Performance Audit of the Public Utilities Department's Chemical Purchases

THE CITY COULD ENHANCE ITS PURCHASING PRACTICES FOR WATER AND WASTEWATER TREATMENT CHEMICALS AND ENSURE IT COMPLIES WITH STATE REQUIRED INSPECTIONS OF ITS CHEMICAL STORAGE FACILITIES

NOVEMBER 2012

Audit Report

Office of the City Auditor

City of San Diego

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THE CITY OF SAN DIEGO

November 23, 2012

Honorable Mayor, City Council, and Audit Committee Members
City of San Diego, California

Transmitted herewith is an audit report on the Public Utilities Department's Chemical Purchases. This report is in accordance with City Charter Section 39.2. The Results in Brief is presented on page 1. The Administration's response to our audit recommendations can be found after page 33 of the report.

We would like to thank Public Utilities staff, as well as representatives from other City departments for their assistance and cooperation during this audit. All of their valuable time and efforts spent on providing us information is greatly appreciated. The audit staff responsible for this audit report is Edward Moreno, Claudia Orsi, and Chris Constantin.

Respectfully submitted,

Eduardo Luna
City Auditor

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Results in Brief

Water treatment chemicals play a critical role in providing clean water to protect public health and the environment. To this end, The Public Utilities Department (PUD) utilizes certain chemicals to treat drinking water and decontaminate wastewater. In this audit, we reviewed:

(1) The process through which the City of San Diego (City) procures chemicals for the treatment of water and wastewater to ensure that chemicals contracts are competitively awarded and to determine to what extent the City uses market-based approaches to reduce the cost of chemicals to the extent possible;

(2) Whether the Public Utilities Department (PUD) and the Purchasing and Contracting Department (P&C) sufficiently track and share information regarding chemical pricing trends;

(3) Whether the water and wastewater facilities that use and/or store chemicals are appropriately inspected by the public agencies charged with their inspections.

During our review, we found that the City may realize potential savings on the $16 million it spends on a yearly basis on chemical purchases by adopting certain market strategies, such as, reverse auction in purchasing bulk chemicals for the treatment of water and wastewater. The County of San Diego (County), for instance, utilizes a system called reverse auctions[1] for its bidding process of certain goods and services and has saved an estimated $1.3 million out of $4.1 million dollar contracts for various goods and services between fiscal years 2009 and 2012. While the County did not specifically use reverse auctions for its purchase of water and wastewater treatment chemicals, this practice could lend itself to the City for the purchase of certain goods and services under some market conditions.

Additionally, during our review we also found that PUD and/or

[1] Reverse auctioning is a real time online bidding process, which allows vendors of any type of good or service to bid a specified time frame (usually one hour), with the lowest bidder awarded the contract.

P&C periodically track information on chemical prices and availability over time but do not conduct regular meetings to share and discuss issues related to chemical supply availability, changes in prices, and alternative chemical uses. We found no departmental agreements that clearly define what PUD and P&C are responsible for in regard to tracking chemical prices. Tracking chemical prices and supply over time and conducting regularly scheduled meetings to share this information would allow both departments to make strategic decisions regarding purchases of chemicals that may allow the City to achieve savings.

Further, we found that between fiscal year 2009 and April 2012, the City contracted approximately $48 million worth of contracts to purchase chemicals for its water and wastewater treatment with contracts that did not have final signatures of the Office of the City Attorney. According to P&C, the procedures used were the accepted practice for entering contracts resulting from competitive bids at the time the chemical contracts were initiated. However, based on the results of the Office of the City Auditor's Performance Audit of the Purchasing and Contracting Department of March 2012, P&C and the Office of the City Attorney have reviewed their practice; as of mid June 2012, all contracts, including those resulting from competitive bids, obtain the appropriate signatures in compliance with City regulations.

Finally, during our review, we found that the San Diego Fire-Rescue Department (SDFD) did not conduct regular inspections of the water and waste water facilities as mandated by State law due to lack of staffing. Because annual inspections performed correctly decrease the risk of fires, it is important that the SDFD develop a systematic approach to comply with this requirement.

We believe that the City should further consider certain purchasing and contracting market strategies to help ensure that it has obtained the best prices for chemical purchases and so it can safeguard against the volatility of the chemical markets, which affect unit chemical costs. To address the issues presented above, we made a total of four recommendations for

the City to consider adopting additional contracting strategies, tracking and sharing information, and ensuring that the necessary State mandated inspections are performed. The City Administration agrees with three of the recommendations and partially agrees with one of the recommendations.

Background

The Independent Rates Oversight Committee (IROC) requested that the Office of the City Auditor audit and evaluate Citywide water and wastewater chemical purchases and usage by the Public Utilities Department (PUD). In its Annual Report for fiscal year (FY) 2011 IROC noted that such an audit could result in recommendations that could offset potential cost pressures that impact rates. Consequently, we initiated and completed this audit in accordance with the City Auditor's Fiscal Year 2012 Audit Work Plan. Our objectives, scope, and methodology can be found in **Appendix A**.

