



**OFFICE OF THE INSPECTOR GENERAL  
LAUREL, MARYLAND**

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**FIRE HYDRANT OPERATIONS AUDIT  
UTILITIES SERVICES DEPARTMENT**



**OIG PROJECT NUMBER 23-FHO-01**

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**FROM:** JAMES A. WALL, JR., SUPERVISORY AUDITOR  
OFFICE OF THE INSPECTOR GENERAL

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**DATE:** FEBRUARY 9, 2024

**SUBJECT: FIRE HYDRANT OPERATIONS AUDIT**

We have performed an audit of Fire Hydrant operations. The detailed report is attached for your review. The OIG conducted the audit in accordance with the U.S. Government Accountability Office's *Generally Accepted Government Auditing Standards (GAGAS)*. We have already discussed with management issues of concern and their action plans are included in this report.

We appreciate the assistance provided by management and other personnel. We hope the information and recommendations presented in our report are helpful.

Attachment

cc: Chief of Staff, (C. Knight-Lee)  
Deputy General Manager for Operations, (A. Tesfaye)  
Performance & Accountability Director, (R. Maloney)  
Utility Services Director, (G. Diaz)  
Utility Services Deputy Director, (J. Rodriguez)  
Asset Management Division Manager, (W. McBride)

# EXECUTIVE SUMMARY



## Why The OIG Did This Audit

In accordance with the Washington Suburban Sanitary Commission (WSSC) Office of the Inspector General's (OIG) Fiscal Year (FY) 2023 Risk-Based Work Plan, and the authority granted to the OIG pursuant to Public Utilities Article, § 17-605 (a)(6) of the Annotated Code of Maryland, the OIG conducted a Fire Hydrant Operations Audit. The OIG conducted the audit in accordance with the U.S. Government Accountability Office's *Generally Accepted Government Auditing Standards*.

The Utility Services Department's (Department) four depots maintain more than 43,000 fire hydrants throughout Montgomery and Prince George's counties of Maryland. WSSC has a robust fire hydrant inspection and maintenance program to ensure public safety and adequate fire protection for communities. According to the WSSC *Fire Hydrant Participant Manual*, all hydrants should be inspected at least annually. Although this is an internal requirement and is not subject to any regulatory requirement, WSSC, however, inspects its hydrants every three (3) years. WSSC performs approximately 13,000 inspections in the two counties every year. Crew members also repair fire hydrants to resolve unplanned disruptions within seven (7) calendar days.

The Department also has a Meter Services Division, and its Shop Operations Section is responsible for the Fire Hydrant Leasing Program. Accordingly, Chapter 3.57 of the WSSC Code of Regulations allows a person or business to use a fire hydrant as a temporary water source if they apply for a permit and pay a rental fee. When the fire hydrant meter is returned, the water usage from the fire hydrant meter is calculated and the renter pays the charges.

## Strategic Alignment

This report addresses WSSC Strategic Priority: Protect Our Resources.

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## Fire Hydrant Operations Warrant Some Improvements

### What the OIG Found

The OIG assessed whether systems and controls are operating effectively and efficiently related to the Utility Services Department's (Department) fire hydrant operations. The audit covered the Department's inventory controls, field services, inspections, replacement and obsolescence procedures, leasing operations, and water service operations for the period from July 1, 2021, to June 30, 2022.

The evidence disclosed that the WSSC's operations relating to the Department's fire hydrant operations warrant improvement to assure compliance and consistency with the requirements outlined in WSSC's Code of Regulations (Code), and policies and procedures. As a result, the OIG noted the following:

- Inaccurate fees stated on the fire hydrant meter permit application;
- Information systems have inaccurate address locations for fire hydrants; and,
- Inspections are not performed timely.

The OIG presented the following recommendations to the Department's management to enhance its policies and procedures:

- Update the WSSC Code to allow WSSC management to revise fees;
- Ensure and record accurate locational data for fire hydrants; and,
- Conduct fire hydrant inspections in accordance with the WSSC *Fire Hydrant Participant Manual*.

WSSC management has addressed each of the OIG's recommendations, and where applicable, presented operational improvements or provided corrective action plans with anticipated due dates.



