

行政院及所屬各機關出國報告
(出國類別： 出席國際會議)

參加「美國自來水協會2002年年會」 心得報告

服務機關：臺灣省自來水公司

出國人 職稱：工程師

姓名：許廷發

出國地區：美國

出國期間：91年6月14日至7月1日

(6月22日至6月30日例假日及休假)

報告日期：91年10月3日

95
209102027

目次

頁次

行政院及所屬各機關出國報告提要出國報告提要	3
行政院及所屬各機關出國報告審核表-----	5
一、報告題目-----	6
二、會議目的-----	6
三、會議過程-----	6
(一)大會及研討會議程-----	6
(二)年會主要活動-----	8
四、紐奧爾良的風土人情-----	16
五、紐奧爾良的自來水-----	16
六、會議心得與建議-----	20
附件一、小型飲用水系統自我安全評估 Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems .	
附件二、研討會論文電子光碟片（原件資料僅一份， 另送國家圖書館）	

一、報告題目

參加「美國自來水協會 2002 年年會」心得報告

二、會議目的

美國自來水協會 AW WA (American Water Work Association) 創立於 1881 年，是全世界最大的自來水專業機構，目前會員數超過 50000 個，包括有淨水廠操作、管理人員、科學家、環境學家、製造商、學者、公務單位管理者及其他對公共給水及衛生有興趣的人士。

美國自來水協會 2002 年年會在路易斯安那州的紐奧爾良市舉行，參加人員除了來自美國國內，也廣泛邀請國外自來水事業人員共襄盛舉，濟濟多士，相聚一堂，交換工作經驗，研討有關技術問題及尋求最佳解決方案，有助於自來水事業的改善及發展。

三、會議過程

(一) 大會及研討會議程

	AM9:00-12:00	PM2:00-5:00
June 15	Benchmark Training for Utilities	

June 16	<p>Energy Solution for Water System Operations : Understanding Energy Procurement (1)</p> <p>Understanding and Controlling the Taste and Odor of Drinking Water (1)</p> <p>Counter Terrorism and Security in the Water Industry : Taking Security to Your Front-Line Employees .</p> <p>Rates and Changes and the Legal Environment .</p> <p>Filter Backwash Recycle Rule Compliance .</p> <p>Arsenic Removal Compliance with Membranes .</p> <p>Public Perception of Disinfectant Residuals .</p> <p>Complying with the Initial Distribution System Evaluation .</p> <p>Regulatory Issues Facing Microfiltration and Ultrafiltration Membrane Filtration Facilities .</p>	
June 17	Opening General Session	<p>Engineering & Construction(1)</p> <p>International(1)</p> <p>Legislative & Regulatory(1)</p> <p>Management(1)</p> <p>Public Affairs(1)</p> <p>Water Science & Research(1)</p> <p>Water Conservation(1)</p> <p>Water Quality & Technology(1)</p> <p>Water Resource(1)</p> <p>AEESP</p> <p>Advanced in Technology(1)</p>
June 18	<p>Distribution & Plant Operations(1)</p> <p>International(2)</p> <p>Legislative & Regulatory(2)</p> <p>Management(2)</p> <p>Public Affairs(2)</p> <p>University Forum(1)</p> <p>Small System(1)</p> <p>Water Quality & Technology(2)</p> <p>Water Resource(2)</p> <p>WTC Emergency Response</p> <p>Advanced in Technology(2)</p> <p>Human Resources</p>	<p>Engineering & Construction(2)</p> <p>Legislative & Regulatory(3)</p> <p>Management(3)</p> <p>Water Science & Research (2)</p> <p>University Forum(2)</p> <p>Small System(2)</p> <p>Water Conservation(2)</p> <p>Water Quality & Technology(3)</p> <p>Water Quality & Technology(4)</p> <p>Water Resource(3)</p> <p>Comm. Strategies</p>

June19	Distribution & Plant Operations(2) Engineering & Construction(3) Legislative & Regulatory(4) Management(4) Management(5) Water Science & Research(3) Small System (3) Water Quality & Technology(5) Water Quality & Technology(6) Water Resource(4) Water for People	Distribution & Plant Operations(3) International(3) Legislative & Regulatory(5) Management(6) Water Science & Research(4) Small System (4) Water Conservation(3) Water Quality & Technology(7) Water Resource(5) Canadian Affairs Young Professionals
June20	Distribution & Plant Operations(4) Engineering & Construction(4) International(4) Engineering & Construction(4) Legislative & Regulatory(1) Management(7) Management(8) Public Affairs(1) Water Science & Research(5) Water Conservation(4) Water Quality & Technology(8) Water Resource(6)	

(二) 年會主要活動

1.開幕儀式(Opening General Session)

- (1) 12002年6月17日上午9:30至11:00在La Nouvelle Orleans Ballroom Convention Center 舉行。
- (2) AWWA 主管介紹及工作報告。
- (3) 專題演講主講者：Dr.Janet Lapp，著名的臨床心理學教授，講題是 Plant Your Feet on the Mid-Air 傳達強而有力的訊息，如何在變動的時代不被潮流淹沒，強調變化不是一種負擔，而是一種機會，在不確

定年代，新的願景引導我們相互了解、新的觀念，還有最重要的是希望。

2 .展覽 (Exposition)

- (1) 全世界最大的自來水設備展，現場技術人員解說，以教育及服務為主要目的。
- (2) 2002年6月16日中午12點在展覽館大廳入口舉行剪綵開幕儀式。
- (3) 參展廠商提供豐富的資訊、產品、服務及供水問題的解決，展示最新及最好的產品，給予參訪者接近觀察及洽談的機會，滿足各種特殊需求。

3 .國際友人之夜(International Reception)

- (1) 每年 AWWA 年會都舉辦國際友人之夜，歡迎來自世界各國的友人，今年亦不例外，2002年6月17日(星期一)晚上5:00至6:00在Marriot Hotel 舉行。
- (2) 新任會長親自在宴會廳迎接來賓，當他知道筆者來自台灣，非常高興，很興奮的說他兒子正在台灣菲律普公司洽公，對於台灣美麗的風光及濃厚的人情味讚不絕口，筆者身為日月潭解說員義工，趁機邀請他日後到台灣訪問參觀時，務必到日月潭一遊，筆者將儘地主之誼，陪同暢遊中部名勝，對於日月潭風景小冊子，愛不釋手，確實比他國人士所送的自來水折頁更有吸引力。

4 . 沉默的拍賣會 (Silent Auction)

- (1) 會員提供收藏品或自行創作品拍賣，有意購買者把標價寫在拍賣品附表上，出價最高者得標。
- (2) 拍賣所得全數捐贈第三世界較落後國家。

5 . 參觀旅遊 (Tour)

(1) 參觀設施 (Facility Tour)

甲、六號抽水站 (Drainage Pumping Station)

抽水量每秒 9480 立方呎，全世界最大的此類型抽水站，紐奧爾良獨特的地形及 58 吋的年平均降雨量，每滴水都務必排出城外。

乙、卡羅頓水處理場

(Carrollton Water Treatment Plant)

平均每日處理水量 128 百萬加侖，供應紐奧爾良東岸居民 428000 人飲用水，水源來自混濁的密西西比河，採傳統沉澱、快濾法處理。

丙、麥考德太空梭工場

(NASA' s Michoud Assembly Facility)

設立於 1973 年，負責 NASA 太空梭計畫之設計、組裝及測試，並由洛克希德馬丁 (Lockheed Martin) 公司太空部門負責操作。

(2) 眷屬旅遊 (Spouse & Guest Tour)

甲、路易斯安那的回響 (Reflection of Louisiana)

坐船遊沼澤區，觀賞Mississippi River 沿岸自然景緻及昔日的甘蔗墾殖地（Sugar Plantation）。

乙、市區旅遊（A City Tour of Longue Vue Estate）
搭觀光巴士參觀市區內各著名景點，包括 Vieux Carre , Jackson Square , Old French Market , City of the Dead , the estate of Long Vue , Lake Pontchartrain , St. Charles Avenue , Canal Street , the Louisiana Superdome , and the World Trade Center .

