mm in diameter with much greater crystal hardness and purity.

• Ostara Process

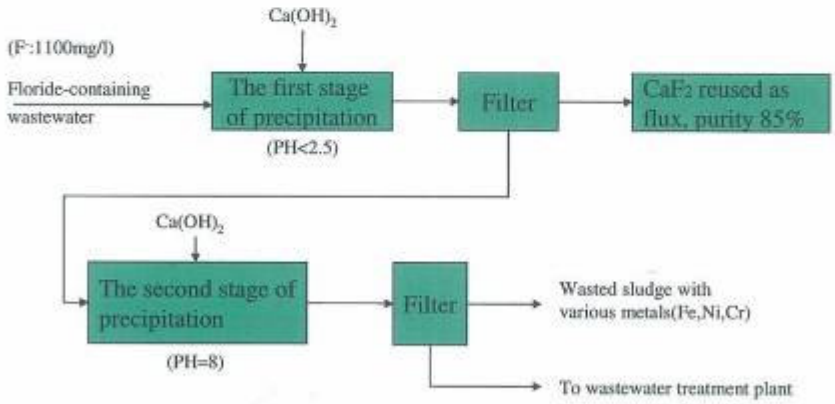


Phosphorus recovery from Edmonton Goldban WWTP, Canada. 80% of phosphorus and 10-15% of the ammonia from a flow of 500 CMD can be recovered.

4.Selective Precipitation of Floride and Phosphate from High-tech Industries.

- **Armco Electrosteel Co.USA**

  Selective precipitation of Floride from Electrosteel waste stream by Two-Stage Lime Neutralization.



Selective precipitation to recovery CaF_2 in Armco ElectroSteel Co. USA

- **Basic Chemical Concept:**

  .The solution of CaF_2 at PH=2.0 is about 65 mg/l, therefore, around 95% of the influent of floride (F^-: 1100 mg/l) will be precipitated as CaF_2.

  .At PH < 3.0, reversely, the solubilities of $Fe(OH)_3$, $Ni(OH)_2$ and $Cr(OH)_3$ are all very high, and can be separated and get high quality of CaF_2.

  .Compare to the nature CaF_2 mineral, the product from selective precipitation process makes even higher purity (85%) than 77%-80% of nature one.

- **Selective Precipitation of Phosphate from Semiconductor Wastewater**

  Flow Characteristics:

Fluoride(F^-):	**800-1000mg/l**
Sulfate ($SO_4^{=}$):	**500-650mg/l**
Phosphate($PO_4^{=}$):	**100-120mg/l**
Ammonium(NH_4^+):	**20-30mg/l**

- **Basic Concepts:**

  Magnesium salts have low reactivity with fluoride,therefore,can be a good separator for phosphorus from fluoride ions.

  Three possible magnesium phosphate precipitates,namely,$MgHPO_4.3H_2O$,

  $Mg_3.(PO_4)_2.22H_2O$ and $Mg_3(PO_4)_2.8H_2O$

  $MgCl_2$ is more effective than MgO.

- **Operation conditions:**

  molar ratio of【Mg^{+2}】:【$Po4^{-3}$】=3 to3:2

  PH=8-10

  phosphate recovery rate = 40-70%

  product Mg3(PO4)2.8H2O is dominated when molar ratio is 3:1, PH=10 , and recovery rate is 70%.

Table C: Periodical system showing pellet reactor experience

1 H																	2 He
3 Li	4 Be					successfully recovered						5 B	6 CO_3	7 NH_4	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 PO_4	16 SO_4	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57/71 La-Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89/103 Ac-Lr	104 Rf-Ku	105 Ha-Ns	106 Unh	107 Uns	108 Uno	109 Une									

In some cases it has proved to be attractive to form metal phosphates. Anions are usually removed as calcium salts. Occasionally it is more desirable to form complex salts. For example, phosphate can be removed as NH_4MgPO_4 while simultaneously reducing the wastewater nitrogen content. 39

Conclusion:

1.Taiwan's know how：

UASB：Start-up process and reactor design.

MBR ：Non-woven fiber membrane.

FBC ：Distributor design and operation practice.