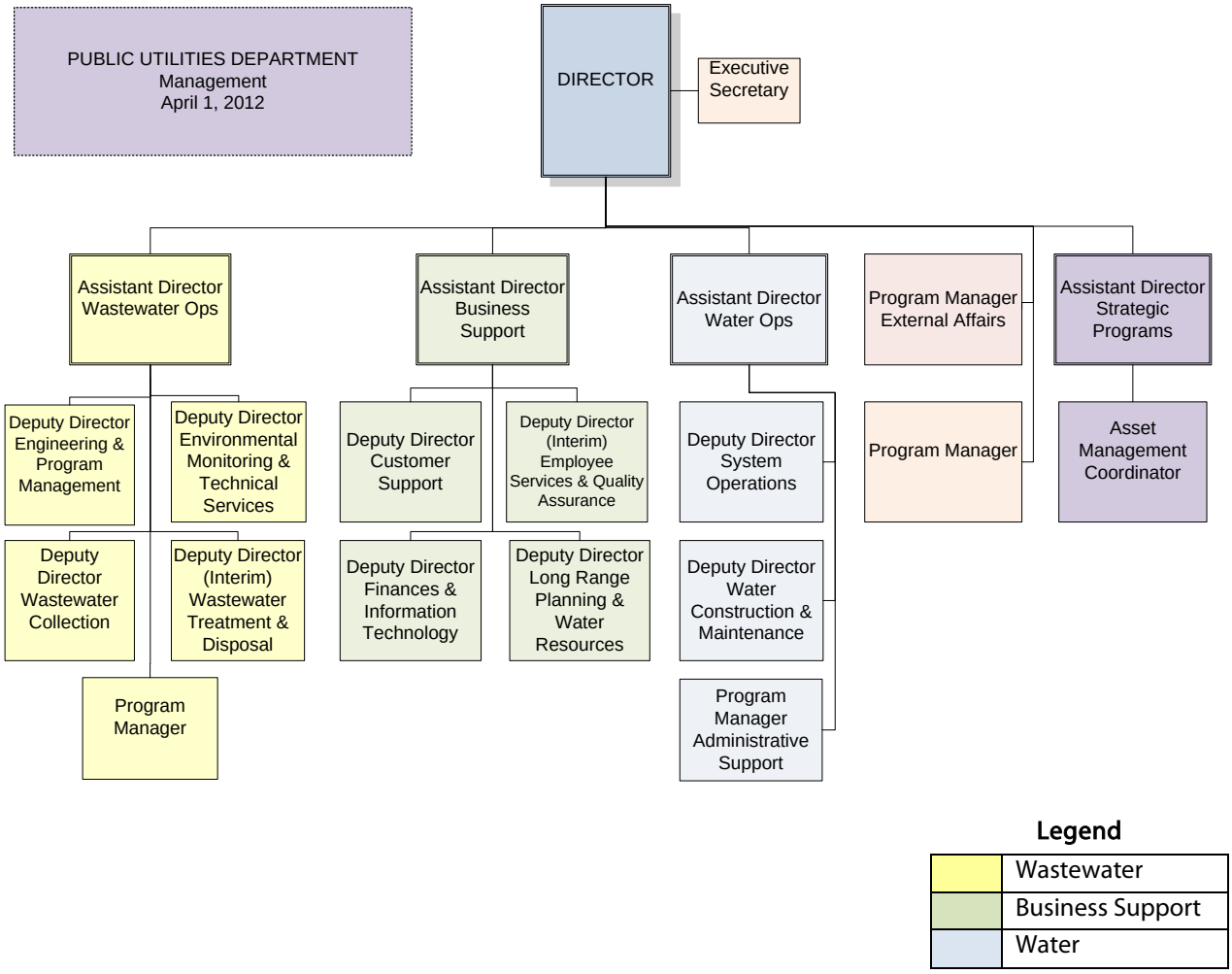
The Public Utilities Department

The mission of PUD is to provide the public with a safe, efficient, and cost-effective water and regional sewage system that supplements limited water supplies and meets regulatory standards for the protection of the environment and the public for the benefit of ratepayers.

To this end, PUD is staffed with more than 1,584 employees and composed of four branches—Water, Wastewater, Business Support and the Strategic Programs Branch. Within PUD, Water and Wastewater divisions are responsible for the purchases of chemicals. **Appendix B** shows staffing, expense, and revenue breakdowns for 2010 through 2012. See **Exhibit 1** below for PUD's organizational structure.

Exhibit 1

PUD Organizational Chart



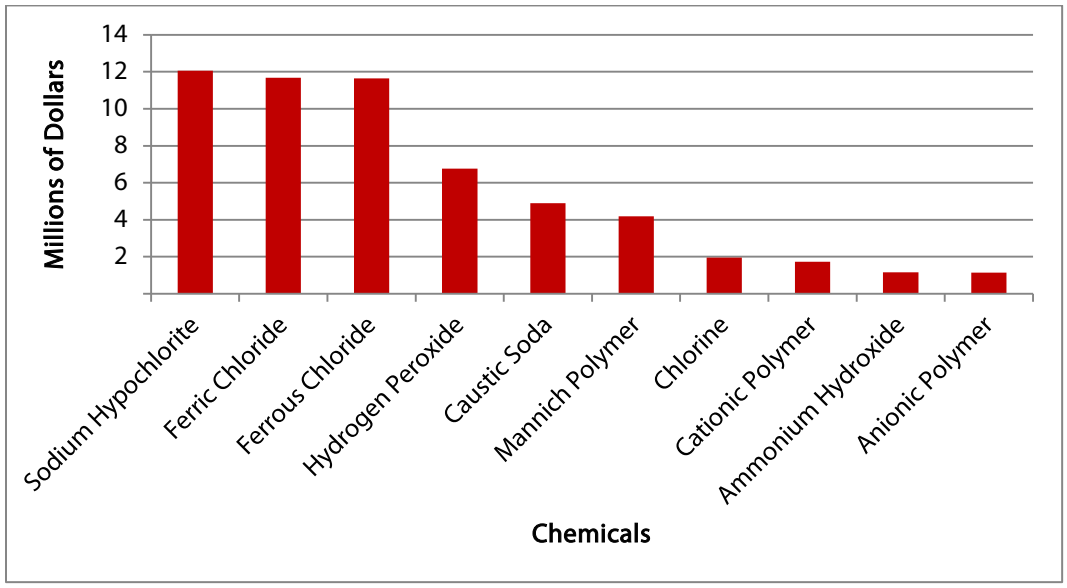
Source: Public Utilities Department

Chemical Purchases for the Water and Wastewater Treatment Plants

Water treatment chemicals play a critical role in providing clean water to protect public health and the environment. To this end, PUD utilizes certain chemicals such as chlorine and hydrogen peroxide to treat drinking water and decontaminate wastewater. **Appendix C** shows a comprehensive list of chemicals and their usage by PUD for the treatment of water and wastewater. Additionally, **Appendix D** shows a list of water and wastewater facilities. Between FY 2009 and FY 2012, PUD purchased $61 million in chemicals. Of this amount, the top ten chemical expenses totaled $57 million (93%). **Exhibit 2** below shows those expenditures.

Exhibit 2

Top Ten Chemical Expenditures Chemical Type between FY 2009 and FY 2012[2]



Source: City Accounting Systems (SAP and Simpler)

Note: FY 2012 includes expenses through March 1, 2012 for wastewater and April 3, 2012 for water

On an annual basis, during fiscal years 2009 through April 2012 PUD expended an average of about $15.25 million in chemical purchases for both water and wastewater treatment. PUD has a total of 15 Water and Wastewater facilities, which treat and pump water and wastewater throughout the City of San Diego. Chemicals are applied at different stages on all of the facilities.[3] **Exhibit 3** below shows the total PUD chemical expenses by plant for both water and wastewater.

[2] We obtained a list of all the chemicals used in each water and wastewater treatment facility and compiled a history of expenditures from July 1, 2009 through April 2012.
[3] **Appendix D** illustrates the 15 Water and Wastewater facilities.