丙、大河路懷舊之旅

（Nostalgic Journey on the Great River Road）
坐巴士橫過Mississippi River 到最後保留下來的克里奧墾殖區（Creole Plantation），再沿著堤岸到橡樹墾殖區（Oak Alley Plantation），該墾殖區於1837年建立。

丁、雜誌街尋寶

（Trash and Treasure on Magazine Street）
從 Canal Street 到 Audubon Park 全長約10公里，整條街都是販售古董商店、藝廊、特殊商品店及咖啡店，是喜歡逛街者的天堂。

6 . 烹飪示範（A cooking Demonstration）

大廚師現場示範道地的克里奧佳餚（Creole Delicacies），用過午餐後逛街、看街頭表演及藝術創作，聆賞戶外爵士樂演奏。

7. 自來水技術競賽（Pipe Tapping Contest）

(1) 參加隊伍來自北美洲各地自來水從業人員，今年是第十七次舉辦，比賽分男子組及女子組。

(2) 本屆初賽女子組在六月十七日，男子組在六月十八日，決賽均在六月十九日。

8. 學生、雇主及青年專業人士交誼

(Student, Employer, & Young Professional Meet & Greet)

為求職者及尋覓人才的公私機構提供交流的機會，雙方把條件預先提出，在輕鬆交談的氣氛中，很快達到人才交流的目的。

9. 技術研討會（Technical Sessions）

(1) 配水及淨水場操作 Distribution & Plant Operation
內容包括基礎設施的汰舊換新及送配水、抽水、操作、維護、測漏及腐蝕等。

(2) 工程施工（Engineering & Construction）

內容包括自來水相關設計施工實務、步驟、儀器、材料及工程電腦應用。

(3) 國際化（International）

來自世界各地的專家學者，集聚一堂，交換經驗。

(4) 法令規章 (Legislative & Regulatory)

探討最新的聯邦及地方法令規章。

(5) 經營管理 (Management)

內容包括領導統御、用戶服務、人力資源、健康及安全、法治、財務及費率等。

(6) 公共事務 (Public Affairs)

內容包括學習第一手的危機處理等。

(7) 科技研究 (Water Science & Research)

內容包括各自來水事業、學術機構、顧問公司及政治單位等最新的科技研究及創新。

(8) 小型供水系統 (Small Systems)

小型供水系統是指供水戶數 3000 戶以下者，佔美國大多數，內容包括如何與聯邦與地方政府互動、符合各項準則及訓練人員、地區化及財務考量。

(9) 節約用水 (Water Conservation)

內容包括提昇用水效率、最新節約用水法規、資訊交流、教育、規劃、技術、研究和評估等。

(10) 水質技術 (Water Quality & Technology)

提供用戶最高品質自來水，為自來水單位努力的目標，內容包括影響水質之物理、化學、生物及微生物污染，監視系統和實驗室量測水源及用戶端自來水。

(1 1) 水源管理 (Management of Water Resources)

內容包括水源管理之公共政策、永續發展、水源保護等。

(1 2) 特別主題 (Special Topics)

Manufacturers/Associates Council 負責報告最新科技部分，Young Professionals Committee 負責報告自來水最新研究部分，Canadian Affairs Committee 負責報告 Walkerton ， Ontario ， Battleford ， Saskatchewan 等水媒疾病發生個案研究，Water for People 負責報告最近的計畫，Association of Environmental Engineering & Science (AEESP) 及 Technical and Educational Council 負責報告紐約世貿大樓 911 攻擊後的自來水應變措施。

1 0 . 研討會 (Workshops)

(1) 反恐 (Anti-terrorism)

甲、2001 年 9 月 11 日紐約世貿大樓遭恐怖分子挾持飛機自殺攻擊，觸目驚心的悲慘景象，深深的烙印在世人心，從此「反恐」已是各國政府，各行各業的第一要務，自來水設施易受攻擊破壞的特性，更有必要加強反恐措施。

乙、美國環境保護署特別撥付 8300 萬美元供自來

水機構反恐經費，用途包括評估設施、訓練從業人員等等，並訂下七大工作方針：

- (甲). 訂定飲用水系統準則。
- (乙). 提供訓練和技術協助。
- (丙). 提供財務協助辦理 Vulnerability Assessments 和緊急應變措施。
- (丁). 建立可信賴的溝通程序。
- (戊). 建立可信賴的資訊系統。
- (己). 加強認識潛在威脅及偵測攻擊的方法。
- (庚). 改善各安全事務間的聯繫。

丙、AWWA 預估全部改善經費約需 16 億美金。

(2) 抗旱 (Anti-draught)

甲、短期的應變措施不可和長期節約用水計畫混為一談。

乙、紐約市在乾旱期間為貫徹限制市民用水措施，市府派直昇機在空中巡邏，發現有市民違規澆花或洗車，即拍照罰款。

丙、德州奧斯丁市抗旱期間的限水措施包括如下：

- (甲). 庭院蓄水池不得使用自動加水設備，以便得知水池是否漏水。
- (乙). 庭院新建蓄水池池緣不得高於地面，以利雨天進水及降低水壓減少滲漏。

(丙). 室內外噴泉應裝置自動循環設備，否則不得使用。

(丁). 透過媒體大幅報導，民眾舉發浪費用水。

四、紐奧爾良的風土人情

(一) 紐奧爾良位於美國南方，在路易斯安那州內，濱臨墨西哥灣，是美國第二大港口，由西岸洛杉磯或東岸紐約轉機約需三個小時。

(二) Pontchartrain Lake & Mississippi River 圍繞，空中鳥瞰猶似新月型，故有「新月之都 (the Crescent City)」稱號，全市大部分土地低於海平面，大型抽水站遍佈，沼澤及出海口三角洲，發展成著名的生態旅遊景點。

(三) 一談到 Jazz Music，就會想到著名的爵士樂家 Louis Armstrong，也會想到 Louis Armstrong 的故鄉紐奧爾良，也就是爵士樂的發源地，1718—1762 年法國移民最早在此定居，隨後西班牙人到來，又因濱臨墨西哥灣，深受非洲、拉丁美洲及希臘文化影響，是多元種族、多元文化的社會。

五、紐奧爾良的自來水

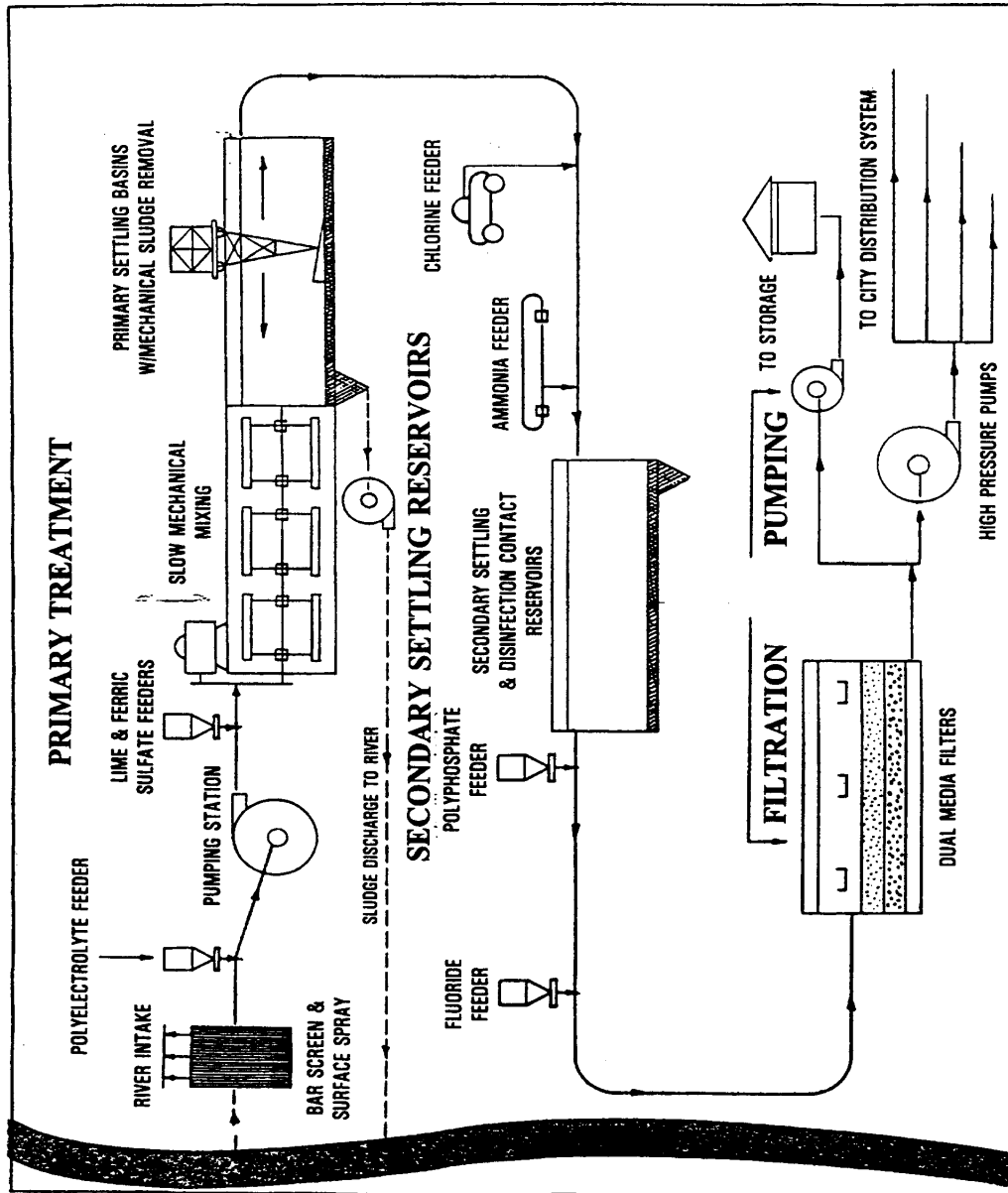
(一) 水源來自混濁的密希西比河，每天抽取用約 2.5 億加侖 (0.95×10^6 CMD) 該河流經紐奧爾良河段平均流量每天達 3000 億加侖 (1100×10^6 CMD)。

(二) 密希西比河懸浮固體含量 145mg/l，分別於 Algiers 及 East Bank 設取水站，埋設導水管送至 Algiers 及 Carrollton

淨水場處理。

(三) 淨水處理流程如下圖。

FLOW DIAGRAM OF WATER PURIFICATION PROCESS, NEW ORLEANS, LA.