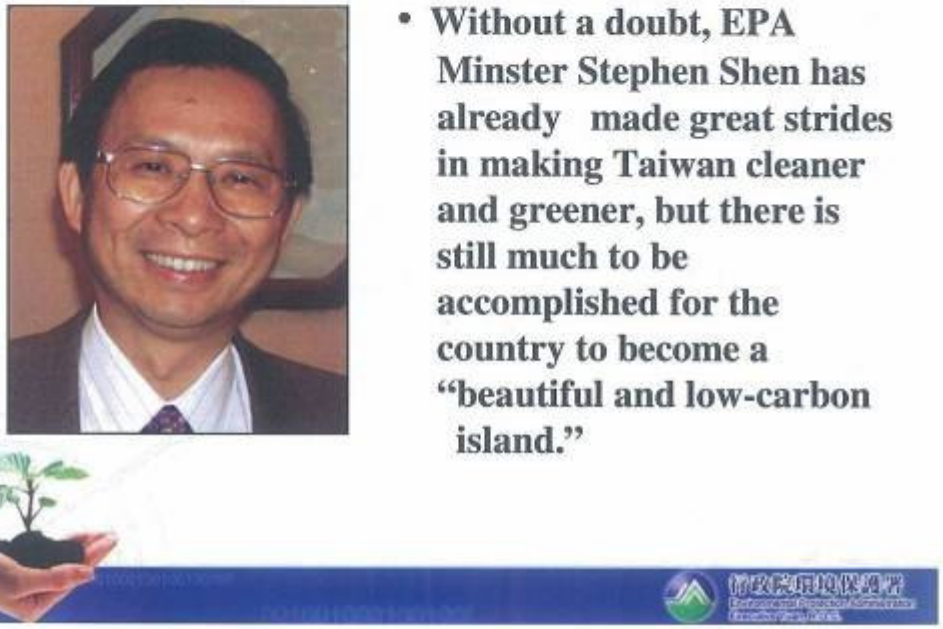
Selective precipitation：Detail physical and chemical and chemical analysis and experience.

2.Taiwan's unique：

The 85% wastewater reclamation rate and N, P.F. resources recovery practices make the manufacturing of semiconductor and TFT-LCD possible.

3.For municipal wastewater, the traditional biological aerobic and anaerobic process can enhance the nitrogen and phosphorus recovery from 40% to as high as 90%. Fluidized bed crystallization unit follows the traditional biological process is recommended.

4.For industrial wastewater, magnesium salts have low reactivity with fluoride, therefore, can be a good separator for phosphorus from fluoride ions. Selective precipitation of phosphorus from semiconductor and TFT-LCD waste streams as the forms of magnesium phosphate precipitates seems a promising approach.



- Without a doubt, EPA Minster Stephen Shen has already made great strides in making Taiwan cleaner and greener, but there is still much to be accomplished for the country to become a "beautiful and low-carbon island."

- **The Ministry of Environment and Natural Resources will be established on 1 January 2012 to encompass water, land, forest and mineral resource in order to integrate environmental protection and ecological conservation.**

行政院環境保護署

環境資源部 MOENR(Ministry of Environment and Natural Resources)
三級機關（構）中英文名稱對照表

100.05.13

部會	中文全稱	中文簡稱	英文全稱	英文簡稱
1	氣象局	氣象局	Meteorological Service	MS
2	水利署	水利署	Water Resources Administration	WRA
3	森林及保育署	森林及保育署	Forestry and Nature Conservation Service	FNCS
4	水保及地礦署	水保及地礦署	Soil and Water Conservation, Geological Survey and Mineral Resources Administration	SGMA
5	污染防治局	污防局	Pollution Prevention and Control Bureau	PPCB
6	國家公園署	國家公園署	National Parks Service	NPS
7	環境教育及訓練所	環教所	Environmental Education and Training Institute	EETI
8	森林及自然保育試驗所	森保所	Forestry and Nature Conservation Research Institute	FNCRI
9	生物多樣性研究所	生研所	Biodiversity Research Institute	BRI

