A Report of the 2002-2003 Civil Grand Jury For the City and County of San Francisco

Keeping the Faucets Flowing: Water Emergency Preparedness in San Francisco

Released June 19, 2003

Reports of the Civil Grand Jury do not identify the individuals interviewed, pursuant to California Penal Code sec. 929. The California Legislature intended this provision to encourage full candor and cooperation by City and County personnel.

Parties identified in the report must respond to the Presiding Judge of the Superior Court within the number of days specified, with a copy sent to the Board of Supervisors. As to each <u>finding</u> of the Grand Jury, the response must either (1) agree with the finding, or (2) disagree with it, wholly or partially, and explain why. Further, as to each <u>recommendation</u> made by the Grand Jury, the responding party must report either (1) that the recommendation has been implemented, with a summary explanation of how it was; (2) the recommendation has not been implemented, but will be implemented in the future, with a timeframe for implementation; (3) the recommendation requires further analysis, with an explanation of the scope of that analysis and a timeframe for the officer or agency head to be prepared to discuss it (less than six months from the release of this Report); or (4) the recommendation will not be implemented because it is not warranted or reasonable, with an explanation of why that is. (Cal. Penal Code, secs. 933, 933.05.)

Keeping the Faucets Flowing: Water Emergency Preparedness in San Francisco

Summary of Recommendations

- 1. The San Francisco Public Utilities Commission should implement the water system risk reduction plan recommended by Lawrence Livermore National Laboratory's Vulnerability Assessment.
- 2. The San Francisco Public Utilities Commission should create a plan for equitable distribution of water to San Francisco residents as well as its wholesale customers when either a man-made or natural disaster limits the system's capability to meet all of the needs of both.
- 3. The City should develop a plan for providing water from alternative sources in emergency water outages, and publicize the need for citizens to store water in their homes.
- 4. The Auxiliary Water Supply System should be repaired and extended to provide maximum access to sources of non-potable water for fire fighting in emergencies.

GLOSSARY

AWSS - Auxiliary Water Supply System

MOES - Mayor's Office of Emergency Services

SFFD - San Francisco Fire Department

SFPUC - San Francisco Public Utilities Commission

OVERVIEW

The Civil Grand Jury investigated the ability of the City and County of San Francisco to protect its water supply prior to and dispense water after a natural or manmade disaster.

The San Francisco Public Utilities Commission (SFPUC) operates the Hetch Hetchy water system, a regional water system that supplies water to San Francisco and to several suburban customers. Pursuant to the requirements of the federal Public Health Security and Bioterrorism Preparedness and Response Act of 2002, SFPUC has, with the assistance of the Lawrence Livermore National Laboratory, completed a vulnerability assessment of all aspects of the water system. That assessment identifies risks to the system from possible acts of sabotage, terrorism, or other criminal conduct, and includes a prioritized plan for reduction of those risks through security upgrades and other measures. However, SFPUC has no present plan for implementation of this risk reduction plan and has not budgeted funds for security upgrades notwithstanding federal warnings to all United States water systems following the events on September 11, 2001. Individual departments within SFPUC have made minor security improvements since that time, by diverting funds allocated for other items in their operating budgets.

A SFPUC study in 2000 concluded that it might be unable to supply water to its customers for up to 60 days following an earthquake. Nonetheless, SFPUC has no present plan for, and disclaims responsibility for, obtaining water from an alternative source should SFPUC be unable to supply water in an emergency.

The Grand Jury makes the following recommendations:

- (1) SFPUC should immediately develop a plan for implementing the risk reduction measures identified in the Vulnerability Assessment so that all aspects of its water delivery system are more secure against sabotage, terrorism, and other criminal acts;
- (2) SFPUC should prepare a plan for restoring water delivery to San Francisco residents if service is interrupted as a result of damage to the delivery system caused by manmade or natural disaster;
- (3) The Mayor's Office of Emergency Services should itself prepare, or designate another City department or agency to prepare, a plan for obtaining and distributing drinking water to San Francisco residents in emergencies if the SFPUC operated Water Department is unable to do so; and
- (4) SFPUC, through its Water Department, should conduct an ongoing public information campaign to inform San Francisco residents that delivery of drinking water to their homes may be interrupted during an emergency and to advise them of the quantities of water each household should keep on hand for emergency use.