(四) 1993-1997 年處理前後水質比較表

FIVE YEAR ANALYSIS DATA (1993 - 1997) FOR NEW ORLEANS
DRINKING WATER PURIFICATION SYSTEM

PARAMETER	MISSISSIPPI RIVER (Before Purification)			FINISHED WATER (After Purification)		
	MAX	MIN	AVG	MAX	MIN	AVG
TOTAL ALKALINITY (PPM AS CaCO3)	162	62	110	140	30	82
TOTAL HARDNESS (PPM AS CaCO3)	216	106	157	225	90	139
NONCARBONATE HARDNESS (PPM AS CaCO3)	112	17	47	114	21	58
CALCIUM HARDNESS (PPM AS CaCO3)	173	75	119	167	57	103
MAGNESIUM HARDNESS (PPM AS CaCO3)	84	5	38	87	8	36
NEPHELOMETRIC TURBIDITY (N.T.U.)	33	8	79	1.50	0.02	0.22
JACKSON TURBIDITY (J.T.U.)	430	19	119	—	—	—
pH	8.44	7.29	7.95	10.01	8.18	9.02
CHLORIDE (PPM)	72	10	29	74	16	31
FLUORIDE (PPM)	0.49	0.10	0.26	1.40	0.25	0.89
TOTAL DISSOLVED SOLIDS (PPM)	329	103	225	341	93	203
TOTAL SUSPENDED SOLIDS (PPM)	474	2	119	—	—	—
FREE CHLORINE RESIDUAL (PPM AS CL2)	—	—	—	1.7	0.0	0.1
TOTAL CHLORINE RESIDUAL (PPM AS CL2)	—	—	—	4.5	0.2	2.7
AMMONIA (PPM AS N)	0.03	0.00	0.00	0.7	0.0	0.2
ORTHO PHOSPHATE (PPM AS PO4)	1.0	0.1	0.4	0.9	0.1	0.3
TOTAL PHOSPHATE (PPM AS PO4)	1.0	0.2	0.4	1.0	0.3	0.5
SULFATE (PPM AS SO4)	77.6	27.1	53.1	77.6	26.1	54.0
SILICA (PPM AS SiO2)	5.6	4.1	5.9	7.3	3.2	4.9
NITRATE (PPM AS N)	3.6	1.0	2.3	5.8	0.9	2.1
NITRITE (PPM AS N)	0.4	0.0	0.1	0.5	0.0	0.0
COLOR (Scale Units)	20	10	14	10	5	5.6
CONDUCTIVITY (umhos/cm)	571	224	395	541	268	366
TEMPERATURE (DEG. F.)	88	32	60	98	46	73
ALUMINUM (PPB)	203	0	28	83	0	15
ARSENIC (PPB)	3.0	0.0	0.6	3.0	0.0	0.3
BARIUM (PPB)	251	4	67	139	1.0	36
CADMIUM (PPB)	1.0	0.0	0.0	1.0	0.0	0.0
CHROMIUM (PPB)	2.0	0.0	0.1	3.0	0.0	0.0
COPPER (PPB)	27.0	0.0	4.2	140	0.0	7.8
IRON (PPB)	359	1.0	21.8	740	0.0	33.0
LEAD (PPB)	3.0	0.0	0.0	7.0	0.0	0.0
MERCURY (PPB)	1.0	0.0	0.0	0.5	0.0	0.0
SELENIUM (PPB)	2.0	0.0	0.4	2.0	0.0	0.2
SILVER (PPB)	0.5	0.0	0.0	0.0	0.0	0.0
ZINC (PPB)	244	1	12	439	0	20
POTASSIUM (PPM)	5.2	2.2	3.4	5.0	2.4	3.3
SODIUM (PPM)	51	6.9	22	43	10.0	21.1
TOTAL TRIHALOMETHANES (PPB)	10.8	0.0	0.0	39	3.4	14.1
TOTAL ORGANIC CARBON (PPM)	11.3	1.5	5.3	7.8	1.1	3.4
1, 2-DICHLOROETHANE (PPB)	18.7	0.0	0.1	3.2	0.0	0.0
CHLOROFORM (PPB)	10.8	0.0	0.0	38	3.4	12.1
CARBON TETRACHLORIDE (PPB)	7.8	0.0	0.0	1.8	0.0	0.0
BROMODICHLOROMETHANE (PPB)	0.5	0.0	0.0	6.7	0.0	1.9
TETRACHLOROETHENE (PPB)	1.8	0.0	0.0	1.8	0.0	0.0
BTX (Benzene, Toluene & Xylenes) (PPB)	3.5	0.0	0.0	2.3	0.0	0.0
TOTAL COLIFORMS (colonies/100 ml)	13000	<100	1634	110	0	0
HETEROTROPHIC PLATE COUNT (col./100 ml)	86250	100	7299	1700	0	11
FECAL COLIFORMS (colonies/100 ml)	2570	<10	252	—	—	—
FECAL STREPTOCOCCI (colonies/100 ml)	11800	10	674	—	—	—

(五) 1997 年處理前後水質比較表

1997 ANALYSIS DATA FOR NEW ORLEANS DRINKING WATER PURIFICATION SYSTEM

PARAMETER	MISSISSIPPI RIVER (Before Purification)			FINISHED WATER (After Purification)		
	MAX	MIN	AVG	MAX	MIN	AVG
TOTAL ALKALINITY (PPM AS CaCO3)	147	70	102	130	51	92
TOTAL HARDNESS (PPM AS CaCO3)	207	106	154	196	126	155
NONCARBONATE HARDNESS (PPM AS CaCO3)	86	32	51	114	43	63
CALCIUM HARDNESS (PPM AS CaCO3)	153	75	107	136	73	112
MAGNESIUM HARDNESS (PPM AS CaCO3)	81	15	47	76	17	44
NEPHELOMETRIC TURBIDITY (N.T.U.)	262	15	85	1.50	0.06	0.23
JACKSON TURBIDITY (J.T.U.)	390	19	121	—	—	—
pH	8.44	7.77	8.05	9.48	8.18	8.81
CHLORIDE (PPM)	72	20	38	74	24	39
FLUORIDE (PPM)	0.4	0.1	0.25	1.40	0.64	0.88
TOTAL DISSOLVED SOLIDS (PPM)	329	168	233	341	169	231
TOTAL SUSPENDED SOLIDS (PPM)	285	65	127	—	—	—
FREE CHLORINE RESIDUAL (PPM AS CL2)	0	0	0	1.70	0	0.10
TOTAL CHLORINE RESIDUAL (PPM AS CL2)	0	0	0	4.50	0.20	2.90
AMMONIA (PPM AS N)	0	0	0	0.35	0.01	0.15
ORTHO PHOSPHATE (PPM AS PO4)	0.32	0.10	0.27	0.29	0.14	0.21
TOTAL PHOSPHATE (PPM AS PO4)	0.40	0.26	0.35	0.44	0.34	0.40
SULFATE (PPM AS SO4)	75.4	42.3	58.2	75.7	41.9	57.8
SILICA (PPM AS SiO2)	6.6	5.1	5.8	5.1	4.2	4.7
NITRATE (PPM AS N)	2.91	1.77	2.33	2.80	1.50	1.90
NITRITE (PPM AS N)	0.28	0.13	0.19	0.33	0.13	0.24
COLOR (Scale Units)	15	10	14	10	5	5
CONDUCTIVITY (umhos/cm)	571	224	377	541	268	381
TEMPERATURE (DEG. F.)	84	40	65	90	46	71
ALUMINUM (PPB)	203	0	40	43	0	15
ARSENIC (PPB)	2	0	0.3	1	0	0.0
BARIUM (PPB)	153	4	59	139	2	48
CADMIUM (PPB)	1.0	0.0	0.0	1.0	0.0	0.0
CHROMIUM (PPB)	0.0	0.0	0.0	1.0	0.0	0.1
COPPER (PPB)	9	1	4	123	0	8
IRON (PPB)	134	2	23	446	0	28
LEAD (PPB)	3	0	0	2	0	0.0
MERCURY (PPB)	0	0	0	0	0	0
SELENIUM (PPB)	0	0	0.0	1	0	0.0
SILVER (PPB)	0	0	0	0	0	0
ZINC (PPB)	95	1	17	172	0	16
POTASSIUM (PPM)	4.1	2.6	3.3	3.7	2.6	3.2
SODIUM (PPM)	51	12	25	43	10.0	23
TOTAL TRIHALOMETHANES (PPB)	0.3	0.0	0.0	35.4	5.0	15.3
TOTAL ORGANIC CARBON (PPM)	5.9	2.4	4.7	3.9	1.9	3.1
1, 2-DICHLOROETHANE (PPB)	2.1	0.0	0.0	2.6	0.0	0.1
CHLOROFORM (PPB)	1.4	0.0	0.0	32.2	4.0	12.7
CARBON TETRACHLORIDE (PPB)	0.0	0.0	0.0	0.0	0.0	0.0
BROMODICHLOROMETHANE (PPB)	0.0	0.0	0.0	5.7	0.7	2.2
TETRACHLOROETHENE (PPB)	0.0	0.0	0.0	0.9	0.0	0.0
BTX (Benzene, Toluene & Xylenes) (PPB)	0.9	0.0	0.0	0.0	0.0	0.0
TOTAL COLIFORMS (colonies/100 ml)	9200	130	1834	1	0	0
HETEROTROPHIC PLATE COUNT (col./100 ml)	52000	750	6300	360	0	0
FECAL COLIFORMS (colonies/100 ml)	1080	10	230	—	—	—
FECAL STREPTOCOCCI (colonies/100 ml)	6800	10	940	—	—	—
BERYLIUM (PPB)	0	0	0	0	0	0
MANGANESE (PPB)	8	0	3	9	1	4
NICKEL (PPB)	13	0	4	19	0	3
ANTIMONY (PPB)	0	0	0	0	0	0
THALLIUM (PPB)	0	0	0	0	0	0