Exhibit 3

PUD Chemical Expenses by Plant

Wastewater	2009	2010	2011
Point Loma	$8,036,151	$10,137,761	$9,344,710
Metro Bio-Solids	$1,521,780	$1,771,738	$1,692,430
North City	$1,090,011	$1,314,670	$1,153,289
South Bay	$294,931	$374,281	$339,292
Pump Station 65	$100,899	$106,633	$161,027
Pump Station 2	$28,455	$35,261	$118,703
EMG Station	-	-	$51,554
Grove Station	-	-	$30,496
Pump Station 1	$35,983	$13,693	$20,404
Pump Station 64	$874	$13,299	$10,232
Penasquitos	$5,359	$12,557	$7,721
Otay Station	-	$8,807	$266
Waste Water Totals	**$11,114,443**	**$13,788,700**	**$12,930,124**
Water			
Alvarado Plant	$1,917,545	$2,037,519	$1,766,484
Miramar Plant	$1,216,473	$1,239,150	$1,065,709
Otay Plant	$404,651	$519,727	$561,838
Water Total	$3,538,669	$3,796,396	$3,394,0311
PUD Total	**$14,653,112**	**$17,585,096**	**$16,324,155**

Source: Simpler and SAP

As **Exhibit 3** illustrates, in FY 2011 the Point Loma Treatment Plant represented about 57 percent of the total chemical expenditures for PUD. The Point Loma Treatment Plant is the principal treatment facility in the City for sewage water.[4] Specifically, the waste water treatment process currently employed at the Point Loma Treatment Plant consists of a chemically enhanced primary treatment with partial disinfection, which results in a higher usage of chemicals such as sodium hypochlorite and ferric chloride, for instance, than other facilities.[5] For more information regarding the various wastewater treatment plants and their operations see **Appendices E and F**. For a glossary of specific terminology related to wastewater treatments see **Appendix G**.

The Public Utilities Department and the Purchasing and Contracting Department Roles and Responsibilities Regarding Chemical Purchases

Both the Water and the Wastewater Treatment branches work closely with the Purchasing and Contracting Department (P&C), using competitive bid processes to obtain the most reasonable prices for needed chemical purchases.[6]

PUD determines which chemicals are needed to treat water and wastewater based on testing, considerations of water quality, and permit/waiver requirements. P&C's responsibility is to oversee the purchasing process, ensure compliance with the City purchasing requirements, and obtain the chemicals needed at the least possible cost for the City.

According to PUD staff, the department works closely with P&C, using the competitive bid process to obtain the most reasonable prices for needed chemical purchases. Under P&C's centralized contracting authority, PUD initiates a requisition for the chemicals and P&C awards a final contract. After PUD has selected the most appropriate chemicals for purchase, P&C will proceed by requesting written bids, submitting bid results and award recommendation to PUD for their review and determination, approving a low bidder and awarding the contract.

[4] This facility has a permitted flow capacity of 240 million gallons per day (MGD) and 432 MGD permitted peak wet weather flow. Additionally, the Point Loma Treatment Plant currently provides advanced primary treatment of sewage in accordance with a waiver from the secondary treatment standards of the Clean Water Act.
[5] Advanced primary comprises of adding ferric chloride and organic polymers to the sedimentation tanks to help waste particles bond together in large enough masses to settle out.
[6] The chemicals and their uses are listed in **Appendix C**.

Audit Results

Finding 1: The City Could Improve Its Purchasing Practices For Water and Wastewater Treatment Chemicals

During the period under review, we found that the City competitively selected vendors for the purchase of water and wastewater treatment chemicals, however, the City may realize savings by improving contracting practices, such as adopting market strategies. We identified three procurement areas that impact the City's ability to control costs and mitigate the volatility of chemical prices. First, the City should evaluate and implement additional contracting and market strategies to achieve potential savings or reduce operating costs from water and wastewater treatment chemical purchases. Second, PUD and P&C can enhance coordination and collaboration to achieve the best possible price for chemicals and more readily monitor changes in chemical prices. Finally, we found that between July 2008 and April 2012, the City purchased approximately $48 million dollars worth of chemicals for water and wastewater treatment with contracts that had not obtained the required Office of the City Attorney signatures. However, as of mid June 2012 all contracts, including those resulting from competitive bids, obtain the appropriate Office of the City Attorney signatures in compliance with City regulations.

We recommend that P&C, in consultation with PUD and any other relevant City departments, work with the Office of the City Attorney to determine which market strategies best fit the City's needs and make the appropriate modifications to City regulations to allow for the adoption of said market strategies in its contractual agreements. Finally, we recommend that P&C and PUD systematically track chemical prices and market fluctuations and share this information with each other to ensure that the appropriate planning for chemical purchases can take place and that ratepayers can be assured that the City has obtained the best possible price.

Market Strategies Such As Reverse Auctions and Joint Purchases Can Play a Significant Role in Achieving Savings within the $16 Million Spent in Annual Chemical Purchases

During the period under review, the City competitively selected vendors for the purchase of water and wastewater treatment chemicals, but we found that the City may realize savings by improving contracting practices and adopting certain purchasing market strategies. Specifically, we found that the City did not utilize certain contracting and market strategies in purchasing bulk chemicals for the treatment of water and wastewater that would allow the City to achieve savings on the $16 million it spent on a yearly basis on chemical purchases.

In our benchmarking studies, we found that one jurisdiction uses planning and market strategy approaches to reduce the cost of purchasing some goods and services.[7] The County of San Diego (County) utilizes a system called reverse auctions for limited numbers of its bidding processes and has saved an estimated $1.3 million, of $4.1 million dollar contract for various goods and services between fiscal years 2009 and 2012. While the County did not specifically use reverse auctions for its purchase of water and wastewater treatment chemicals, this practice could lend itself to the City for the purchase of certain goods and services under some market conditions. Reverse auctioning is a real time online bidding process, which allows vendors of goods or services to bid during a specified time frame (for example one hour), with the lowest bidder awarded the contract. Even though the City has not conducted a similar analysis of reverse auctions, it is believed that there is great potential in using reverse auctions. Since this would be a new practice for the City, it is unknown how much the City could realize in cost savings.

Additionally, the City has recently encouraged other public agencies to piggyback on purchases (contracts) initiated by the City. For instance, according to a memorandum issued by the former P&C director, the City recently issued a request for proposal (RFP) for fuel that included the County, the Port, and several other public agencies, which more than doubled the total estimated number of gallons of fuel to be purchased

[7] We inquired with the City of Poway, the City of Escondido, the County Water Authority and the County of San Diego how they purchased their chemicals for the treatment of water and found that the City of Poway and the City of Escondido award their contracts to the lowest bidder and bid for their chemicals every year. The County Water Authority has contracted out this function to a private company.

under the agreement. During April 2012, P&C reported to the Audit Committee that the City's initial fuel estimate prior to piggybacking was about 5.3 million gallons. After piggybacking with other agencies, the total estimated fuel volume surged to about 13.5 million gallons.[8] P&C reported that establishing an accurate cost savings figure would require a significant amount of work since fuel prices fluctuate daily and the price is determined on the day of the purchase based on the daily OPIS price index.[9] Savings estimates would need to be built on hypothetical cost comparisons and as such, they have not conducted it.