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### **BACKGROUND**

In accordance with the Washington Suburban Sanitary Commission (WSSC) Office of the Inspector General's (OIG) Fiscal Year (FY) 2023 Risk-Based Work Plan, and the authority granted to the OIG pursuant to Public Utilities Article, § 17-605 (a)(6) of the Annotated Code of Maryland, the OIG conducted a Fire Hydrant Operations Audit. The OIG conducted the audit in accordance with the U.S. Government Accountability Office's *Generally Accepted Government Auditing Standards (GAGAS)*.<sup>1</sup>

Fire hydrants are the above-ground components of a water distribution system, which provide access to a community's water supply for many purposes, including firefighting. Fire hydrants, among other reasons, are used; 1) for flushing water mains to maintain water quality in areas where water use is minimal; 2) to periodically test the system for compliance with fire flow requirements; and 3) as temporary water supply connections. Accordingly, the American Water Works Association (AWWA) and the National Fire Protection Association (NFPA) both advise water utilities to schedule regular and frequent inspections of fire hydrants to ensure that they are in good working conditions.<sup>2</sup> The benefits of having a fully functional water distribution system, including the fire hydrants, highlight the need for a well-developed fire hydrant inspection, maintenance, and repair operations program.

The Utility Services Department's (Department) four depots maintain more than 43,000 fire hydrants throughout Montgomery and Prince George's counties of Maryland. WSSC has a robust fire hydrant inspection and maintenance program to ensure public safety and adequate fire protection for communities. According to the WSSC *Fire Hydrant Participant Manual (Manual)*, all hydrants should be inspected at least annually. This is not a regulatory requirement but an internal goal. WSSC, however, inspects hydrants every three (3) years. WSSC inspects approximately 13,000 hydrants in the two counties annually. Crew members also repair fire hydrants to resolve unplanned disruptions within seven (7) calendar days.

To organize and manage the inspection and maintenance programs, the Department uses its Fire Hydrant Dashboard. The Fire Hydrant Dashboard has all the information and characteristics for each fire hydrant, including the manufacturer, identification number, fire hydrant size, installation date, and locational data for the hydrant. Inspection reports and repair service reports for fire hydrants are prepared and stored in WSSC's Rumba database. Based on discussions with WSSC management, crew members periodically update the fire hydrant's location address in WSSC's Geographic Information System (GIS).

WSSC only maintains public fire hydrants within its service areas. Private fire hydrants are owned and maintained by property or business owners. Private fire hydrant owners are required to ensure that these fire hydrants are inspected annually. Private fire hydrant owners, however, can request WSSC to maintain and inspect their hydrant for a fee.

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<sup>1</sup> In March 2023, an independent external peer review of the OIG was conducted in accordance with GAGAS, and a satisfactory rating was assessed.

<sup>2</sup> AWWA Manual of Water Supply Practices M17, *Fire Hydrants: Installation, Field Testing and Maintenance, Fifth Edition*; see also NFPA 291, *Recommended Practice for Fire Flow-Testing and Marking of Hydrants* 2019.



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During a typical inspection, crew members:

- Conduct a visual inspection to detect obstructions that could interfere with hydrant operations and leaky or broken nozzles, gaskets of valves;
- Conduct routine maintenance (oiling and greasing cylinders, exercise valve, replacing caps as necessary, etc.);
- Check fire hydrants against WSSC inventory records to determine the age of the fire hydrant, among other takes;
- Measure the water pressure and flow rate; and
- Compare water pressure and flow rate against historical data.

WSSC crew members collect the necessary equipment to repair fire hydrants and collect and install new fire hydrants where necessary in the field, as shown in Exhibit 1.<sup>3</sup> During the inspection process, crew members conduct preventive maintenance by greasing stems, as shown in Exhibit 2.

*Exhibit 1: WSSC Inspectors collecting new fire hydrant from Anacostia Depot.*



*Exhibit 2: Public fire hydrant maintained and greased by a crew member.*



<sup>3</sup> Unless otherwise noted, the report photos are sourced to the OIG taken in December 2022.

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Crew members also check for leaks and test hydrant functionality by opening the main valve to flush the hydrant until the water is clear, as shown in Exhibit 3. While inspecting the hydrants, inspectors visually check for damage. The crew members also check for leaks at the base of the hydrant. If the inspector determines that the hydrant is not functioning properly, the inspector will place an out-of-service disk on the hydrant (as shown in Exhibit 4).