六、會議心得與建議

(一) 多派人員參與國際活動：

研討會眾多，內容廣泛且有深度，極有參與之價值，每場次研討會都需另外付費，最高一場近美金 450 元，宜預先上網登記繳費。亞洲地區的日本、大陸及韓國均派六、七人以上參加，建請多派人員參與，以收集思廣益之效，並加速國內自來水事業的發展。

(二) 加強員工外語能力：

加入 WTO 後，在國內外參加國際性會議及研討會機會愈來愈多，外語能力就是溝通的基本要求，員工外語能力亟待加強，新進人員外語能力列入基本條件之一。

(三) 充實圖書設備：

AWWA 出版很多非常實用的好書，建請圖書館定期購買，供員工研究參考，日後總管理處擴建時，宜考慮增加圖書館面積，不但增加圖書收藏空間，也可讓員工有舒適的環境查閱資料。

(四) 節約用水從小教育：

舉辦各項親子活動，讓小朋友認識水資源的寶貴，培養節約用水的觀念與習慣。

(五) 水資源合理分配

台灣加入 WTO 後，開放農作產品進口政策下，農業耕作面積必然日漸減少，應適當合理的調整水源分配，以避免珍貴有限的水資源為少數利益團體把持，影響整體經濟發展；據加

拿大社運人士巴蘿女士著有「藍金（水）」一書，強力主張水資源絕對要掌握在公眾手中，英國環保組織「地球之友」的葛瑞非斯說，水是生命必要的資源，有關水的配給必須根據民主方式及人人可獲得安全乾淨用水的基本權利來決定。據聯合國統計，目前全球有二十億人得不到充足的乾淨用水，到二〇二五年，全球人口將成長為八十億，得不到充足用水的人口將有五十億，且依據一項研究報告顯示，未來 20 年將有超過 8000 萬人因無乾淨水飲用而染病死亡。

(六) 水價偏低是浪費用水之主因：

自來水事業為公用事業，反映成本的合理水價，才能維持企業的正常營運及服務品質，為避免受到民意代表非理性的反對，宜成立客觀的水價審議委員會。

(七) 減少水源污染優先於淨水處理：

俗話說「預防甚於治療」，以往國內一切以經濟掛帥，對於經濟活動所造成的水源污染，地方政府疏於管制取締，百姓生活水準提高後要求更高的生活品質，飲用水品質的提昇已是刻不容緩，為減少淨水處理費用，減少水源污染應是今後政府重點施政項目。

(八) 引進國外優良管材另件及儀控設備

美國自來水器材性能優良而耐用，主要原因為製造商多、工廠規模大，研究經費足，又無惡性競爭之弊，反觀國內市場小，競爭大，又採最低價得標，致品質難以提昇及影響新產

品之開發，有必要鼓勵廠商引進國外優良器材。

(九) 逐步增加委外設計，加強操作維護人員訓練。

自來水設施各項處理設備及程序，日漸進步，一般公營單位設計人員較缺少開創性，設計工作可委託專業顧問公司辦理，光有先進的硬體設施，沒有高素質操作維護人員之配合，必然無法發揮其效果，操作維護人員素質之提昇，有賴於平時的培訓。

(十) 國際合作辦理員工訓練

荷蘭 KIWA、IHE 及美國 AWWA 是舉世知名的自來水專業機構，其中 KIWA 專注於研究工作，IHE 專注於訓練自來水專業人才，AWWA 集合自來水界具有理論及實務經驗的學者專家研討交流，若能與上述機構合作辦理員工訓練，必然可提昇員工自來水專業水準。

(十一) 自來水協會功能加強

AWWA 年會雖然僅為美國國內社團之技術性集會，但常邀請國外同業、專家學者參加，故實質上亦為國際性之集會，其籌備、議程及眾多研討會之進行，相當緊湊，秩序甚好，頗值得我國自來水協會學習。

七、其他相關會議資料如附件



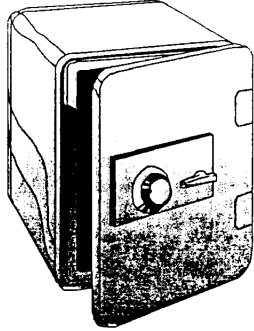
Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems

**Association of State Drinking Water
Administrators**

National Rural Water Association

May 30, 2002

A Note about Security for this Document



This document contains sensitive information about the security of your water system. Therefore, it should be treated as **Confidential Information** and should be stored in a secure place at your water system. A duplicate copy should also be stored in a secure off-site location.

Acknowledgments

This document is the result of collaboration among the Association of Drinking Water Administrators (ASDWA), the U.S. Environmental Protection Agency (U.S. EPA), the U.S. EPA Drinking Water Academy, and the National Rural Water Association (NRWA). We also thank NRWA for the template that was used as the foundation for this project.

Contents

SECURITY VULNERABILITY SELF-ASSESSMENT GUIDE FOR SMALL WATER SYSTEMS	4
INTRODUCTION	4
HOW TO USE THIS SELF-ASSESSMENT GUIDE.....	4
KEEP THIS DOCUMENT.....	4
SECURITY VULNERABILITY SELF-ASSESSMENT	5
RECORD OF SECURITY VULNERABILITY SELF-ASSESSMENT COMPLETION	5
INVENTORY OF SMALL WATER SYSTEM CRITICAL COMPONENTS.....	6
SECURITY VULNERABILITY SELF-ASSESSMENT FOR SMALL WATER SYSTEMS	7
GENERAL QUESTIONS FOR THE ENTIRE WATER SYSTEM	7
WATER SOURCES.....	10
TREATMENT PLANT AND SUPPLIERS	10
DISTRIBUTION	12
PERSONNEL	12
INFORMATION STORAGE/COMPUTERS/CONTROLS/MAPS	13
PUBLIC RELATIONS.....	14
ATTACHMENT 1. PRIORITIZATION OF NEEDED ACTIONS.....	17
ATTACHMENT 2. EMERGENCY CONTACT LIST	18
SECTION 1. SYSTEM IDENTIFICATION.....	18
SECTION 2. NOTIFICATION/CONTACT INFORMATION	19
SECTION 3. COMMUNICATION AND OUTREACH	22
ATTACHMENT 3: THREAT IDENTIFICATION CHECKLISTS.....	23
WATER SYSTEM TELEPHONE THREAT IDENTIFICATION CHECKLIST	23
WATER SYSTEM REPORT OF SUSPICIOUS ACTIVITY	25
CERTIFICATION OF COMPLETION	28

Security Vulnerability Self-Assessment Guide for Small Water Systems

Introduction

Water systems are critical to every community. Protection of public drinking water systems must be a high priority for local officials and water system owners and operators to ensure an uninterrupted water supply, which is essential for the protection of public health (safe drinking water and sanitation) and safety (fire fighting).