According to the Water Research Foundation (WRF), industry surveys, experts, and literature indicate that water utilities can minimize the cost of water treatment chemicals by strategically planning and using purchasing strategies to control uncertainties in the market.[10] **Exhibit 4** below summarizes the various purchasing strategies we identified that could minimize the cost of water treatment.

[8] City of San Diego Memorandum dated April 20, 2012, Follow Up on Implementation of Recommendations-Efficiency in Government: Managed Competition, Outsourcing, Reengineering and Reverse Auction within San Diego County, issued June 30, 2010 and follow up Memo dated January 11, 2012.
[9] Gasoline and Fuel Price Index.
[10] Supply of Critical Drinking Water and Wastewater Treatment Chemicals-A White Paper for understanding Recent Chemical Price Increases and Shortages, Water Research Foundation, p. 18.

Exhibit 4

Potential Purchasing Strategies for Chemicals Used in the Treatment of Water and Wastewater

Strategy	Description
Contracting	Tie chemical prices in the contract to a price index. The general idea is to use independently published price indices to justify price increases and require decreases when appropriate.[11]
Dual Sourcing	In some cases, it could be advantageous to use two sources of supply.[12]
Joint Purchases	Consider regional purchase solutions to take advantage of economies of scale (share the cost of storage or shipping). Combining buying power with other jurisdictions could influence manufacturers to offer bulk price discounts.[13]
Reverse Auctions	Reverse auction is a real time online bidding process in which vendors bid during a specified time frame (for example one hour), with the lowest bidder awarded the contract.[14]

Source: Water Research Foundation, P&C

We found that except where noted, the City did not use the above mentioned contracting and market strategies for the period under review. A contract that P&C has entered into with its vendor ties the price of caustic soda to the Chemical Market Associates, Inc. (CMAI) index and according to P&C it

[11] This practice is currently utilized by the City.
[12] According to P&C, since P&C purchases based on low bid, legal review of any dual sourcing strategy would be required.
[13] According to P&C, due to Water and Wastewater infrastructure and the hazardous nature of most of the chemicals used in the treatment process, these chemicals are shipped and delivered to their ultimate City facility destination and their shipping containers are directly connected to the treatment process infrastructure.
[14] According to P&C, this practice can result in savings in certain market situations and may have some applicability in the procurement of chemicals.

has resulted in significant savings. Although a utility can get better prices from large volume purchases, dual purchases may be advantageous when reliability of supply is an issue.[15] PUD chemical contracts are based on volume purchases and there have not been any supply reliability issues. Joint purchases may allow the City to take advantage of economies of scale by combining purchasing power with other jurisdictions, however, the City takes full truck load deliveries and chemicals must be stored at site of use so little to no savings from shipping and storage would be anticipated. P&C has been working with the Office of the City Attorney to propose modifications to the San Diego Municipal Code (SDMC) to allow for the implementation of reverse auctions.

We believe that the City should further consider certain purchasing and contracting market strategies to help ensure that:

(1) it has done its best to obtain the best prices for chemical purchases, and

(2) it can safeguard against the volatility of the chemical markets, which affect unit chemical costs.

Any further savings the City realizes by adopting purchasing and contracting market strategies to purchase chemicals could be used to offset water rate increases or to reinvest in water/wastewater infrastructure.

We recommend that:

Recommendation #1 **The Purchasing and Contracting Department evaluate all market strategies presented above and identify which, if any, would allow the City to achieve further savings for chemical purchases. Additionally, if any of the market strategies require a change in the San Diego Municipal Code, the Purchasing and Contracting Department should work closely with the Office of the City Attorney to present those revisions to City Council for approval in order to ensure that the City can take advantage of these additional processes. (Priority 3)**

[15] Supply of Critical Drinking Water and Wastewater Treatment Chemicals – A White Paper for Understanding Recent Chemical Price Increases and Shortages, p. S-5.

The Purchasing and Contracting Department and the Public Utilities Department Can Enhance Coordination

During our review, we also found that the Public Utilities Department (PUD) and Purchasing and Contracting Department (P&C) periodically track information on chemical prices and availability over time but do not conduct regular meetings to share and discuss issues related to chemical supply availability, changes in prices, and alternative chemical uses. We found no departmental agreements that clearly define what PUD and P&C are responsible for in regard to tracking chemical prices. Tracking chemical prices and supply over time and conducting regularly scheduled meetings to share this information would allow both departments to make strategic decisions regarding purchases of chemicals that may allow the City to achieve savings.

The departments should take the initiative to establish periodic meetings to review and discuss price trends for the chemicals used in the water and wastewater treatment process.

According to the Water Research Foundation, two of the most helpful steps that public utilities can take to understand how to control costs and protect public health and the environment are to track chemical markets over time and to invest in planning that can help manage the risk associated with future water treatment market volatility. Specifically, according to the Water Research Foundation, utilities can increase their ability to minimize the effect of water treatment chemical price changes by closely tracking the market for treatment of chemicals.

During our review, we found that PUD considers P&C responsible for tracking the cost of chemicals and market conditions since they are in charge of the contracting process. P&C indeed does receive certain publications to track market prices and supply availability, but it does that only at times of contract renewals or requests for prices increases. This approach may not be sufficient to develop market strategies for the long term and could be improved by increased periodic coordination and sharing of information related to tracking of chemical prices over time. Additionally, neither PUD nor P&C have policies and procedures in place that define their roles and responsibilities regarding the process of purchasing chemicals for water and wastewater treatment, tracking

chemical prices and trends, and sharing this information.

According to PUD, long term contracts are in place to ensure chemical prices are static and products are available for the term of the contract(s). PUD should continue to periodically evaluate potential options for treatment processes as they have done in the use of the Peroxide Regenerated Iron – Sulfide Control (PRI-SC/PRI-CEPT) to optimize the cost and performance associated with the current use of iron salts for wastewater treatment within the City's Wastewater system.

PUD should systematically track information on chemical prices and availability over time and share this information with P&C periodically. For instance, there could be routine reporting sessions between PUD and P&C on chemical bid prices, market indicator performance, and alerts on supply issues. The communication mechanism could be a quarterly meeting, a newsletter, or any other mechanism that the departments see fit.

Increasing Chemical Expenses Between FY 2009 and FY 2012 Are Related To Increasing Demand For Chemicals To Meet Water and Wastewater Regulatory Standards

During the period under review, we found that City purchases for carbon, chlorine, ferric chloride, and ferrous chloride increased from FY 2009 to FY 2012 as a result of varying water quality that necessitated PUD to use and purchase more treatment chemicals to meet water and wastewater regulatory standards. Additionally, we also found that some unit costs went up, but generally, unit chemical costs fluctuated. While the City may not be able to limit increasing treatment chemical expenses to meet water and wastewater regulatory standards, it could utilize the purchasing and contracting market strategies that we mentioned in **Exhibit 4** (page 12) to potentially achieve savings during the procurement phase.