組織架構圖

- **The announcement made by President Ma Ying-Jeou regarding his decision to ask the state-owned CPC Corporation to withdraw its investment in the naphtha cracking complex, known as Kuokuang Petrochemical Project. We anticipate the positive long-term effect of this decision.**

email:gdroam@mail.niea.gov.tw

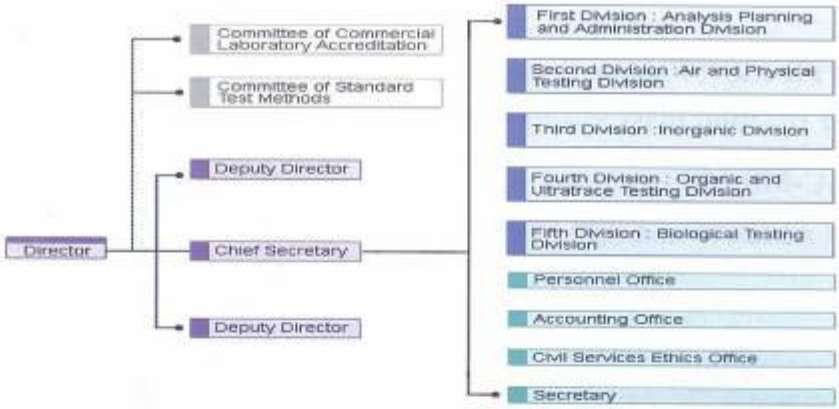
Tel:886-3-491-1006

Fax:886-3-491-5460

Thanks for your attention!

The National Environmental Analysis Building

- **has a ground area of 36,000 m^2.**
- **consists of a modernized Roman style courtyard and a central office building surrounded by laboratories on two wings.**



- **The EAL is divided into five divisions with total 120 employees and supervises about 100 commercial labs.**

Instruments and Capabilities

$PM_{2.5}$ & $PM_{0.1}$ measurement ($\mu g/m^3$)

Ambient $PM_{2.5}$

Mobile Lab

Real-time, On-road Air Quality Monitoring

Continuous monitoring for Hg

Gaseous Hg in ambient

PTR-MS（Proton Transfers or reaction mass Spectrometry）	Real-time online VOCs SVOCs in air ppb level
LC-MS-MS （API2000 and API 3000）	algae toxins, environ. hormones, pesticides, pharmaceuticals ppb~ppt level

Two-dimensional GC-TOF-MS	SVOCs, ppb level Analysis of stable isotope
GC-IRMS	ratio of C. N.H ppm level

HRGC/HRMS	**Dioxin, Dioxin-like PCBs & pops, ppt level**
ICP-MS	**trace metals and elements ppb~ppt level Can be conjugated with HPLC for Cr and As, with GC for Sn Compounds**

Main projects in 2011：

- **Wetland survey：water, sediment and biological quality study**
- **Passive sampler devices development**

被動採樣器圖

- **Greener pretreatment or analytical techniques**
- **Integrate Mobile Lab, PTR-MS and micro-meteorological model to identify air pollution incident on a real-time basis**
- **Bionanotechnology application for biosensor and biochip development.**

More information Please find：

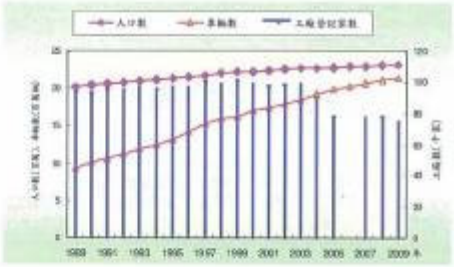
www.niea.gov.tw/english

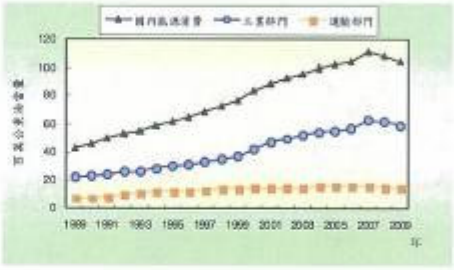
附件六 專題演講資料－莊簡任技正訓城

壹、背景現況說明

歷年人口、經濟、車輛與能源消耗成長趨勢

- 2009年底總人口數相較於1989年成長約14%。
- 總能源消耗2009約為1989年的2.4倍。
- 車輛數自1989年的928萬輛逐年增加至2009年2137萬輛，約2.3倍；運輸部門能源耗用由1989年的7.4增至2009年的14.9百萬公秉油當量，約2倍。