Adequate security measures will help prevent loss of service through terrorist acts, vandalism, or pranks. If your system is prepared, such actions may even be prevented. The appropriate level of security is best determined by the water system at the local level.

This Security Vulnerability Self-Assessment Guide is designed to help small water systems determine possible vulnerable components and identify security measures that should be considered. A "vulnerability assessment" is the identification of weaknesses in water system security, focusing on defined threats that could compromise its ability to provide adequate potable water, and/or water for firefighting. This document is designed particularly for systems that serve populations of 3,300 or less. This document is meant to encourage smaller systems to review their system vulnerabilities, but it may not take the place of a comprehensive review by security experts.

The Self-Assessment Guide has a simple design. Answers to assessment questions are "yes" or "no," and there is space to identify needed actions and actions you have taken to improve security. For any "no" answer, refer to the "comment" column and/or contact your state drinking water primacy agency.

How to Use this Self-Assessment Guide

This document is designed for use by water system personnel. Physical facilities pose a high degree of exposure to any security threat. This self-assessment should be conducted on all components of your system (wellhead or surface water intake, treatment plant, storage tank(s), pumps, distribution system, and other important components of your system).

The Assessment includes an emergency contact list for your use. This list will help you identify who you need to contact in the event of an emergency or threat and will help you develop communication and outreach procedures. Filling out the Emergency Contact List is an important step toward developing an Emergency Response Plan, which provides detailed procedures on how to respond to an emergency.

You may be able to obtain sample Emergency Response Plans from your state drinking water primacy agency.

Security is everyone's responsibility. We hope this document helps you to increase the awareness of all your employees, governing officials, and customers about security issues.

Once you have completed this document, review the actions you need to take to improve your system's security. Make sure to prioritize your actions based on the most likely threats. Please complete the Certificate of Completion on page 27 and return only the certificate to your state drinking water primacy agency. Do not include a full copy of your self-assessment.

Keep this Document

This is a working document. Its purpose is to start your process of security vulnerability assessment and security enhancements. Security is not an end point, but a goal that can be achieved only through continued efforts to assess and upgrade your system.

Don't forget that this is a sensitive document. It should be stored separately in a secure place at your water system. A duplicate copy should also be retained at a secure off-site location.

Access to this document should be limited to key water system personnel and local officials as well as the state drinking water primacy agency and others on a need-to-know basis.

Security Vulnerability Self-Assessment

Record of Security Vulnerability Self-Assessment Completion

The following information should be completed by the individual conducting the self-assessment and/or any additional revisions.

Name:	_____		
Title:	_____		
Area of Responsibility:	_____		
Water System Name:	_____		
Water System PWSID:	_____		
Address:	_____		
City:	_____		
County:	_____		
State:	_____		
Zip Code:	_____		
Telephone:	_____		
Fax:	_____		
E-mail:	_____		
Date Completed:	_____		
Date Revised:	_____	Signature:	_____
Date Revised:	_____	Signature:	_____
Date Revised:	_____	Signature:	_____
Date Revised:	_____	Signature:	_____
Date Revised:	_____	Signature:	_____

Inventory of Small Water System Critical Components

Component	Number & Location (if applicable)	Description
Source Water Type		
Ground Water		
Surface Water		
Purchased		
Treatment Plant		
Buildings		
Pumps		
Treatment Equipment (e.g., basin, clearwell, filter)		
Process Controls		
Treatment Chemicals and Storage		
Laboratory Chemicals and Storage		
Storage		
Storage Tanks		
Pressure Tanks		
Power		
Primary Power		
Auxiliary Power		
Distribution System		
Pumps		
Pipes		
Valves		
Appurtenances (e.g., flush hydrants, backflow preventers, meters)		
Other Vulnerable Points		
Offices		
Buildings		
Computers		
Files		
Transportation/ Work Vehicles		
Communications		
Telephone		
Cell Phone		
Radio		
Computer Control Systems (SCADA)		

Security Vulnerability Self-Assessment for Small Water Systems

General Questions for the Entire Water System			
<i>The first 13 questions in this vulnerability self-assessment are general questions designed to apply to all components of your system (wellhead or surface water intake, treatment plant, storage tank(s), pumps, distribution system, and offices). These are followed by more specific questions that look at individual system components in greater detail.</i>			
QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
1. Do you have a written emergency response plan (ERP)?	Yes <input type="checkbox"/> No <input type="checkbox"/>	<p>It is essential that you have an ERP. If you do not have an ERP, you can obtain a sample from your state drinking water primary agency. As a first step in developing your ERP, you should develop your Emergency Contact List (see Attachment 2).</p> <p>A plan is vital in case there is an incident that requires immediate response. Your plan should be reviewed at least annually (or more frequently if necessary) to ensure it is up-to-date and addresses security emergencies.</p> <p>You should designate someone to be contacted in case of emergency regardless of the day of the week or time of day. This contact information should be kept up-to-date and made available to all water system personnel and local officials (if applicable).</p> <p>Share this ERP with police, emergency personnel, and your state primary agency. Posting contact information is a good idea only if authorized personnel are the only ones seeing the information. These signs could pose a security risk if posted for public viewing since it gives people information that could be used against the system.</p>	
2. Is access to the critical components of the water system (i.e., a part of the physical infrastructure of the system that is essential for water flow and/or water quality) restricted to authorized personnel only?	Yes <input type="checkbox"/> No <input type="checkbox"/>	<p>You should restrict or limit access to the critical components of your water system to authorized personnel only. This is the first step in security enhancement for your water system. Consider the following:</p> <ul style="list-style-type: none"> • Issue water system photo identification cards for employees, and require them to be displayed within the restricted area at all times. • Post signs restricting entry to authorized personnel and ensure that assigned staff escort people without proper ID. 	

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
3. Are facilities fenced, including wellhouses and pump pits, and are gates locked where appropriate?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Ideally, all facilities should have a security fence around the perimeter. The fence perimeter should be walked periodically to check for breaches and maintenance needs. All gates should be locked with chains and a tamper-proof padlock that at a minimum protects the shank. Other barriers such as concrete "jersey" barriers should be considered to guard certain critical components from accidental or intentional vehicle intrusion.	
4. Are your doors, windows, and other points of entry such as tank and roof hatches and vents kept closed and locked?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Lock all building doors and windows, hatches and vents, gates, and other points of entry to prevent access by unauthorized personnel. Check locks regularly. Dead bolt locks and lock guards provide a high level of security for the cost. A daily check of critical system components enhances security and ensures that an unauthorized entry has not taken place. Doors and hinges to critical facilities should be constructed of heavy-duty reinforced material. Hinges on all outside doors should be located on the inside. To limit access to water systems, all windows should be locked and reinforced with wire mesh or iron bars, and bolted on the inside. Systems should ensure that this type of security meets with the requirements of any fire codes. Alarms can also be installed on windows, doors, and other points of entry.	
5. Is there external lighting around the critical components of your water system?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Adequate lighting of the exterior of water systems' critical components is a good deterrent to unauthorized access and may result in the detection or deterrence of trespassers. Motion detectors that activate switches that turn lights on or trigger alarms also enhance security.	
6. Are warning signs (tampering, unauthorized access, etc.) posted on all critical components of your water system? (For example, well houses and storage tanks.)	Yes <input type="checkbox"/> No <input type="checkbox"/>	Warning signs are an effective means to deter unauthorized access. "Warning - Tampering with this facility is a federal offense" should be posted on all water facilities. These are available from your state rural water association. "Authorized Personnel Only," "Unauthorized Access Prohibited," and "Employees Only" are examples of other signs that may be useful.	
7. Do you patrol and inspect your source intake, buildings, storage tanks, equipment, and other critical components?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Frequent and random patrolling of the water system by utility staff may discourage potential tampering. It may also help identify problems that may have arisen since the previous patrol. Consider asking your local law enforcement agencies to conduct patrols of your water system. Advise them of your critical components and explain why they are important.	