***Exhibit 3: Fire hydrants are flushed until water runs clear.***



***Exhibit 4: Nonfunctional hydrants may be placed out-of-service.***



According to Chapter 3.57 of WSSC's Code of Regulations (Code), under certain circumstances and as a service, the WSSC will allow a requesting individual, firm, or agency to temporarily use a WSSC fire hydrant to draw water upon application for a permit and payment of a fee. The Department also has a Meter Services Division, and its Shop Operations Section (Section) is responsible for the Fire Hydrant Leasing Program. A person or business can apply for a permit and pay a fee to rent a fire hydrant meter. When the fire hydrant meter is returned, the water usage from the fire hydrant meter is calculated and the renter pays the charges. According to the Department's fire hydrant database, the Section rented over 1,704 fire hydrant meters during the fiscal year 2022, and the fees including the water charges received totaled approximately \$1.7 million. The permit records, including the application and payment receipts, are located and maintained in the Section's Fire Hydrant FileNet database. The permit records are maintained for a minimum of three years.

**FIRE HYDRANT OPERATIONS AUDIT****FEBRUARY 9, 2024****PAGE 8****OBJECTIVE**

The audit's objective is to provide WSSC management with an independent assessment of whether the fire hydrant operations' systems and controls are operating effectively and efficiently in accordance with the following regulations, standards, manuals, and guidelines:

- WSSC Code, Temporary Use of WSSC Fire Hydrants, Chapter 3.57, describing the conditions under which WSSC fire hydrants can be used as a temporary source of water;
- The Department's *Fire Hydrant Participant Manual* provides a technical series on how to inspect and repair fire hydrants;
- The WSSC *Fire Hydrant Fact Sheet* which outlines the practices used by the Department to manage and operate all WSSC's fire hydrants; and
- The U.S. Government Accountability Office's *Standards for Internal Control in the Federal Government*, which sets the standards for an effective internal control system and provides the overall framework for designing, implementing, and operating an effective internal control system.

**SCOPE AND METHODOLOGY**

The scope of the audit included the Utility Services' inventory controls, field services, inspections, replacement and obsolescence procedures, leasing operations, and water service operations related to fire hydrant operations for the fiscal year ending June 30, 2022. To accomplish the audit's objective, the OIG:

- Participated in a ride-a-long with Department staff to observe fire hydrant inspections, repairs, and replacements;
- Conducted interviews with WSSC management to identify and review critical reports and essential internal controls and operations related to the fire hydrant program;
- Reviewed relevant sections of the WSSC Code and the Department's policies and procedures, to gain an understanding of the Department's governance and establish audit parameters;
- Examined the Department's information systems and data to obtain a working knowledge of its functionality and usability;



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- Examined fire inspection reports and work orders to determine the timeliness of fire hydrant repairs;
- Examined geographical locations for fire hydrants to determine the accuracy of location data on file;
- Examined the Department's fire hydrant lease program and analyzed and recalculated fees to determine the accuracy of income from fire hydrant meter rentals;
- Selected eighty (80) items for each audit procedure using a randomly systemic process from the OIG's data analytics software, where applicable;
- Reviewed data related to years in service of fire hydrants to determine obsolescence of fire hydrants;
- Examined fire hydrant purchase orders and work orders used to issue new fire hydrants to determine the accuracy of inventory records; and
- Used statistical sampling of the Department's data to perform tests of areas under audit.

GAGAS requires the OIG to plan and perform the audit to obtain sufficient, appropriate evidence that will provide a reasonable basis for our findings and conclusions based on our audit objectives. Accordingly, based on the audit's scope and objectives, the evidence obtained during this audit provides a reasonable basis for our findings and conclusions stated herein.

**CONCLUSION**

Overall, the Department's systems and controls are operating efficiently and effectively in accordance with applicable WSSC regulations, guidelines, policies, and procedures. The evidence, however, did disclose that the Department's fire hydrant operations warrant improvement to adhere to some areas of the WSSC Code, and the Department's policies and procedures. Specifically, the OIG noted the following:

- Inaccurate fees on the fire hydrant meter permit application;
- Information systems have inaccurate locational data for fire hydrants; and
- Inspections are not performed timely.