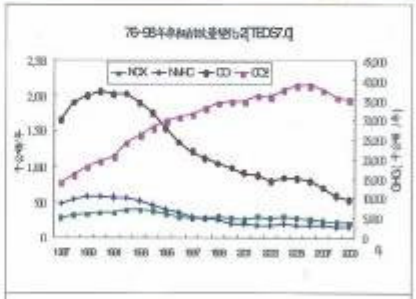


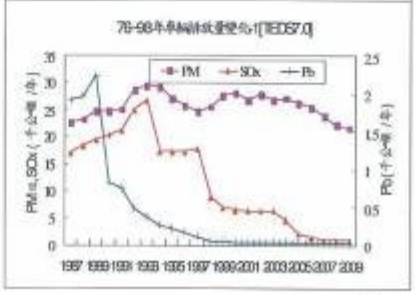
3

壹、環境負荷變化

移動污染源歷年排放量變化

- 2009年相較於1987年排放量變化率
  - PM10排放量降低5%
  - SOx排放量降低95%
  - NOx排放量降低22%
  - NMHC排放量降低69%
  - CO排放量降低68%
  - Pb排放量降低98%
- 溫室氣體隨燃油使用量成長2009年排放量約為1987年的2.5倍。

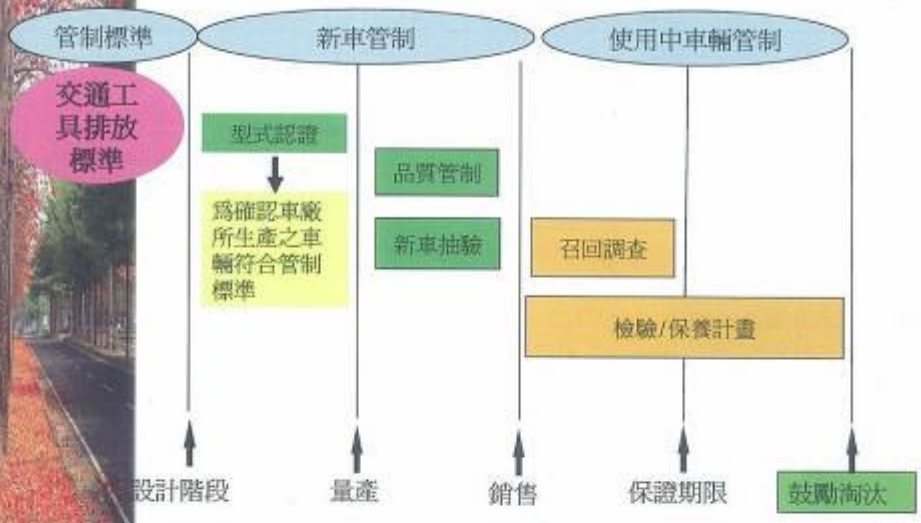




4

貳、現行管制措施

車輛生命週期管制圖



5

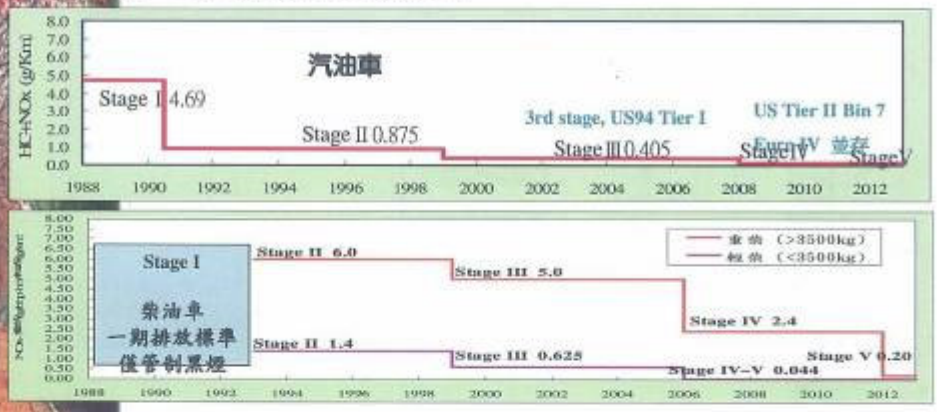
貳、現行管制措施

6

貳、現行管制措施

一、新車管制

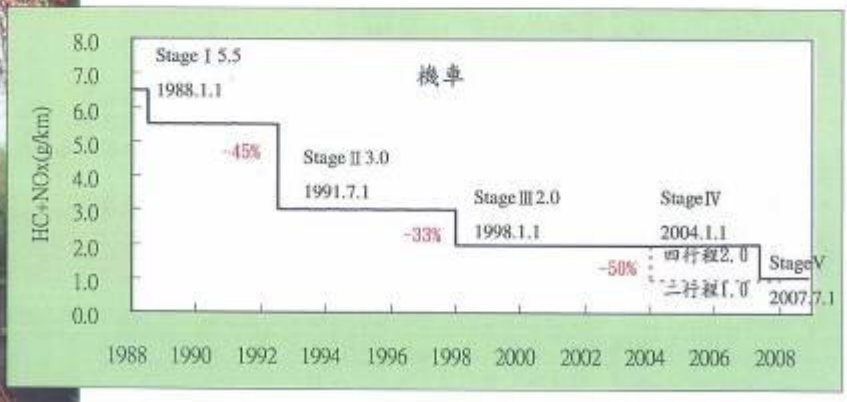
(一) 逐期加嚴排放標準



1早期我國汽柴油車排放標準均採用美國管制法規與標準。
2柴油車自第3期起、汽油車自第4期起採認歐盟標準，以符合法規調和精神。
3柴油車第5期排放標準已於98年10月29日公告，訂於101年實施。
4汽油車第5期排放標準已於99年3月31日公告，訂於101年10月實施。

貳、現行管制措施

(一) 逐期加嚴排放標準



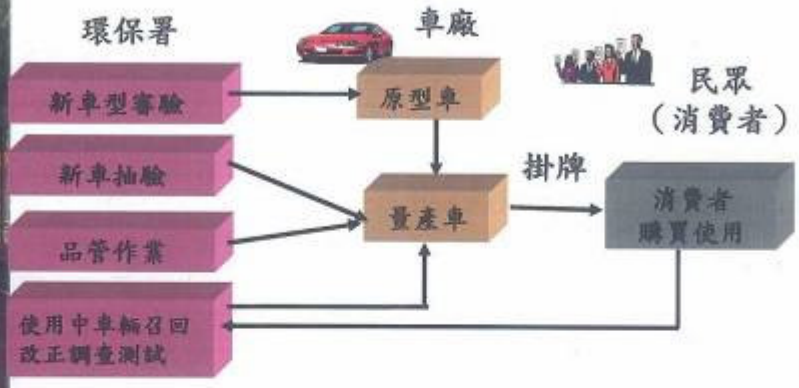