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
8. Is the area around the critical components of your water system free of objects that may be used for breaking and entering?	Yes <input type="checkbox"/> No <input type="checkbox"/>	When assessing the area around your water system's critical components, look for objects that could be used to gain entry (e.g., large rocks, cement blocks, pieces of wood, ladders, valve keys, and other tools).	
9. Are the entry points to your water system easily seen?	Yes <input type="checkbox"/> No <input type="checkbox"/>	You should clear fence lines of all vegetation. Overhanging or nearby trees may also provide easy access. Avoid landscaping that will permit trespassers to hide or conduct unnoticed suspicious activities. Trim trees and shrubs to enhance the visibility of your water system's critical components. If possible, park vehicles and equipment in places where they do not block the view of your water system's critical components.	
10. Do you have an alarm system that will detect unauthorized entry or attempted entry at critical components?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Consider installing an alarm system that notifies the proper authorities or your water system's designated contact for emergencies when there has been a breach of security. Inexpensive systems are available. An alarm system should be considered whenever possible for tanks, pump houses, and treatment facilities. You should also have an audible alarm at the site as a deterrent and to notify neighbors of a potential threat.	
11. Do you have a key control and accountability policy?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Keep a record of locks and associated keys, and to whom the keys have been assigned. This record will facilitate lock replacement and key management (e.g., after employee turnover or loss of keys). Vehicle and building keys should be kept in a lockbox when not in use. You should have all keys stamped (engraved) "DO NOT DUPLICATE."	
12. Are entry codes and keys limited to water system personnel only?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Suppliers and personnel from co-located organizations (e.g., organizations using your facility for telecommunications) should be denied access to codes and/or keys. Codes should be changed frequently if possible. Entry into any building should always be under the direct control of water system personnel.	
13. Do you have a neighborhood watch program for your water system?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Watchful neighbors can be very helpful to a security program. Make sure they know whom to call in the event of an emergency or suspicious activity.	

Water Sources

In addition to the above general checklist for your entire water system (questions 1-13), you should give special attention to the following issues, presented in separate tables, related to various water system components. Your water sources (surface water intakes or wells) should be secured. Surface water supplies present the greatest challenge. Typically they encompass large land areas. Where areas cannot be secured, steps should be taken to initiate or increase law enforcement patrols. Pay particular attention to surface water intakes. Ask the public to be vigilant and report suspicious activity.

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
14. Are your wellheads sealed properly?	Yes <input type="checkbox"/> No <input type="checkbox"/>	A properly sealed wellhead decreases the opportunity for the introduction of contaminants. If you are not sure whether your wellhead is properly sealed, contact your well drilling/maintenance company, your state drinking water primacy agency, your state rural water association, or other technical assistance providers.	
15. Are well vents and caps screened and securely attached?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Properly installed vents and caps can help prevent the introduction of a contaminant into the water supply. Ensure that vents and caps serve their purpose, and cannot be easily breached or removed.	
16. Are observation/test and abandoned wells properly secured to prevent tampering?	Yes <input type="checkbox"/> No <input type="checkbox"/>	All observation/test and abandoned wells should be properly capped or secured to prevent the introduction of contaminants into the aquifer or water supply. Abandoned wells should be either removed or filled with concrete.	
17. Is your surface water source secured with fences or gates? Do water system personnel visit the source?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Surface water supplies present the greatest challenge to secure. Often, they encompass large land areas. Where areas cannot be secured, steps should be taken to initiate or increase patrols by water utility personnel and law enforcement agents.	

Treatment Plant and Suppliers

Some small systems provide easy access to their water system for suppliers of equipment, chemicals, and other materials for the convenience of both parties. This practice should be discontinued.

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
18. Are deliveries of chemicals and other supplies made in the presence of water system personnel?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Establish a policy that an authorized person, designated by the water system, must accompany all deliveries. Verify the credentials of all drivers. This prevents unauthorized personnel from having access to the water system.	
19. Have you discussed with your supplier(s) procedures to ensure the security of their products?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Verify that your suppliers take precautions to ensure that their products are not contaminated. Chain of custody procedures for delivery of chemicals should be reviewed. You should inspect chemicals and other supplies at the time of delivery to verify they are sealed and in unopened containers. Match all delivered goods with purchase orders to ensure that they were, in fact, ordered by your water system. You should keep a log or journal of deliveries. It should include the driver's name (taken from the driver's photo I.D.), date, time, material delivered, and the supplier's name.	

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
20. Are chemicals, particularly those that are potentially hazardous or flammable, properly stored in a secure area?	Yes <input type="checkbox"/> No <input type="checkbox"/>	All chemicals should be stored in an area designated for their storage only, and the area should be secure and access to the area restricted. Access to chemical storage should be available only to authorized employees. You should have tools and equipment on site (such as a fire extinguisher, drysweep, etc.) to take immediate actions when responding to an emergency.	
21. Do you monitor raw and treated water so that you can detect changes in water quality?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Monitoring of raw and treated water can establish a baseline that may allow you to know if there has been a contamination incident. Some parameters for raw water include pH, turbidity, total and fecal coliform, total organic carbon, specific conductivity, ultraviolet adsorption, color, and odor. Routine parameters for finished water and distribution systems include free and total chlorine residual, heterotrophic plate count (HPC), total and fecal coliform, pH, specific conductivity, color, taste, odor, and system pressure. Chlorine demand patterns can help you identify potential problems with your water. A sudden change in demand may be a good indicator of contamination in your system. For those systems that use chlorine, absence of a chlorine residual may indicate possible contamination. Chlorine residuals provide protection against bacterial and viral contamination that may enter the water supply. The use of tamper-proof padlocks at entry points (hatches, vents, and ladder enclosures) will reduce the potential for unauthorized entry. If you have towers, consider putting physical barriers on the legs to prevent unauthorized climbing. Air vents and overflow pipes are direct conduits to the finished water in storage facilities. Secure all vents and overflow pipes with heavy-duty screens and/or grates.	
22. Are tank ladders, access hatches, and entry points secured?	Yes <input type="checkbox"/> No <input type="checkbox"/>		
23. Are vents and overflow pipes properly protected with screens and/or grates?	Yes <input type="checkbox"/> No <input type="checkbox"/>		
24. Can you isolate the storage tank from the rest of the system?	Yes <input type="checkbox"/> No <input type="checkbox"/>	A water system should be able to take its storage tank(s) out of operation or drain its storage tank(s) if there is a contamination problem or structural damage. Install shut-off or bypass valves to allow you to isolate the storage tank in the case of a contamination problem or structural damage. Consider installing a sampling tap on the storage tank outlet to test water in the tank for possible contamination.	

Distribution		
<i>Hydrants are highly visible and convenient entry points into the distribution system. Maintaining and monitoring positive pressure in your system is important to provide fire protection and prevent introduction of contaminants.</i>		
QUESTION	ANSWER	COMMENT
25. Do you control the use of hydrants and valves?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Your water system should have a policy that regulates the authorized use of hydrants for purposes other than fire protection. Require authorization and backflow devices if a hydrant is used for any purpose other than fire fighting. Consider designating specific hydrants for use as filling station(s) with proper backflow prevention (e.g., to meet the needs of construction firms). Then, notify local law enforcement officials and the public that these are the only sites designated for this use. Flush hydrants should be kept locked to prevent contaminants from being introduced into the distribution system, and to prevent improper use.
26. Does your system monitor for, and maintain, positive pressure?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Positive pressure is essential for fire fighting and for preventing back-siphonage that may contaminate finished water in the distribution system. Refer to your state primary agency for minimum drinking water pressure requirements.
27. Has your system implemented a backflow prevention program?	Yes <input type="checkbox"/> No <input type="checkbox"/>	In addition to maintaining positive pressure, backflow prevention programs provide an added margin of safety by helping to prevent the intentional introduction of contaminants. If you need information on backflow prevention programs, contact your state drinking water primary agency.

Personnel		
<i>You should add security procedures to your personnel policies.</i>		
QUESTION	ANSWER	COMMENT
28. When hiring personnel, do you request that local police perform a criminal background check, and do you verify employment eligibility (as required by the Immigration and Naturalization Service, Form I-9)?	Yes <input type="checkbox"/> No <input type="checkbox"/>	It is good practice to have all job candidates fill out an employment application. You should verify professional references. Background checks conducted during the hiring process may prevent potential employee-related security issues. If you use contract personnel, check on the personnel practices of all providers to ensure that their hiring practices are consistent with good security practices.

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
29. Are your personnel issued photo-identification cards?	Yes <input type="checkbox"/> No <input type="checkbox"/>	For positive identification, all personnel should be issued water system photo-identification cards and be required to display them at all times. Photo identification will also facilitate identification of authorized water system personnel in the event of an emergency.	
30. When terminating employment, do you require employees to turn in photo IDs, keys, access codes, and other security-related items?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Former or disgruntled employees have knowledge about the operation of your water system, and could have both the intent and physical capability to harm your system. Requiring employees who will no longer be working at your water system to turn in their IDs, keys, and access codes helps limit these types of security breaches.	
31. Do you use uniforms and vehicles with your water system name prominently displayed?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Requiring personnel to wear uniforms, and requiring that all vehicles prominently display the water system name, helps inform the public when water system staff is working on the system. Any observed activity by personnel without uniforms should be regarded as suspicious. The public should be encouraged to report suspicious activity to law enforcement authorities.	
32. Have water system personnel been advised to report security vulnerability concerns and to report suspicious activity?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Your personnel should be trained and knowledgeable about security issues at your facility, what to look for, and how to report any suspicious events or activity. Periodic meetings of authorized personnel should be held to discuss security issues.	
33. Do your personnel have a checklist to use for threats or suspicious calls or to report suspicious activity?	Yes <input type="checkbox"/> No <input type="checkbox"/>	To properly document suspicious or threatening phone calls or reports of suspicious activity, a simple checklist can be used to record and report all pertinent information. Calls should be reported immediately to appropriate law enforcement officials. Checklists should be available at every telephone. Sample checklists are included in Attachment 3. Also consider installing caller ID on your telephone system to keep a record of incoming calls.	