As **Exhibit 5** demonstrates, certain chemicals experienced significant expenditure increases. PUD informed us that these expenses were associated with the quality of the water and increased usage of chemicals to maintain regulatory requirements.[16] **Exhibit 5** also shows that some chemical unit costs went up, while others went down. These fluctuations

[16] According to PUD, water chemistry changes due to environmental factors requires adjustments to chemical feed rates and dosage of treatment in order to meet regulatory and operational requirements.

were due to overall changes in the chemical markets and other economic factors, which affect chemical supplies and demand.

Exhibit 5

Chemical Expenditure Increases and Associated Unit Costs (Dry Tons) Between FY 2009 and April 2012[17]

	2009		2010		2011		2012	
Chemical	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price
Carbon	$28,316[18]	$19,100	$178,919	$19,100	$434,548[19]	$22,000	$183,749	$22,000
Chlorine	$234,295	$378	$629,152	$391	$496,887	$430	$590,000	$550
Ferric Chloride	$2,127,395	$695	$2,403,808	$695	$2,998,384	$650	$2,456,950	$650
Ferrous Chloride	$1,973,811	$649	$3,257,594	$649	$3,461,655	$639	$2,117,775	$628

Source: PUD

To enhance PUD and P&C's ability to coordinate and minimize the effect of water and wastewater treatment chemicals price fluctuations, we recommend that:

Recommendation #2 **The Public Utilities Department in conjunction with the Purchasing and Contracting Department should develop policies and procedures that establish a systematic tracking system of information on chemical prices and availability over time and a system to periodically share this information. (Priority 3)**

[17] We did not include the average gallon of water treated at water and wastewater facilities because we cannot determine if every one of the chemicals in the table were used for every gallon of water treated. However, as we noted, quality of water treated is a key factor in usage of chemicals rather than quantity of water treated. PUD explained to us, as discussed in the text, that water quality affected the chemical price increases noted in the table.

[18] According to PUD, the changing of the carbon expenditure is dictated by its sulfur content and scheduling. A late FY09 change-out was scheduled but occurred in FY10. Thus the expenditure is showing an increase from FY09 to FY10.

[19] According to PUD, the changing of the carbon expenditure is dictated by its sulfur content and scheduling. An early FY12 change was scheduled but occurred late FY11 so the expenditure is showing a decrease from FY11 to FY12. According to PUD, the decrease can also be attributed to the optimization of the plant.

The City Should Ensure That All Chemical Contracts Obtain the Office of the City Attorney Final Signature

We found that between fiscal years 2009 and April of 2012, the City contracted approximately $48 million dollars worth of contracts to purchase chemicals for its water and wastewater treatment with contracts that did not have final signatures of the Office of the City Attorney. According to P&C the procedures used were the accepted practice for entering contracts resulting from competitive bids at the time the chemical contracts were entered into. Several of these agreements were docketed and approved by the City Council because they exceeded $ 1 million in value. These documents included language relating to the total contract amount, the total duration of the relationship, and the documentation necessary to justify price increases or other legal language that could aid the City in controlling chemical prices. However, based on the results of the Office of the City Auditor Performance Audit of the Purchasing and Contracting Department of March 2012, P&C and the Office of the City Attorney have reviewed their practice and as of mid June 2012 all contracts, including those resulting from competitive bids, should obtain the appropriate signatures in compliance with City regulations.

The San Diego City Charter specifically states that for a City contract to be executed and valid, the Mayor or his designee, the contractor, and the Office of the City Attorney must review and sign the contract.[20] In addition, the City Charter requires the Office of the City Attorney's signature in order to properly execute City contracts and provides that it is the Office of the City Attorney's duty to "prepare in writing all ordinances, resolutions, contracts, bonds, or other instruments in which the City is concerned, and to endorse on each approval of the form of correctness thereof " An Office of the City Attorney Memorandum of Law dated December 18, 2009 reviews all codes associated with the City contracting regulations and concludes that the Office of the City Attorney's signature as well as those of the Mayor or its authorized representatives are necessary for the formation of a valid contract.

As a result, P&C processed and authorized approximately $48

[20] San Diego City Charter Article V, Sections 28 and 40, Article XV, Sections 260 and 265 (a).

million worth of chemical expenditures without the Office of the City Attorney signature. According to the Office of the City Attorney Memorandum of Law dated December 18, 2009, the effect of an improper execution of a City contract is that the contract is invalid or unenforceable against the City and that any contractor that performs work under an improperly formed contract is at risk of non-payment.

Our discussions with P&C officials indicate that prior to the Office of the City Auditor Purchasing and Contracting Department audit issued in March of 2012, P&C used purchase orders as contracts even though this practice did not satisfy City contracting requirements. P&C has since agreed to change those practices and is currently working with the Office of the City Attorney to ensure that all contracts are validly executed and receive the appropriate reviews and signatures as required by the City Charter. In a Memorandum of Law dated July 24, 2012, addressed to the Audit Committee titled *Legal Review of Contracts Identified in the March 2012 Performance Audit of the Purchasing and Contracting Department*, the Office of the City Attorney validates our concerns found in the audit that purchase orders that lack the signatures of the Office of the City Attorney, the vendor, the Mayor or its designee are not valid forms of contracts and are not enforceable.

To ensure that all contracts in the City are validly executed, and that the City is better positioned to safeguard itself against chemical price increases, we recommend that:

Recommendation # 3 **The Purchasing and Contracting Department should work in conjunction with the Office of the City Attorney to formulate legal contracts for the purchases of chemicals that include all the required signatures and the necessary legal language and to ensure that the City can have better control over its prices. (Priority 3)**

Finding 2: The San Diego Fire-Rescue Department Does Not Conduct Regularly Scheduled Inspections of the Water and Wastewater Treatment Facilities as Required by Law

Use of water treatment chemicals by water and wastewater utilities is critical to protect the environmental and public health, as such state and City regulations establish a process of inspections for facilities that use and store hazardous materials and chemicals. During our review, we found that water and wastewater facilities are inspected on a regular basis by the City and the County of San Diego entities to ensure compliance with Federal and State regulatory requirements aimed at safeguarding the environment and the public. However, State law requires mandatory fire inspections of buildings and facilities that house hazardous materials.