During a ride-along with the Department staff, the auditor observed crew members promptly conducting fire hydrant repairs and displaying in-depth knowledge of fire hydrant operations. We did not find any significant amount of obsolescence in the operational age of fire hydrants. In addition, the Department's purchasing and inventory appear to be adequate based on the current evaluation of fire hydrant operations.

We thank the Utility Services Department personnel and appreciate their timely responses and cooperative support. We also thank the crew members who assisted the OIG auditors on the ride-a-longs and provided crucial insight into understanding the Department's field operations.

**FIRE HYDRANT OPERATIONS AUDIT****FEBRUARY 9, 2024****PAGE 10****FINDINGS, MANAGEMENT RESPONSES, AND ACTION PLANS****Finding 1: Inaccurate fees on the fire hydrant meter permit application****Risk Rating: MEDIUM**

According to WSSC 3.57.030 (a)(8), applicants whose hydrant use applications are approved will, before being issued a fire hydrant meter, be required to provide WSSC with a deposit covering the costs of the meter. The exception to the deposit requirement is if the applicant is an existing water and sewer account holder and is only requiring a two week permit, then WSSC may charge the applicant's account upon the return of the hydrant.<sup>4</sup> Section 3.57.030 (a)(11) states that upon the return of the fire hydrant meter, a service charge, water consumption charges at the current average daily consumption of 1,000 gallons, and any meter repair costs will be assessed to the permittee and deducted from the deposit.

The fee amounts on the permit application differ from the fee amounts outlined in the WSSC 3.57.030 (a). Both the permit application and the Code have three types of fee categories: a deposit fee, service charge fee, and late return fees. The permit application was last revised in May 2020 and the WSSC 3.57.030 (a) reflects the fees as of the time of the audit.

The following schedule shows the difference between the Code and the Permit Application fees:

	<b>Permit Application</b>	<b>WSSC Code</b>	<b>Overcharges (Undercharges)</b>
<b>Deposit Fee</b>			
Meter size, 3/4 inches	\$ 379.00	\$ 150.00	\$ 229.00
Meter size, 3 inches	\$ 2,420.00	\$ 700.00	\$ 1,720.00
<b>Service Charges</b>			
Two-week or less rental period	\$ -	\$ 10.00	\$ (10.00)
Two-week rental - Meter size, 3/4 inches	\$ 75.00	\$ -	\$ 75.00
Two-week rental - Meter size, 3 inches	\$ 130.00	\$ -	\$ 130.00
More than two-week rental period	\$ 175.00	\$ 75.00	\$ 100.00
<b>Returned Late Fee</b>	\$ 10.00	\$ 5.00	\$ 5.00

OIG auditors detected that WSSC management was unaware of the differing fees in the permit application and Code. The Department risks overcharging for fire hydrant meter rentals and then having to reimburse permittees for overcharges when the rental prices are not in compliance with the WSSC's Code.

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<sup>4</sup> See WSSC 3.57.030 (a)(8).

**FIRE HYDRANT OPERATIONS AUDIT****FEBRUARY 9, 2024****PAGE 11****Recommendation 1: Update the Code to allow WSSC management to change fees**

The OIG recommends WSSC management consult with WSSC's General Counsel to amend the WSSC Code, specifically § 3.57.030 to allow the General Manager or appropriate designee to periodically set the permit application fees for deposit, service charges, and returned late fees. This will allow WSSC management the flexibility to revise fees for fire hydrant meter permits and also remain compliant with WSSC's Code.

**Management Response and Action Plan (including anticipated due dates):**

Utility Services will consult with GCO and pursue an update to the WSSC Code to allow flexibility to adjust fire hydrant permit fees periodically. Utility Services anticipates being able to complete all updates by December 31, 2024.

**Finding 2: Information systems have incomplete and inaccurate locational data for Fire Hydrants****Risk Rating: MEDIUM**

Principle 13.01 of the U.S Government Accountability Office's *Standards for Internal Control in the Federal Government* states, in part, that "management should use quality information to achieve the entity's objectives."<sup>5</sup> According to the GAO, quality information is appropriate, current, complete, accurate, accessible, and provided on a timely basis, and it is used by management to make informed decisions and evaluate the entity's performance in achieving key objectives and addressing risks."<sup>6</sup>

The audit results disclosed that the locational data, i.e., the addresses, for 29, or 36%, of the 80 fire hydrants tested were not accurate in the hydrant database maintained by the Department. The OIG auditors used the Department's fire hydrant database to obtain the locational data for fire hydrants and generate a sample of addresses to test the accuracy of the locational data in WSSC's GIS.