Information storage/computer controls/maps

Security of the system, including computerized controls like a Supervisory Control and Data Acquisition (SCADA) system, goes beyond the physical aspects of operation. It also includes records and critical information that could be used by someone planning to disrupt or contaminate your water system.

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
34. Is computer access "password protected"? Is virus protection installed and software upgraded regularly and are your virus definitions updated at least daily? Do you have Internet firewall software installed on your computer? Do you have a plan to back up your computers?	Yes <input type="checkbox"/> No <input type="checkbox"/>	All computer access should be password protected. Passwords should be changed every 90 days and (as needed) following employee turnover. When possible, each individual should have a unique password that they do not share with others. If you have Internet access, a firewall protection program should be installed on your computer. Also consider contacting a virus protection company and subscribing to a virus update program to protect your records. Backing up computers regularly will help prevent the loss of data in the event that your computer is damaged or breaks. Backup copies of computer data should be made routinely and stored at a secure off-site location.	

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
35. Is there information on the Web that can be used to disrupt your system or contaminate your water?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Posting detailed information about your water system on a Web site may make the system more vulnerable to attack. Web sites should be examined to determine whether they contain critical information that should be removed. You should do a Web search (using a search engine such as Google, Yahoo!, or Lycos) using key words related to your water supply to find any published data on the Web that is easily accessible by someone who may want to damage your water supply.	
36. Are maps, records, and other information stored in a secure location?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Records, maps, and other information should be stored in a secure location when not in use. Access should be limited to authorized personnel only. You should make back-up copies of all data and sensitive documents. These should be stored in a secure off-site location on a regular basis.	
37. Are copies of records, maps, and other sensitive information labeled confidential, and are all copies controlled and returned to the water system?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Sensitive documents (e.g., schematics, maps, and plans and specifications) distributed for construction projects or other uses should be recorded and recovered after use. You should discuss measures to safeguard your documents with bidders for new projects.	
38. Are vehicles locked and secured at all times?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Vehicles are essential to any water system. They typically contain maps and other information about the operation of the water system. Water system personnel should exercise caution to ensure that this information is secure. Water system vehicles should be locked when they are not in use or left unattended. Remove any critical information about the system before parking vehicles for the night. Vehicles also usually contain tools (e.g., valve wrenches) that could be used to access critical components of your water system. These tools should be secured and accounted for daily.	

Public Relations

You should educate your customers about your system. You should encourage them to be alert and to report any suspicious activity to law enforcement authorities.

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
39. Do you have a program to educate and encourage the public to be vigilant and report suspicious activity to assist in the security protection of your water system?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Advise your customers and the public that your system has increased preventive security measures to protect the water supply from vandalism. Ask for their help. Provide customers with your telephone number and the telephone number of the local law enforcement authority so that they can report suspicious activities. The telephone number can be made available through direct mail, billing inserts, notices on community bulletin boards, flyers, and consumer confidence reports.	

QUESTION	ANSWER	COMMENT	ACTION NEEDED/TAKEN
40. Does your water system have a procedure to deal with public information requests, and to restrict distribution of sensitive information?	Yes <input type="checkbox"/> No <input type="checkbox"/>	<p>You should have a procedure for personnel to follow when you receive an inquiry about the water system or its operation from the press, customers, or the general public.</p> <p>Your personnel should be advised not to speak to the media on behalf of the water system. Only one person should be designated as the spokesperson for the water system. Only that person should respond to media inquiries. You should establish a process for responding to inquiries from your customers and the general public.</p> <p>It is critical to be able to receive information about suspected problems with the water at any time and respond to them quickly. Procedures should be developed in advance with your state drinking water primacy agency, local health agencies, and your local emergency planning committee.</p>	
41. Do you have a procedure in place to receive notification of a suspected outbreak of a disease immediately after discovery by local health agencies?	Yes <input type="checkbox"/> No <input type="checkbox"/>		
42. Do you have a procedure in place to advise the community of contamination immediately after discovery?	Yes <input type="checkbox"/> No <input type="checkbox"/>	<p>As soon as possible after a disease outbreak, you should notify testing personnel and your laboratory of the incident. In outbreaks caused by microbial contaminants, it is critical to discover the type of contaminant and its method of transport (water, food, etc.). Active testing of your water supply will enable your laboratory, working in conjunction with public health officials, to determine if there are any unique (and possibly lethal) disease organisms in your water supply.</p> <p>It is critical to be able to get the word out to your customers as soon as possible after discovering a health hazard in your water supply. In addition to your responsibility to protect public health, you must also comply with the requirements of the Public Notification Rule. Some simple methods include announcements via radio or television, door-to-door notification, a phone tree, and posting notices in public places. The announcement should include accepted uses for the water and advice on where to obtain safe drinking water. Call large facilities that have large populations of people who might be particularly threatened by the outbreak: hospitals, nursing homes, the school district, jails, large public buildings, and large companies. Enlist the support of local emergency response personnel to assist in the effort.</p> <p>It is critical to be able to respond to and quickly identify potential water quality problems reported by customers. Procedures should be developed in advance to investigate and identify the cause of the problem, as well as to alert local health agencies, your state drinking water primacy agency, and your local emergency planning committee if you discover a problem.</p>	
43. Do you have a procedure in place to respond immediately to a customer complaint about a new taste, odor, color, or other physical change (oily, filmy, burns on contact with skin)?	Yes <input type="checkbox"/> No <input type="checkbox"/>		

Now that you have completed the "Security Vulnerability Self-Assessment Guide for Small Water Systems," review your needed actions and then prioritize them based on the most likely threats. A Table to assist you in prioritizing actions is provided in Attachment 1.

Attachment 1. Prioritization of Needed Actions

Once you have completed the “Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems,” review the actions you need to take to improve your system’s security. Note the questions to which you answered “no” on this worksheet. You can use it to summarize the areas where your system has vulnerability concerns. It can also help you prioritize the actions you should take to protect your system from vulnerabilities. Make sure to prioritize your actions based on the most likely threats to your water system.

Question Number	Needed Action	Scheduled Completion

Attachment 2. Emergency Contact List

We urge all public water systems to adopt an emergency response plan (ERP). Emergency plans are action steps to follow if a primary source of drinking water becomes contaminated or if the flow of water is disrupted. You can obtain sample ERPs from your state drinking water administrator, or from your state primacy agency.

This sample document is an "Emergency Contact List." It is an essential part of your ERP. It contains the names and telephone numbers of people you might need to call in the event of an emergency. This is a critical document to have at your disposal at all times. It gives you a quick reference to all names and telephone numbers that you need for support in the case of an emergency.

Filling out this Emergency Contact List reminds you to think about all of the people you might need to contact in an emergency. It also may encourage you to talk with these people about what you and they would do if an emergency were to occur.

Section 1. System Identification

Public Water System (PWS) ID Number		
System Name		
Town/City		
Telephone Numbers	System Telephone	Evening/Weekend Telephone
Other Contact Information	System Fax	Email
Population Served and Number of Service Connections	People Served	Connections
System Owner (The owner must be listed as a person's name)		
Name, title, and telephone number of person responsible for maintaining this emergency contact list	Name and title	Telephone

Section 2. Notification/Contact Information

Local Notification List

ORGANIZATION	CONTACT NAME/TITLE	TELEPHONE (DAY)	TELEPHONE (NIGHT)	EMAIL
Fire Department				
Police Department				
FBI Field Office				
Health Department				
Primacy Agency District Office				
Local Hospital				
Local Emergency Planning Committee				
EMS				
Local Pharmacy				
Local Nursing Homes				
Local Schools				
Local Prisons				
Local Government Official				
Local Hazmat Team				
Water System Operator				
Neighboring Water System				
Neighboring Water System				
Other				

Service/Repair Notification List

ORGANIZATION	CONTACT NAME/TITLE	TELEPHONE (DAY)	TELEPHONE (NIGHT)	EMAIL
Electrician				
Electric Utility Company				
Gas Utility Company				
Sewer Utility Company				
Telephone Utility Company				
Plumber				
Pump Specialist				
"Dig Safe" or local equivalent				
Soil Excavator/Backhoe Operator				
Equipment Rental (Power Generators)				
Equipment Rental (Chlorinators)				
Equipment Rental (Portable Fencing)				
Equipment Repairman				
Radio/Telemetry Repair Service				
Bottled Water Source				
Bulk Water Hauler				
Pump Supplier				
Well Drillers				
Pipe Supplier				
Chemical Supplier				
Local/Regional Analytical Laboratory				

State Notification List

ORGANIZATION	CONTACT NAME/TITLE	TELEPHONE (DAY)	TELEPHONE (NIGHT)	EMAIL
Drinking Water Primacy Agency				
Department of Environmental Protection (or state equivalent)				
Department of Health				
Emergency Management Agency				
Hazmat Hotline				

Media Notification List

ORGANIZATION	CONTACT NAME/TITLE	TELEPHONE (DAY)	TELEPHONE (NIGHT)	EMAIL
Designated Water System Spokesperson				
Newspaper - Local				
Newspaper – Regional/State				
Radio				
Radio				
Radio				
Television				
Television				
Television				

Section 3. Communication and Outreach

Communication

Communications during an emergency poses some special problems. A standard response might be to call “911” for local fire and police departments. But what if your emergency had disrupted telephone lines and over-loaded cell phone lines? Talk with your state drinking water primacy agency about local emergency preparedness and solutions to these problems. Increasingly, state emergency agencies are establishing secure lines of communication with limited access. Learn how you can access those lines of communication if all others fail.