We found that the San Diego Fire-Rescue Department's Fire Prevention Bureau (Bureau) did not conduct regular inspections of PUD's Water and Wastewater Facilities as required by California Law and City policies. Specifically, we found that the Bureau did not inspect any of the 15 Water and Wastewater facilities on a yearly basis or systematic schedule in accordance with rules and regulations. For example, the Bureau last inspected the Miramar Water Treatment Plant in November of 2002. Further, the Bureau inspected the Point Loma Wastewater Treatment Plant and Metro Bio Solids facility in 2004. Finally, the Bureau's inspection record database contains no information regarding five out of 15 facilities. **Exhibit 6** below illustrates the Water and Wastewater facilities and the last inspection dates.

Exhibit 6

SDFD PUD Inspections of Water and Wastewater Facilities[21]

Facility	Organization	Last Date of Inspection	Year(s) Without Inspection (approx)
Pump Station 1	Wastewater	11/11/2001	10
Miramar Plant	Water	11/10/2002	10
Metro Bio Solids	Wastewater	6/1/2004	8
Point Loma Plant	Wastewater	8/10/2004	8
Alvarado Plant	Water	8/11/2004	8
South Bay	Wastewater	2/28/2008	4
Otay Plant	Water	5/20/2010	2
Pump Station 64	Wastewater	7/10/2010	2
E. Mission George Pump	Wastewater	2/8/2011	1
Peñasquitos Pump	Wastewater	No records	At least 10 years
Otay Pump Station	Wastewater	No records	At least 10 years
Grove Station	Wastewater	No records	At least 10 years
Pump Station 65	Wastewater	No records	At least 10 years
Pump Station 2	Wastewater	No records	At least 10 years
North City Plant	Wastewater	No records	At least 10 years

Source: SDFD and PUD

State and municipal policy requires periodic inspections to be made of various occupancies, such as buildings, structures and installations that use combustible, explosive or otherwise dangerous materials.[22] The Bureau's own policies and

[21] The table is organized by the latest date of inspection to the most recent.
[22] California Health and Safety Code Sections 1790-1792.

procedures state that the high hazard sites must be inspected annually.[23] Good business practices require the retention of historical documents regarding program performance to increase transparency, reliability, and accountability.[24]

According to the Bureau's officials, the Bureau lacks the resources and staffing to maintain annual inspections of required facilities despite legal requirements to do so. For instance, for the CEDMAT program, CEDMAT supervisors have had a practice of cancelling scheduled inspections due to lack of staff. This contributed to the lack of inspections of certain facilities. Specifically, Bureau officials informed us that the Water and Wastewater facilities were not included in the Bureau's priority schedule of inspections based on an internal risk assessment that the Bureau made in which it determined that its few resources should be focused on facilities with greater public access on a daily basis. According to the Bureau, PUD facilities represent a lesser risk than other facilities so due to a lack of resources it did not perform these inspections. Instead it chose to concentrate on other types of facilities with greater access to the public such as high-rise buildings that house several business and or restaurants and daycare facilities. However, the SDFD agrees that these sites should be inspected annually or at least on a systematic schedule. We discussed these issues with officials from the SDFD and they stated that the additional eight positions that they received during fiscal year 2013 will be utilized to address the deficiencies in the CEDMAT unit.

The lack of timely inspections, reliable data systems that include all pertinent information regarding inspections, and documents to support which inspections are conducted increases the risk that some of these facilities may not be optimally and safely operating. Annual inspections performed correctly decrease the risk of fire. Prioritization and systematic approaches ensure equitable treatment of all facilities, apply limited resources to their best and highest purpose, and reduce the risk to public safety.

[23] City of San Diego FPB Policy C-11-5 Industrial Inspection (CEDMAT) Priority Policy, April 8, 2011.
[24] Office of the City Auditor Performance Audit of the Fire Prevention Activities Within the City of San Diego, October 2010.

It is important to note that even though these facilities are not inspected regularly by the Bureau, they are supposed to be inspected by other departments as well. The purpose of these other inspections is to ensure safe storage and usage of chemicals at each of the water and wastewater facilities. For instance the City of San Diego, Environmental Services Department, Hazardous Materials Management Program and the County of San Diego, Department of Environmental Health, Hazardous Material Division also conduct inspections of these facilities. We found that these inspections occurred on a scheduled basis.

As we recommended during the Office of the City Auditor Performance Audit of the Fire Prevention Activities Within the City of San Diego issued in October of 2010, we recommend that:

Recommendation #4 **The San Diego Fire Department should ensure that it performs all inspections required by law. If resources are not available to ensure that all inspections are performed, the San Diego Fire Department should ensure that the appropriate system of inspection prioritization is in place. (Priority 3)**

Conclusion

The Independent Rates Oversight Committee (IROC) requested that the Office of the City Auditor audit and evaluate Citywide Water and Wastewater chemical purchases by the Public Utilities Department (PUD). In its Annual Report for fiscal year (FY) 2011 IROC noted that such an audit could result in recommendations that could offset potential cost pressures that impact rates.

Our review of the chemical purchases for the City of San Diego water and wastewater treatment indicates that the possibility to achieve savings exists. To achieve cost savings for chemical purchases the City could explore and implement planning and market strategies such as reverse auctions. In addition, the Public Utilities Department (P&C) could enhance coordination and collaboration to achieve the best possible price for chemicals and more readily monitor changes in chemical prices. P&C and PUD could adopt a system to systematically track chemical prices and market fluctuations and share this information with each other to ensure that the appropriate planning for chemical purchases can take place and that ratepayers can be assured that the City has obtained the best possible price. Finally, the City should ensure that all receive the final signature from the Office of the City Attorney.

Recommendations

Recommendation #1 The Purchasing and Contracting Department evaluate all market strategies presented above and identify which, if any, would allow the City to achieve further savings for chemical purchases. Additionally, if any of the market strategies require a change in the San Diego Municipal Code, the Purchasing and Contracting Department should work closely with the Office of the City Attorney to present those revisions to City Council for approval in order to ensure that the City can take advantage of these additional processes. (Priority 3)

Recommendation #2 The Public Utilities Department in conjunction with the Purchasing and Contracting Department should develop policies and procedures that establish a systematic tracking system of information on chemical prices and availability over time and a system to periodically share this information. (Priority 3)

Recommendation #3 The Purchasing and Contracting Department should work in conjunction with the Office of the City Attorney to formulate legal contracts for the purchases of chemicals that include all the required signatures and the necessary legal language and to ensure that the City can have better control over its prices. (Priority 3)

Recommendation #4 The San Diego Fire Department should ensure that it performs all inspections required by law. If resources are not available to ensure that all inspections are performed, the San Diego Fire Department should ensure that the appropriate systems of inspections prioritizations are in place. (Priority 3)

Appendix A: Objectives, Scope, and Methodology

We reviewed the process through which the City procures chemicals for the treatment of water and wastewater to ensure that chemicals are competitively awarded. Additionally, we also reviewed whether the City uses market-based approaches to reduce the cost of chemicals to the extent possible. To achieve the objectives stated above, we reviewed a total of 22 contracts that the City entered into from fiscal year 2009 through April 2012 and determined whether the City contracting process was in accordance with the City rules and regulations. Additionally, we researched best practices and industry standards set by the Water Research Foundation and determined to what extent the City utilized these best practices to achieve cost savings.[25] We focused our review on data related to those contracts from fiscal years 2009 through April 2012, unless otherwise noted. We benchmarked certain chemicals prices and contracting and market strategies with other jurisdictions to determine how San Diego compares with other cities. We also analyzed chemical expenditures and unit costs trends over the period under review to identify and understand any fluctuations we noticed. We performed data reliability testing when necessary to ensure our findings are based on accurate information.