In GIS, an icon is used to indicate the actual physical location of the fire hydrant. The testing results disclosed that sum addresses in the fire hydrant database were inaccurate. The correct location of fire hydrants is (1) critical to WSSC operations, (2) a resource tool for local fire departments, and (3) a vital contributor to public safety.

According to WSSC management, the addresses for fire hydrants were manually inputted into its fire hydrant database, which may have resulted in inaccurate locational data.

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<sup>5</sup> See GAO, *Standards for Internal Control in the Federal Government* (Green Book), September 2014, Fundamental Concepts of Internal Control, Principle 13.

<sup>6</sup> See GAO, Principle 13, ¶¶ 13.06 and 13.06.

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If the locational data for fire hydrants is inaccurate, they will not be located and the Department's operations will be impaired, including the delay of repairs and inspections.

**Recommendation 2: Ensure that the locational data for fire hydrants is accurate**

The OIG recommends WSSC management implement periodic monitoring procedures to ensure the locational data and addresses for fire hydrants in its information systems are correct. This will mitigate disruptions in the Department's operations concerning inspections and repairs and mitigate any safety concerns.

**Management Response and Action Plan (including anticipated due dates):**

Utility Services will continue to monitor fire hydrant location data within our systems of record to ensure accurate and reliable information. With the implementation of a new computerized maintenance management system from Cityworks, this effort will be fully automated by December 31, 2025.

**Finding 3: Fire hydrant inspections are not performed timely****Risk Rating: MEDIUM**

Although there are no regulatory requirements establishing the frequency of fire hydrant inspections, the Operations & Maintenance section of the WSSC's *Fire Hydrant Participant Manual* states, in part, that fire hydrants will be inspected [ed] every three (3) years.<sup>7</sup> The three-year time frame for inspections is based on the time from the last inspection date to the next inspection date.

The audit disclosed that from July 1, 2021, to June 30, 2022, 21, or 26%, of the 80 fire hydrants sampled were not inspected within three years. Specifically, fifteen (15) fire hydrants out of eighty (80), or 19 %, did not have an inspection in over 1,095 days, and six fire hydrants had not been inspected in over four years. The OIG auditors were able to examine inspections using the Department's fire hydrant database which houses the inspection reports. The OIG auditors compared inspection reports and inspection dates three years before and after the last current inspection report and calculated the number of days between the inspections. If the number of days between the inspections was over three years or 1,095 days, then the inspection was noted as an untimely inspection.

The OIG auditors asked WSSC management why fire hydrants were not inspected timely, and they responded that the current inspection cycle is inadequate to ensure all fire hydrants are inspected promptly. WSSC management also added that fire hydrants may be inspected outside of (or over) the Department's three-year inspection time frame.

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<sup>7</sup> WSSC's Fire Hydrant – Participant Manual, Hydrant Maintenance, pg. 23 (May 3, 2010).

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If inspections are not conducted promptly and in accordance with the Manual, then damages to fire hydrants will go unnoticed and increase the fire hydrant's out-of-service period. Further, timely inspections are necessary to identify needed hydrant repairs promptly. Failure to inspect the reported conditions timely increases the risk a location may be without hydrant coverage for an extended period, a potential threat to public safety.

**Recommendation 3: Conduct fire hydrant inspections in accordance with the Manual**

The OIG recommends WSSC management conduct fire hydrant inspections in accordance with the Department's *Manual* and develop monitoring reports to review the inspection status of fire hydrants periodically. This will assist the staff in meeting the Department's goal of inspecting fire hydrants every three years.

**Management Response and Action Plan (including anticipated due dates):**

Utility Services will complete all fire hydrant inspection older than 3 years by June 30, 2024, to ensure compliance with the department's Manual. Utility Services currently re-inspects 5% of the fire hydrants within 6 weeks of the original inspection date to ensure compliance with the inspection program. We have enhanced the QA/QC process to ensure adherence to the established inspection cycle.