Outreach

If there is an incident of contamination in your water supply, you will need to notify the public and make public health recommendations (e.g., boil water, or use bottled water). To do this, you need a plan.

- How will you reach all customers in the first 24 hours of an emergency?
- Appoint a media spokesperson—a single person in your water system who will be authorized to make all public statements to the media.
- Make arrangements for contacting institutions with large numbers of people, some of whom may be immuno-compromised:
 - Nursing homes
 - Hospitals
 - Schools
 - Prisons

Attachment 3: Threat Identification Checklists

Water System Telephone Threat Identification Checklist

In the event your water system receives a threatening phone call, remain calm and try to keep the caller on the line. Use the following checklist to collect as much detail as possible about the nature of the threat and the description of the caller.

1. Types of Tampering/Threat:					
Contamination		Threat to tamper			
Biological		Bombs, explosives, etc.			
Chemical		Other (explain)			
2. Water System Identification:					
Name:					
Address:					
Telephone:					
PWS Owner or Manager's Name:					
3. Alternate Water Source Available: Yes/No			If yes, give name and location:		
4. Location of Tampering:					
Distribution Line	Water Storage Facilities	Treatment Plant	Raw Water Source	Treatment Chemicals	
Other (explain):					
5. Contaminant Source and Quantity:					
7. Date and Time of Tampering/Threat:					
8. Caller's Name/Alias, Address, and Telephone Number:					
9. Is the Caller (check all that apply):					
Male	Female	Foul	Illiterate	Well Spoken	Irrational
					Incoherent

10. Is the Caller's Voice (check all that apply): <input type="checkbox"/> Soft <input type="checkbox"/> Calm <input type="checkbox"/> Angry <input type="checkbox"/> Slow <input type="checkbox"/> Rapid <input type="checkbox"/> Slurred <input type="checkbox"/> Loud <input type="checkbox"/> Laughing <input type="checkbox"/> Crying <input type="checkbox"/> Normal <input type="checkbox"/> Deep <input type="checkbox"/> Nasal <input type="checkbox"/> Clear <input type="checkbox"/> Lispering <input type="checkbox"/> Stuttering <input type="checkbox"/> Old <input type="checkbox"/> High <input type="checkbox"/> Cracking <input type="checkbox"/> Excited <input type="checkbox"/> Young <input type="checkbox"/> Familiar (who did it sound like?) <input type="checkbox"/> Accented (which nationality or region?)	
11. Is the Connection Clear? (Could it have been a wireless or cell phone?)	
12. Are There Background Noises?	
<input type="checkbox"/> Street noises (what kind?)	
<input type="checkbox"/> Machinery (what type?)	
<input type="checkbox"/> Voices (describe)	
<input type="checkbox"/> Children (describe)	
<input type="checkbox"/> Animals (what kind?)	
<input type="checkbox"/> Computer Keyboard, Office	
<input type="checkbox"/> Motors (describe)	
<input type="checkbox"/> Music (what kind?)	
<input type="checkbox"/> Other	
13. Call Received By (Name, Address, and Telephone Number): Date Call Received: Time of Call:	
14. Call Reported to:	Date/Time
15. Action(s) Taken Following Receipt of Call:	

Water System Report of Suspicious Activity

In the event personnel from your water system (or neighbors of your water system) observe suspicious activity, use the following checklist to collect as much detail about the nature of the activity.

<p>1. Types of Suspicious Activity:</p> <p><input type="checkbox"/> Breach of security systems (e.g., lock cut, door forced open) <input type="checkbox"/> Changes in water quality noticed by customers (e.g., change in color, odor, taste) that were not planned or announced by the water system</p> <p><input type="checkbox"/> Unauthorized personnel on water system property. <input type="checkbox"/> Other (explain)</p> <p><input type="checkbox"/> Presence of personnel at the water system at unusual hours</p>									
<p>2. Water System Identification:</p> <p>Name: Address:</p> <p>Telephone:</p> <p>PWS Owner or Manager's Name:</p>									
<p>3. Alternate Water Source Available: Yes/No</p>		<p>If yes, give name and location:</p>							
<p>4. Location of Suspicious Activity:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 20%; text-align: center;">Distribution Line</td> <td style="width: 20%; text-align: center;">Water Storage Facilities</td> <td style="width: 20%; text-align: center;">Treatment Plant</td> <td style="width: 20%; text-align: center;">Raw Water Source</td> <td style="width: 20%; text-align: center;">Treatment Chemicals</td> </tr> </table> <p>Other (explain):</p>					Distribution Line	Water Storage Facilities	Treatment Plant	Raw Water Source	Treatment Chemicals
Distribution Line	Water Storage Facilities	Treatment Plant	Raw Water Source	Treatment Chemicals					

<p>5. If Breach of Security, What was the Nature of the Breach?</p> <p>Lock was cut or broken, permitting unauthorized entry.</p> <p style="padding-left: 40px;">Specify location</p> <p>Lock was tampered with, but not sufficiently to allow unauthorized entry.</p> <p style="padding-left: 40px;">Specify location</p> <p>Door, gate, window, or any other point of entry (vent, hatch, etc.) was open and unsecured</p> <p style="padding-left: 40px;">Specify location</p> <p>Other</p> <p style="padding-left: 40px;">Specify nature and location</p>	
<p>6. Unauthorized personnel on site?</p> <p>Where were these people?</p> <p style="padding-left: 40px;">Specify location</p> <p>What made them suspicious?</p> <p style="padding-left: 80px;">Not wearing water system uniforms</p> <p style="padding-left: 80px;">Something else? (Specify)</p> <p>What were they doing?</p>	
<p>7. Please describe these personnel (height, weight, hair color, clothes, facial hair, any distinguishing marks):</p>	
<p>8. Call Received By (Name, Address, and Telephone Number):</p> <p style="padding-left: 40px;">Date Call Received:</p> <p style="padding-left: 40px;">Time of Call:</p>	
<p>9. Call Reported to:</p>	<p>Date/Time:</p>
<p>10. Action(s) Taken Following Receipt of Call:</p>	

Disclaimer

This document contains information on how to plan for protection of the assets of your water system. The work necessarily addresses problems in a general nature. You should review local, state, and federal laws and regulations to see how they apply to your specific situation.

Knowledgeable professionals prepared this document using current information. The authors make no representation, expressed or implied, that this information is suitable for any specific situation. The authors have no obligation to update this work or to make notification of any changes in statutes, regulations, information, or programs described in this document. Publication of this document does not replace the duty of water systems to warn and properly train their employees and others concerning health and safety risks and necessary precautions at their water systems.

Neither the Association of State Drinking Water Administrators, the National Rural Water Association, the U. S. Environmental Protection Agency, or the Drinking Water Academy, nor its contractor, The Cadmus Group, Inc., assume any liability resulting from the use or reliance upon any information, guidance, suggestions, conclusions, or opinions contained in this document.

Certification of Completion

A final step in completing the "Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems" is to notify the state drinking water primacy agency that the assessment has been conducted. Please fill in the following information and send this page only to the appropriate state drinking water primacy agency contact so that this certification can be included in the records that the state maintains on your water system.

Public Water System (PWS) ID: _____

System Name: _____

Address: _____

Town/City: _____ **State:** _____

ZIP Code: _____

Phone: _____ **Fax:** _____

Email: _____

Person Name: _____

Title: _____

Address: _____

Town/City: _____ **State:** _____

ZIP Code: _____

Phone: _____ **Fax:** _____

Email: _____

I certify that the information in this vulnerability assessment has been completed to the best of my knowledge and that the appropriate parties have been notified of the assessment and recommended steps to be taken to enhance the security of the water system. Furthermore, a copy of the completed assessment will be retained at the public water system, in a secure location, for state review as requested.

Signed _____ **Date** _____

Please send this page only to the attention of the State Drinking Water Primacy Agency.