To ensure that the public is safe and that the City takes the appropriate measures to protect the public from the dangers associated with the usage and storage of chemicals for the treatment of water and wastewater, we also analyzed whether the water and wastewater facilities that use and store chemicals are appropriately inspected by the public agencies charged with their inspections.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings. Our conclusions on the effectiveness of these controls are detailed within the report.

[25] The City is currently conducting its own internal review of contracting procedures.

Appendix B: Public Utilities Department Budget Summary FY 2010 through FY 2012

	FY 2010	FY 2011	FY 2012
Positions	1,613	1,626	1,584
Personnel Expenditures	$ 141,038,805	$ 152,091,917	$ 147,778,180
Non-Personnel Positions Expenditures	$888,624,966	620,950,062	633,966,989
Total Department Expenditures	$1,029,663,771	$ 733,041,979	$ 781,745,169
Total Department Revenues	$ 964,798,341	$ 1,025,233,480	$ 983,171,000

Source: City of San Diego Fiscal Years 2010, 2011, 2012 Adopted Budgets

Appendix C: Type of chemicals used and applications

Chemical	Use
Activated Carbon	Odor Control
Ammonium Hydroxide	Chemically Enhanced Primary Treatment
Anionic Polymer	Chemically Enhanced Primary Treatment
Bioxide	Odor Control
Calcium Hypochlorite	Chemically Enhanced Primary Treatment
Cationic Polymer	Secondary solids removal
Caustic Soda 25%	Odor Towers
Caustic Soda 50%	Odor Towers
Chlorine Gas	Disinfection
Corrosion Inhibitors	Water Treatment for Boilers
Deodorizer[26]	Odor Masking
Ferric Chloride	Chemically Enhanced Primary Treatment/Sludge processing
Ferrous Chloride	Hydrogen Sulfide Control
Hydrogen Peroxide	Regeneration of Iron added for Hydrogen Sulfide Control
Insect Control Products[27]	Insect control
Liquid Caustic Soda[28]	Odor Control
Liquid Chlorine	Disinfection
Liquid Oxygen	Disinfection
Mannich Polymer	Sludge Processing
Muriatic Acid 18%	EDR cleaning
Muriatic acid 31%	Odor Tower cleaning
Ozone[29]	Disinfection
Permanganate[30]	Odor control

[26] Part of the MRO contracting process.
[27] Service Contract.
[28] Liquid Caustic Soda does not have a contract because it is produced by caustic soda on site.
[29] Ozone does not have a contract because it is produced by liquid oxygen on site.
[30] As of fiscal year 2013 the City is not longer renewing the Permanganate contract.

Polymer Alum	Secondary solids removal
Salt	Water softeners for Odor Towers
Sodium Chlorite	Disinfection
Sodium Hypochlorite	Odor Towers and disinfection

Source: PUD

Appendix D: PUD's Water and Wastewater Facilities

Facility	Branches
Metro Bio Solids	Wastewater
North City Plant	Wastewater
Point Loma Plant	Wastewater
Peñasquitos Pump Station	Wastewater
Otay Pump Station	Wastewater
East Mission George Pump	Wastewater
Grove Station	Wastewater
Pump Station 1	Wastewater
Pump Station 64	Wastewater
Pump Station 65	Wastewater
Pump Station 2	Wastewater
South Bay	Wastewater
Alvarado Plant	Water
Miramar Plant	Water
Otay Plant	Water

Source: PUD

Appendix E: Wastewater Operations

The Wastewater Branch of the Public Utilities Department treats wastewater from the City of San Diego and 15 other cities and districts, called participating agencies, from a 450 square mile area with a population of over 2.2 million. Wastewater System operations are subject to Federal, State, and local environmental regulations that primarily address the quality of effluent that may be discharged from the wastewater system, the disposal of sludge generated by the wastewater system, and the nature of waste material discharged into the collection system. The Federal regulations that have the most significant effect on the Wastewater System are the Clean Water Act, which is administered by the U.S EPA, the California State Water Board, the Regional Water Board, and the Federal Resource Conservation and Recovery Act.

These regulations set limitations on the discharge of pollutants at treatment plants and generally prohibit the discharge of pollutants into navigable waterways. Chemicals are used at all those facilities to achieve the best possible compliance with Federal, State, and Municipal regulations in regard to ocean discharge and output into the environment.

There are four main wastewater treatment plants: The Point Loma Treatment Plant, the North City Water Reclamation Plant, the South Bay Water Reclamation Plant, and Metro Biosolids Center. Each plant has to meet certain regulatory requirements to be permitted by the appropriate regulatory bodies.

Water Operations

The City's three Water Treatment Plants provide 200 million gallons per day of potable water to approximately 1.3 million people in San Diego, Coronado, Del Mar and Imperial Beach. [31] This is done through more than 280,000 metered service connections in the City of San Diego.

All three plants utilize several treatment processes to provide safe drinking water to the public. The plants are managed by the Water Operations Branch of the City's Public Utilities Department. As discussed above, various Federal, State, and local regulations dictate the type of chemicals that must be used to ensure safety and water quality. According to PUD, the types of chemicals used at treatment plants are not specifically dictated by regulatory agencies. These plants must meet certain performance standards, and the types of chemicals used to meet those standards are determined during the design of the plant.

[31] The three treatment plants are Alvarado Water Treatment Plant, Miramar Water Treatment Plant, and Otay Water Treatment Plant.

Appendix F: Overview of the Wastewater Treatment Plants

The Point Loma Treatment Plant currently provides chemically enhanced primary treatment of sewage in accordance with a waiver from the secondary treatment standards of the Clean Water Act. The wastewater treatment process currently employed at the Point Loma Plant consists of a chemically enhanced primary treatment. Chemically enhanced primary treatment consists of adding ferric chloride and organic polymers to the sedimentation tanks to help waste particles bond together in large enough masses to settle out. Chemicals are flow paced to target optimum removal rates before discharge to the ocean through a 4.5 mile long Ocean Outfall.