1.機車第4期排放標準將2行程機車的標準加嚴，93年起不再生產銷售2行程機車。
2.機車第五期排放標準自96年7月1日開始實施，機車全面改採電子噴射供油系統。
3.財正研擬機車第六期排放管制標準，預計100年年底公告，103年實施。

貳、現行管制措施

一、新車管制

（二）實施新車型審驗

透過車型審驗制度，確保新車均能符合排放標準



9

貳、現行管制措施

二、使用中車輛管制

（一）使用中車輛定期排氣檢驗

1. 汽油車與柴油車排氣定檢，係由交通監理單位配合年度車輛安全檢驗時一併進行。刻正與交通監理單位協調，以提升汽油車排氣檢驗品質及加強資料應用。另並研擬規劃柴油車定期維修保養制度，以更有效改善柴油車排放黑煙。

2. 機車排氣定檢，係由環保機關委託機車排氣定檢站執行，截至99年底全國共設立2,582個機車排氣檢驗站，每年寄發通知約1,000萬輛機車檢驗，到檢700萬餘輛，扣除不再使用機車數，到檢率為83.44%，不合格率為15%，未到檢及不合格機車均由縣市環保局列管要求改善。

10

貳、現行管制措施

二、使用中車輛管制

（二）加強不定期檢驗

1. 由縣市環保局執行機車排氣路邊攔查、攔檢及巡查等不定期檢驗工作，99共計檢驗1,507,924輛次，不合格車輛均由縣市環保局告發處分。
2. 已於22縣市設置26線柴油車動力計排煙檢測設備，通知有污染之虞柴油車輛檢驗，99年共檢驗79,230輛，不合格率5%。
3. 由縣市環保局於高速收費站及其他適當地點執行柴油車排煙路邊攔檢工作， 99年共檢驗10,982輛，不合格率27.5%。