The Grand Jury also found that the Auxiliary Water Supply System (AWSS), built in 1913 for the San Francisco Fire Department (SFFD), which uses non-potable water and is capable of using water from the Bay if necessary, is not being adequately maintained. As a result, leaking and failing pipes have caused property damage and forced curtailment of the system. The AWSS is the primary source of water for fire fighting in those parts of the City that it serves. Its use could be essential in a major disaster. Moreover, if the AWSS were not available and the SFFD were forced to use the potable water stored in SFPUC reservoirs for fire fighting, that use would rapidly diminish the supply of available drinking water.

Therefore, the Grand Jury further recommends:

(5) All relevant agencies should coordinate to improve maintenance of the AWSS, repair its infrastructure, and extend it to serve all parts of the City.

BACKGROUND

In 1913, the United States Congress passed the Raker Act which gave the City and County of San Francisco the right to use land inside Yosemite National Park and the Stanislaus National Forest to build a system to convey water "for domestic purposes and uses to the city and county of San Francisco and such other municipalities and water districts." Specifically, the Act allowed for the flooding of the Hetch Hetchy Valley to create a large reservoir. The water in that system travels 33 hours, over 150 miles west to the San Francisco Bay Area. The water is moved by gravity for its entire journey. No pumps are used to accelerate the water travel until the water reaches the hills of San Francisco.

The Bay Area Regional Water System managed by SFPUC provides water to 2.4 million people in San Francisco, Santa Clara, Alameda and San Mateo counties. SFPUC operates a retail division, which acts as the water department for San Francisco, and a wholesale division that supplies water to twenty-nine Bay Area water districts. Two-

thirds of the system's water customers are outside of San Francisco. It is the second largest municipal water system in the state and sixth largest in the country.

This Regional Water System includes five reservoirs in addition to the Hetch Hetchy Reservoir outside of San Francisco. These reservoirs in the Alameda and Peninsula watersheds – the San Antonio, Calaveras, Crystal Springs, Pilaritos, and San Andreas reservoirs – are filled by rainfall and run off from the surrounding hills. Water delivered through the system to San Francisco is stored in ten reservoirs within the City, three of which are jointly owned by the suburban customers of SFPUC.

Eighty-five percent of the water delivered to SFPUC customers comes from Sierra Nevada snowmelt stored in the Hetch Hetchy Reservoir. The remaining 15 percent of system water comes from the reservoirs in the Alameda and Peninsula watersheds. The entire system delivers up to 300 million gallons of water per day to its customers.

The SFPUC water system has previously been the victim of politically motivated vandalism. Because the water delivery system crosses four major fault lines, ² seismic safety is a major concern. The system also has been identified as a potential target for terrorism.

The federal Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (PL 107-188, Title IV; 42 U.S.C. 300f et seq.) ("Bioterrorism Act") mandates that community drinking water systems conduct a vulnerability assessment and prepare an emergency response plan. A Presidential directive vests the Environmental Protection Agency with responsibility to work with water utilities to provide for protection of crucial water infrastructure. A system like that operated by SFPUC must review the vulnerability of the system to terrorist attack or other intentional acts that are intended to substantially disrupt the ability of the system to prove a safe and reliable supply of drinking water. The elements of a vulnerability assessment include identification of adverse consequence to be avoided. Those consequences may include contamination of the water supply, disruption of the delivery system, and damage to the delivery infrastructure. The assessment also identifies the assets that are vulnerable, an assessment of the likelihood of those acts, an evaluation of existing countermeasures, and a prioritized plan for reduction of the risks that have been identified. Risk reduction includes providing physical security for the delivery system and preparation for quick response to emergencies.

An Emergency Response Plan should address response, recovery and remediation actions for man-made or technological emergencies. The plan, based on the results of the vulnerability assessment should include plans, procedures, and identification of equipment that can be implemented or utilized in the event of a terrorist or other intentional attack on the system, and actions or procedures that can obviate or lessen the

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¹ Water held in the Crystal Springs Reservoir is not available for use for drinking purposes without approval of the California Department of Public Health. Serpentine rock in the reservoir causes asbestos to form in the water.

² The Hayward, San Andreas, Green Valley, and San Joaquin fault systems.

impact of such attacks or actions. The Environmental Protection Agency recommends that a response plan include provision for an alternative water source when contamination or damage to the system from an intentional act makes it necessary to shut down water delivery from the system.