The Metro Biosolids Center dewaters sludge. Located on 39 acres adjacent to the Miramar Landfill, the Metro Biosolids Center is the City of San Diego's state of the art regional biosolids treatment facility. Metro Biosolids Center provides two treatment operations: thickening and digestion of the raw solids and the dewatering of the anaerobically digested sludge. Biosolids are nutrient rich, organic material produced from the anaerobic digestion process at the Point Loma Wastewater Treatment Plan and the Metro Biosolids Center. The facility produces dewatered biosolids that are approximately 30 percent solids and 70 percent water.

The North City Water Reclamation Plant is the first large-scale water reclamation plant in San Diego's history and part of the single largest sewage system expansion in the area in more than 35 years. This state-of-the-art facility can treat up to 30 million gallons of wastewater per day which is generated by northern San Diego communities. Wastewater entering the plant undergoes a series of treatment and purifying steps using the latest technologies to supplement the water supply of the region.

The South Bay Water Reclamation Plant provides local wastewater treatment services and reclaimed water to the South Bay. The plant design incorporates the newest technologies and meets strict odor control standards. Untreated water enters the plant from the South Bay region and it then passes through large, rake-like bar screens to remove solid debris and floating material. At the South Bay Water Reclamation Plant wastewater is treated to secondary and tertiary treatment levels. The secondary treatment process utilizes bacteria to speed up the decomposition of wastes in the wastewater being treated allowing the secondary effluent to be discharged to the ocean. In tertiary treatment the plant uses a filtration to remove microscopic particles from wastewater that has already been treated to a secondary levels. The filtered water then passes through chambers where it is disinfected through exposure to ultraviolet light. At this stage the water is considered reclaimed.

Appendix G: Glossary

Anaerobic digestion: Process by which organisms break down sludge, creating the by-products of methane gas, carbon dioxide, solid organic material and water.

Biosolids: Nutrient rich, organic material produced from the anaerobic digestion process at Point Loma WWTP and MBC. Once digested and dewatered, the material, called Biosolids, can be beneficially recycled.

Chemically enhanced primary treatment: During wastewater treatment at the Point Loma Wastewater Treatment Plan, ferric chloride and organic polymers are added to the sedimentation tanks to help waste particles bond together in large enough masses to settle out.

Co-generation: Co-production of electrical and thermal energy, also called combined heat and power.

Disinfection: Final step in the tertiary wastewater treatment process, when chlorine or sodium hypochlorite is added to the treatment of wastewater to kill disease-causing organisms. Ultraviolet light is another means of disinfection.

Effluent: "Cleaned" wastewater which flows out of a treatment plant.

Influent: Untreated wastewater when it flows into a treatment plant.

Raw sewage: Untreated wastewater.

Secondary treatment: Second state of wastewater treatment that uses biological process in which bacteria consume organic matter, then settles out as sludge.

Sewage: The used water and added waste of a community which is carried away by drains and sewers.

Sludge: The solid waste material which settles out in the wastewater treatment process.

Tertiary treatment: The use of filtration to remove microscopic particles from wastewater that has already been treated to a Secondary Level. Anthracite coal is the filter medium used by the Public Utilities Department Wastewater Branch.

Appendix H: Definition of Audit Recommendation Priorities

DEFINITIONS OF PRIORITY 1, 2, AND 3
AUDIT RECOMMENDATIONS

The Office of the City Auditor maintains a classification scheme applicable to audit recommendations and the appropriate corrective actions as follows:

Priority Class[32]	Description[33]	Implementation Action[34]
1	Fraud or serious violations are being committed, significant fiscal or equivalent non-fiscal losses are occurring.	Immediate
2	A potential for incurring significant or equivalent fiscal and/or non-fiscal losses exist.	Six months
3	Operation or administrative process will be improved.	Six months to one year

[32] The City Auditor is responsible for assigning audit recommendation priority class numbers. A recommendation which clearly fits the description for more than one priority class shall be assigned the higher number.

[33] For an audit recommendation to be considered related to a significant fiscal loss, it will usually be necessary for an actual loss of $50,000 or more to be involved or for a potential loss (including unrealized revenue increases) of $100,000 to be involved. Equivalent non-fiscal losses would include, but not be limited to, omission or commission of acts by or on behalf of the City which would be likely to expose the City to adverse criticism in the eyes of its residents.

[34] The implementation time frame indicated for each priority class is intended as a guideline for establishing implementation target dates. While prioritizing recommendations is the responsibility of the City Auditor, determining implementation dates is the responsibility of the City Administration.

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THE CITY OF SAN DIEGO

MEMORANDUM

DATE: November 13, 2012

TO: Eduardo Luna, City Auditor

FROM: Ed Plank, Interim Director of Purchasing & Contracting
Chief Mainar, Chief, San Diego Fire-Rescue Department
Roger Bailey, Director, Public Utilities Department

SUBJECT: Performance Audit of the Public Utilities Department's Chemical Purchases

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The Purchasing & Contracting Department, Public Utilities Department and San Diego Fire-Rescue Department have reviewed the City Auditor's recommendations in the audit report on the Public Utilities Department's Chemical Purchases. In general we agree with the recommendations contained in the report and in fact have already implemented new practices and policies which address them.

Finding 1:

Recommendation #1: The Purchasing & Contracting Department will further evaluate the identified purchasing strategies, some of which are already in use, to determine if they can achieve further savings for chemical purchases. Purchasing is working with the City Attorney's office on amendments to the Municipal Code which will enable the use of the reverse auction as a purchasing strategy. Further evaluation of the purchasing strategies and the Municipal Code amendments to allow reverse auctions should be completed by July 1, 2013.

Recommendation #2: Purchasing & Contracting and the Public Utilities Department partially agree with the recommendation that the departments "develop policies and procedures that establish a systematic tracking system of information on chemical prices and availability over time and a system to periodically share this information". The departments will review their current practice of periodically tracking and sharing information on chemical prices and trends and establish a more systematic structure to this process. However the departments do not feel it is necessary to establish formal policies and procedures for researching and sharing information on this commodity. A more systematic process for tracking and sharing information will be developed and implemented by July 1, 2013.

Recommendation #3: The Purchasing & Contracting Department agrees with this recommendation and has worked with the City Attorney's Office to establish a Memorandum of

Agreement (MOA) as the basis for procurement of materials, such as chemicals, through the Request for Bids process. This MOA has been in use since June 2012 and incorporates all required signatures and necessary legal language.

Finding 2:
Recommendation #4: Management agrees with this recommendation. The Fire Prevention Bureau implemented Policy # C-11-15 on April 8, 2011 to provide guidance for prioritizing CEDMAT inspections based on risk. Compliance with this policy will ensure that occupancies or processes posing the greatest risk to life, property and the environment will be inspected annually while occupancies or processes posing lesser degrees of risk may be inspected less frequently due to limited staffing.