11

貳、現行管制措施

二、使用中車輛管制

（三）獎勵檢舉烏賊車

1. 依「使用中汽車排放空氣污染物檢舉及獎勵辦法」由民眾檢舉柴油車排放黑煙、汽機車排放白煙者。99年共受理民眾檢舉133,418件，通知完成檢驗車輛數共有2行程機車26,684輛，4行程機車1,742輛，汽車876輛，柴油車8,126輛。
2. 自98年1月1日起，檢舉時檢附3張照片並經環保局認定有污染之虞案件，每案發給檢舉人300元獎勵金。99年檢附照片比例達84.2%，顯示新制度更具誘因，可有效提升民眾檢舉意願。

12

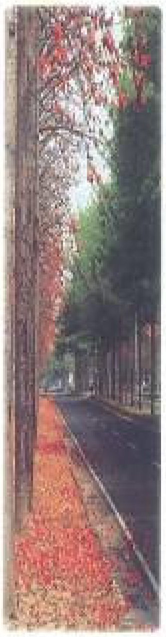
貳、現行管制措施

二、使用中車輛管制

（四）淘汰高污染老舊二行程機車

1. 於95年底核定補助高雄市環保局辦理高高屏地區高污染老舊二行程機車淘汰計畫，提供每輛車1,500元補助，預計以3年時間（96至98年）淘汰35萬輛二行程機車。高雄市於96年11月12日訂定發布「高雄市辦理高高屏地區二行程機器腳踏車汰舊補助辦法」，開始辦理補助。
2. 依據立法院審查本署97年度空污基金預算之決議，將97年度擬補助之10萬輛二行程機車，分配為高高屏地區5萬輛、其他縣市5萬輛，並於97年7月17日發函核定除高高屏三縣市外其餘22縣市辦理補助淘汰老舊二行程機車計畫。
3. 97年共補助淘汰51,607輛二行程機車，98年補助89,449輛，99年補助74,249輛。

貳、現行管制措施



三、推動使用潔淨燃料

（一）訂定油品成分標準

1. 訂定「車用汽柴油成分及性能管制標準」，自2000年開始施行。
2. 逐年降低車用柴油硫含量，由78年的5,000ppmw，降至94年的50ppmw，汽油亦自96年1月1日起50ppmw
3. 已於98年7月29日修正發布「車用汽柴油成分管制標準」，預計於100年7月1日將柴油硫含量降低至10ppmw，101年1月1日汽油硫含量降低至10ppmw，與國際油品管制趨勢接軌。

[illegible]	[illegible]								[illegible]			
	成分標準						性能標準		成分標準			
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
九十四年一月一日	1.0	100	8.5psi	2.0	—	—	1700	40	50	—	35	—
九十六年一月一日	1.0	50	8.7psi	2.7	36	18	—	—	50	—	35	—
一○○年七月一日	1.0	50	60kPa	2.7	35	18	—	—	10	40	-	11
一○一年一月一日	1.0	10	60kPa	2.7	35	18	—	—	10	40	-	11

貳、現行管制措施

三、推動使用潔淨燃料

（二）加強取締非法油品

1. 為遏止柴油車使用非法油品，92年1月8日修正「交通工具違反空氣污染防制法裁罰準則」，大幅提高柴油車使用非法油品罰鍰，最高達75,000元。
2. 99年共稽查取締25,931件，不合格25件，不合格率為0.096%，將持續加強取締。
3. 為能由源頭進行管制，漁業署已改用VDR（航程記錄器），以實際出海作業里程，核定補助款，大幅減少漁船用油發油量（95年發油量為108萬公秉，96年為82萬公秉，97年88萬公秉）。

15

貳、現行管制措施

三、推動使用潔淨燃料

（三）推動油氣（LPG）雙燃料車

1. 第一階段：85年至89年底補助計程車改裝為油氣雙燃料車，共計補助改裝2萬7千餘輛。
2. 第二階段：90年10月1日起補助降低液化石油氣售價每公升補助3元，以鼓勵車主使用，95年調整為每公升2.5元，96年調整為2元。
3. 第三階段：97年1月16日提報行政院院會通過「油氣雙燃料車推廣計畫」，預計在5年內投入75.72億元，使油氣雙燃料車總數增為15萬輛，加氣站增為150站。
4. 97至99年底已新增加氣站29站，使營業中加氣站達49站；另已新增油氣雙燃料車11,967輛，總數達20,804輛。