SFPUC is also subject to the provisions of the California Wholesale Regional Water System Security and Reliability Act. (Water Code sections 73500-73514.) Section 73503 mandates that SFPUC create by July 1, 2003, and adopt by September 1, 2003, an emergency response plan for restoring water service for customers it serves in the bay area Regional Water System. Within San Francisco that system includes only three of the ten reservoirs used to supply water to San Francisco residents. Section 73503 also mandates that during a natural or manmade catastrophe that causes an interruption in supply, a regional wholesale water supplier such as SFPUC distribute water to its customers on an equitable basis without regard to their location within or outside the boundary of the wholesale supplier.

SCOPE OF INVESTIGATION

Members of the Civil Grand Jury conducted interviews with representatives of:

- American Red Cross
- City Attorney's Office
- SFPUC Commissioners and other officials
- Lawrence Livermore National Laboratories
- San Francisco Department of Public Health
- San Francisco Department of Public Works
- San Francisco Fire Department
- San Francisco Police Department
- San Francisco Sheriff's Department
- Sheriff's Department of Tuolumne County
- Suburban wholesale customers of the SFPUC
- U.S. Environmental Protection Agency
- California Governor's Office of Emergency Services

Grand Jurors conducted site visits at Moccasin, the O'Shaughnessy Dam and Reservoir.

The Grand Jury also reviewed relevant parts of:

- City and County of San Francisco and SFPUC Emergency Operations Plans
- City Distribution Department Emergency Operations Plan
- HHWP Emergency Operations Plan
- SFPUC Proposed FY2003-2004 Budget
- SFPUC Public Notification Plan & Notification Plan for Suburban Customers
- San Francisco Administrative Code
- SFPUC Facilities Reliability Program January 2000
- U.S. Environmental Protection Agency publications
- SFPUC Vulnerability Assessment Draft (dated March 31, 2003)
- Water Code sections 73500-73514, 81300 et seq. and 81600 et seq.
- Water Quality Bureau Emergency Operations Plan

FACTS, FINDINGS, AND RECOMMENDATIONS

1. SECURITY PLANS MUST BE IMPLEMENTED

FACTS

- SFPUC has contingency plans for operations in an emergency following a natural or man made disaster, but does not have a plan to implement increased security for all parts of its water delivery system.
- SFPUC hired the Lawrence Livermore National Laboratory to conduct the vulnerability assessment mandated by the federal Bioterrorism Act. The Lawrence Livermore Laboratory Vulnerability Assessment was submitted to the EPA and the Office of Homeland Security on March 31, 2003. This was the first security assessment of the entire water system. The risk reduction section of that assessment recommends steps that should be taken to make the SFPUC water system more secure.³
- SFPUC management has denied requests by SFPUC departments for funding for security. The few security upgrades made by SFPUC departments to date have been funded out of existing department operating budgets. For example, the SFPUC city distribution department made security improvements such as installing sensory badge access, re-keying locks and installing fencing.
- Although SFPUC has not implemented and has no plan for implementation of comprehensive, system wide, security, it has contracted with the National Park Service to assign rangers, trucks and radios to provide security for the O'Shaughnessy Dam and Hetch Hetchy reservoir. The \$300,000 annual cost is paid for out of the existing Hetch Hetchy budget.
- The SFPUC budget for fiscal year 2003-2004 includes one security related item \$1.2 million to be spent on lab assistants and equipment to be used in the Water Quality Bureau for screening for contaminants which are either natural or intentional.
- In November 2002, the voters approved a \$1.6 billion revenue bond measure to fund the SFPUC long-term capital improvement program. The Capital Improvement Plan includes 77 water infrastructure projects designed to replace or repair aging facilities, seismically upgrade facilities, provide safe water in increasing demand, and improve water supply. Those projects, which affect only 60 to 70 percent of the system, will include upgraded security in the design.

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³ Because the vulnerability assessment contains sensitive information, the Grand Jury has not detailed specifically identified vulnerabilities of the water delivery system nor the steps recommended by Lawrence Livermore Act to make the system more secure.

• SFPUC has recently created a security director position. SFPUC is conducting interviews and expects to fill the position within the next few months.

FINDINGS

- 1. Creation and implementation of a security plan and program would lessen the vulnerability of the water system to contamination, terrorism and crime.
- 2. The Capital Improvement Program does not cover all of the security upgrades that may be needed for the system
- 3. A specific budget item for needed security upgrades is needed to ensure that those projects are adequately funded.

RECOMMENDATIONS

- 1a. SFPUC should prepare a plan for implementation of system-wide security measures based on the recommendations of the Lawrence Livermore National Laboratory Vulnerability Assessment. The SFPUC security director should give priority to developing this plan.
- 1b. SFPUC should include the expense of security planning and implementation as well as needed system security upgrade as discrete items in it's budget and, if necessary, seek a supplemental budget appropriation to meet those needs.