16

貳、現行管制措施

四、推廣使用低污染車輛

（一）補助購買電動輔助自行車及電動自行車

1. 電動輔助自行車係加裝電池及馬達而具備輔助動力的自行車。自90年起訂定補助辦法，每輛補助3,000元，每年補助3,000～4,000輛。
2. 電動自行車是以電力為主，沒有人力踩踏的腳踏板，配合交通部修訂法令同意其合法上路，本署亦已於98年5月5日訂定補助辦法，提供民眾購車補助每輛3,000元。

17

貳、現行管制措施

四、推廣使用低污染車輛

（二）鼓勵業者建置電動車電池交換營運系統

藉由建置電動車電池交換營運系統，讓電動車使用者可快速交換電池，達到與加油相同的方便性，加速電動車普及。

1. 完成「電動機車電池交換系統補助辦法」及「電動機車電池交換費用補助辦法」訂定。
2. 辦理2處電動機車電池交換先導運行示範，評估成效及規劃未來推動方向。
3. 研訂電池共同規格及交換站設置規範。
4. 配合低碳社區及低碳島推動計畫，規劃建置電池交換營運系統。

18

貳、現行管制措施

四、推廣使用低污染車輛

（三）推動使用電動巴士

1. 國內已有華德動能公司電動巴士完成交通部安全審驗之各項測試，取得安審合格證可合法領牌上路。
2. 另立凱綠能公司亦已完成電動巴士研發，刻正辦理安全審驗之各項測試。
3. 現階段電動巴士尚有價格偏高等問題待解決，業者已提出車體電池分開銷售、電池交換等構想，以吸引公車業者使用。
4. 配合低碳社區及低碳島推動計畫，規劃電動公車試營運事宜。

19

貳、現行管制措施

五、交通管理措施

（一）推動停車熄火措施

1. 臺南市已於96年6月28日訂定「臺南市反怠速自治條例」，並於97年1月1日起正式實施，對違反者處罰500至2,000元罰鍰，97年度共稽查1萬8,480件，處分機車1件、汽車35件、公務車1件、大貨車11件等共48件。怠速比例由1月份7.9%降低至3.5%，支持本政策比例達93%。
2. 另臺中市及新竹市已依空氣污染防制法第31條第1項第6款規定公告「機動車輛惰轉3分鐘未熄火為空氣污染行為」。
3. 立法院已於100年4月8日三讀通過空污法修正案，增訂停車怠速熄火相關規定，本署刻正研訂相關管理辦法及罰鍰標準，預計101年起實施。

20

貳、現行管制措施

五、交通管理措施

（二）推動環保駕駛

1.辦理大客車、大貨車及計程車之環保駕駛示範車隊300輛以上。

2.印製環保駕駛訓練教材2,000份。

3.研訂全面推廣環保駕駛之策略與行動計畫。

（三）持續推動使用大眾運輸及自行車等綠色運

21

參、電動機車電池交換系統-推廣必要性

– 降低電動車輛購置價格

扣除工業局及地方環保局之補助後僅3萬多元，已較市售汽油引擎機車之價格低（約6萬餘元），惟民眾會擔心後續需1萬5,000元至2萬元的更換電池費用。加入交換系統成為會員，不需購置第二顆以後的電池。

– 快速更換電池，節省電動車輛電池充電時間

目前所生產的電動機車雖搭配抽取式鋰電池，惟仍有充電時間長而不方便等問題。電池交換系統的交換機台則須在3分鐘內完成交換。

– 延長電動車輛續航里程

目前電動機車在馬力、爬坡力等性能已可與傳統汽油引擎機車匹敵。惟續航力性能尚嫌不足，交換系統可大幅延長續航力。

22

參、電動機車電池交換系統-推廣必要性

- **做到像機車加油一樣的方便性**

  交換系統為減輕電池組單元的重量，以多組電池並聯使用，方便女騎士手提持用，快速更換電池，做到像加油一樣的方便。

- **透過專業管理，降低電池損耗及不當使用風險**

  透過電池交換系統平台，電池業者可以搖籃到搖籃經營模式，維持電池使用的最佳管理狀態，降低電池使用的耗損風險。

- **提高電池使用率，達到節能減碳之目的**

  容量降至80%以下汰換之電池，可由業者統一移作如電網儲能之其他用途。

23

電池交換站

24

電池交換站

25

取出電池

26

刷車主ID卡

27

選擇交換數量

28

刷悠遊卡付費

29

退出空軌

30

放入電池

31

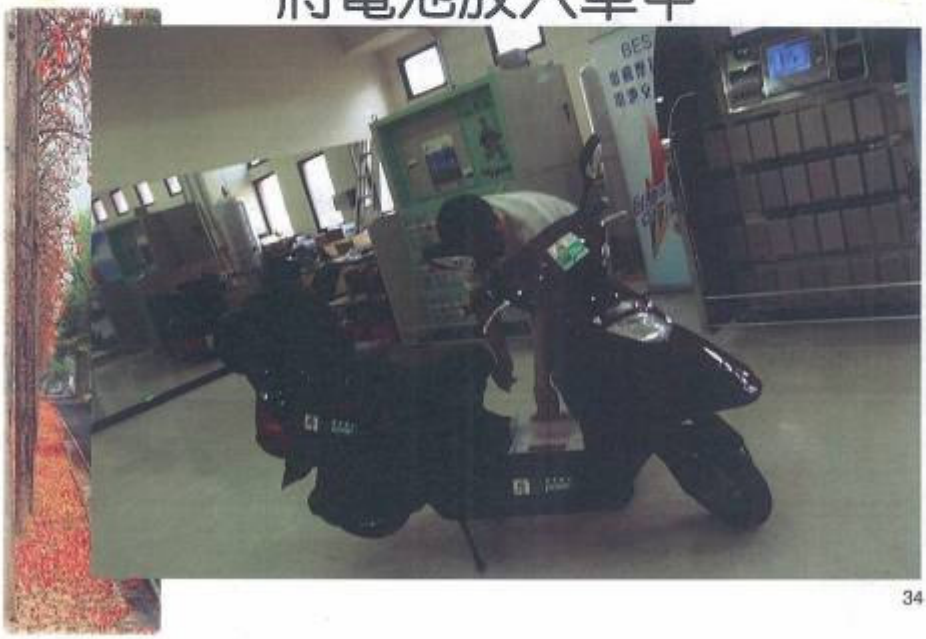
取出已充飽電之電池

32

取出收據結束交易

33

將電池放入車中



34

參、電動機車電池交換系統-補助作法

- 本署已邀集電動機車、電池及交換機廠商召開7次會議討論電池、接頭及交換機共同規格、驗證測試項目及標準。後續將持續召開會議研商。
- 本署已研擬「電動機車電池交換系統補助辦法」（草案）及「電動機車電池交換費用補助辦法」（草案），補助營運業者建置電池交換營運系統，已於3月30日召開公聽會，刻正辦理後續法制程序作業中。

35

參、電動機車電池交換系統-補助作法

- **電池交換系統軟硬體內涵**

  中控中心、電池組交換站、電動機車用戶會員、會員購置之第一組電池組、系統補充之電池組、供會員機車使用之電池組並聯供電管理晶片、維修站與經營管理及維修人員組成。

- **電池交換系統區分為主系統與子系統**

  主系統下之子系統具備前項之軟硬體內涵，使用外型尺寸、充電連結器及功能規格均相同之電池組，各子系統會員之機車可至不同子系統交換電池組及充電；各子系統各有中控中心，其會員之機車可使用與主系統下其他子系統不同之並聯晶片。

- **補助方式**

  以設置30個交換站，服務5,000輛電動機車為基準，每站最高補助金額為新臺幣150萬元。補助對象不超過兩個交換主系統（北部及南部各1個主系統），以維護電動機車使用者交換電池之最大方便性與成本效益。

36

參、電動機車電池交換系統-補助作法

補助使用者電動機車電池交換費用

- 接受電動機車電池交換系統補助辦法所補助設置之電動機車電池交換系統，補助其使用電動機車之騎士會員進行電池交換之費用。
- 以補助5,000位使用電動機車之騎士為原則，每位電動機車使用者補助之電池交換費用金額，以新臺幣1萬元為上限 。

電池交換站設置模擬圖

資料來源：城市動力公司
見發科技公司

37

肆、移動源管制之遠景

結合低碳社區及低碳城市，推動低碳運輸，打造以人為本的行車環境，積極改善車輛污染排放，共創美好未來。

簡報結束
敬請指正

39