REQUIRED RESPONSES

SFPUC – 60 days Board of Supervisors – 90 days

2. THE CITY MUST PLAN FOR WATER DELIVERY TO SAN FRANCISCO CUSTOMERS WHEN NATURAL OR MAN MADE DISASTER RENDERS THE SFPUC SYSTEM INOPERABLE OR INADEQUATE

FACTS

- SFPUC estimates that the supply of potable water stored in reservoirs within the City will meet the needs of residents for up to five days. Factors that could decrease that supply include damage to infrastructure caused by earthquake, crime, leakage and contamination through aging or poor maintenance and use of drinking water by SFFD for firefighting.
- Another factor that could decrease the supply is that three reservoirs within San
 Francisco, holding approximately 79 percent of the water stored in the City, are held
 as joint assets with suburban customers. As specified in the master sales agreement,
 the regional users pay two-thirds of the maintenance and operational expenses of
 those reservoirs. In an emergency, water could be back-flowed from those reservoirs

⁴ Lake Merced might afford a 30-day emergency supply of water, but that water is not currently potable.

- to wholesale customers. Thus, some water stored within San Francisco may not be available to San Francisco residents during an emergency that limits the supply.
- Damage to any part or parts of the 165-mile long water system from Hetch Hetchy to San Francisco could restrict or prevent delivery of water to San Francisco.
- A January 2000 Reliability Study commissioned by SFPUC concludes that a seismic event on any one of the four faults that the system crosses could result in a outage of up to 60 days.
- The San Francisco Emergency Operations Plan of October 1, 1996 states, "All residents and business owners are cautioned to store three gallons of potable (drinkable) water per person in case of an emergency. If this were done, it would represent the largest volume of back-up supply in the City and the most widely distributed."
- Both SFPUC and the Department of Public Health disclaim responsibility for obtaining water from alternative sources if the SFPUC system is unable to deliver water in an emergency. SFPUC representatives state that the responsibility of SFPUC in an emergency is to fix the system, not to find alternate sources of water.
- The Environmental Protection Agency guidelines for a Bioterrorism Emergency Response Plan suggest, but do not mandate, that a plan include consideration of alternative sources of water.
- The state Wholesale Regional Water System Security and Reliability Act (Water Code, sections 73500 et seq.) does not mandate a plan to obtain and provide water to customers from alternative sources in an emergency.
- The American Red Cross does not store water in large quantities; it provides potable water in bottles for individual consumption at shelters only.
- In October 2002, the East Bay Municipal Utility District (EBMUD) announced a regional partnership with SFPUC, the City of Hayward and Alameda County Water District to increase reliability of water services for more then 4 million Bay Area residents in the event that water supplies are cut off due to natural disaster or planned critical maintenance or repair. The project is currently being designed with an implementation date of winter 2005. The agencies involved are developing a \$16.5 million project, which will connect the SFPUC, EBMUD and City of Hayward water systems by installing a pump station and pipelines. Whether water is actually available for delivery to another agency would be determined by the supplying agency.
- Water Code section 75305(a)-(b) mandates that SFPUC "prepare an emergency response plan describing how water will be restored to the area served by the bay area regional water system after an interruption caused by earthquake or other natural or

manmade disaster...A draft of the plan shall be submitted to the Office of Emergency Services on or before July 1, 2003." This mandate does not apply to the portion of the system in San Francisco except to the extent that the system includes the three joint use reservoirs located in the City. SFPUC has not begun a similar plan for San Francisco in the event that the remaining reservoirs or other key facilities in the City are damaged.

- The San Francisco Administrative Code imposes on the Director of Emergency Services responsibility for development and management of a City emergency plan and for coordinating emergency planning and response.
- The San Francisco Administrative Code makes the Disaster Council responsible for approving agency disaster plans.

FINDINGS

- 1. SFPUC reservoirs within the City and County of San Francisco do not hold sufficient water to serve the needs of San Francisco residents if either a man-made or a natural disaster shuts down delivery of the Hetch Hetchy water for a prolonged period. The estimated five-day supply would be decreased if SFPUC must provide its suburban customers with water from the three jointly owned reservoirs under the terms of the contract with those customers and the mandate of Water Code section 73503.
- 2. The SFPUC has not planned for prolonged outages, despite knowing since the 2000 Water Facilities Reliability study that an outage of up to 60 days is possible.
- 3. No City department or agency is currently responsible for procuring and distributing water to San Francisco residents in an emergency when the SFPUC system is unable to do so.

RECOMMENDATIONS

- 2a. SFPUC should prepare a plan for San Francisco that is equivalent to the plan being prepared for the suburban customers pursuant to Water Code section 73503. This plan should be filed with MOES by January 2004.
- 2b. MOES should develop, or delegate to a City department responsibility for development of, a plan to supply San Francisco with water in the event that an emergency compromises the ability of SFPUC to provide water. This plan should be submitted to the Disaster Council by January 2004.
- 2c. SFPUC, through its Water Department, should conduct public information campaigns at least quarterly to educate San Francisco residents on the limited supply of stored water in San Francisco and the amount of water each household should store for use in an emergency.

REQUIRED RESPONSES

SFPUC – 60 days Department of Public Health – 60 days MOES – 60 days

3. THE CITY MUST REPAIR AND EXPAND THE AUXILIARY WATER SUPPLY SYSTEM

FACTS

- The SFFD Auxiliary Water Supply System (AWSS) includes two fireboats, high-pressure distribution lines and fire hydrants, storage tanks, cisterns and pump stations. This system is completely separate from the SFPUC water system. The system does not extend to the Outer Richmond or Outer Sunset past 19th Avenue, Bayview-Hunter's Point, or as far as Silver Avenue and Bayshore Boulevard.
- When functioning, the high-pressure water system provides unlimited water for fire suppression to parts of the city because it has the ability to pump water from the Bay. SFFD cisterns are supplied with SFPUC water and bay water is available for use by SFFD if necessary. Water in the AWSS is non-potable.
- Because of high pressure in the AWSS, very large amounts of water are released in a short period of time.
- If the AWSS is not functioning or not available, SFFD reverts to a fire hydrant system that uses SFPUC drinking water. In a conflagration, this use would severely deplete the City's supply of stored drinking water.
- The Department of Public Works maintains the AWSS high-pressure water system. The most recent bond measure to improve the system was passed in 1986. The annual budget for AWSS system repair and maintenance is \$900,000. One fireboat is dry-docked in any given year. The \$300,000 annual maintenance of one fireboat is shared equally by the Port of San Francisco and the SFFD.
- In the last three years, five major breaks in AWSS water pipes have caused property damage. In early 2003, a broken pipe in the system flooded the basement of several Union Square stores.
- In a 1988 study, SFFD determined that the AWSS loses approximately 20,000 gallons of water each day through undetected leaks. This water is replaced with potable water.
- The AWSS has circuits for underground cisterns that connect water pipes to each
 other. These circuits are remotely activated to open and close the underground valves
 that connect these pipes. If an earthquake or fire occurs, these circuits are designed to
 allow water to be pumped into other areas of the city. These circuits are unsupervised.

No audible or visual signal appears when the circuit is not functioning. These circuits are not regularly monitored and preventative maintenance is not regularly performed.

- An August 2002 DPW study prepared for SFFD concluded that a \$117.4 million bond issue was needed to meet the cost of maintenance and improvement of the AWSS.
 The Capital Improvement Advisory Committee denied the SFFD request that the bond issue be placed on the ballot for voter approval.
- SFPUC has requested that DPW study the feasibility of SFPUC's assuming responsibility for maintenance and repair of the AWSS. SFPUC would use the system to distribute reclaimed water for irrigation when it is not needed by the fire department.

FINDINGS

- 1. In areas not served by the AWSS and during any period in which the SFPUC system is not functioning, SFFD must use potable water. Use of potable water in areas not served by the AWSS and when the SFPUC system is not functioning reduces the already limited amount of drinking water available in an emergency.
- 2. The AWSS infrastructure is deteriorating as a result of inadequate maintenance.
- 3. Extension of the AWSS to areas of the City not now served would benefit the City by reducing the need to use potable water in an emergency when SFPUC supplies are inadequate.

RECOMMENDATIONS

- 3a. SFPUC should incorporate and assume responsibility for the AWSS if the current study concludes that the proposal is feasible.
- 3b. SFFD should again seek funds to repair and expand the AWSS system.

REQUIRED RESPONSES

SFPUC – 60 Days SFFD – 60 Days Board of Supervisors – 90 Days

The Members of the 2002-2003 Civil Grand Jury For the City and County of San Francisco

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