AUDIT COMMITTEE

DENVERGOV.ORG/AUDITOR

TIMOTHY M. O'BRIEN, CPA, AUDITOR

AUDIT ANALYTICS TEAM

SEMIANNUAL AUDIT ANALYTICS UPDATE

AUGUST 2023

Chris Wilson, *MPA, Audit Analytics Manager*

Heather Burger, *MPA, CFE, Audit Analytics Senior*

Daniel Summers, *MPA, Audit Analytics Senior*

Kayley Smiley, *MS, Audit Analytics Intern*

Dawn Wiseman, *CRMA, Audit Director*

AGENDA

- Continuous audit and risk analytics update.
- Project updates.
- Audit support.
- Outreach to the audit community and internal training.

BACKGROUND

Continuous auditing is a method to identify and analyze risks through automated, scheduled analysis of the city's financial and process data.

Using this approach, we:

- Connect to and analyze information.
- Share results with Auditor's Office leadership.

2023 midyear continuous audit and risk analytics number of records analyzed

Source: Auditor's Office illustration using information from the city's financial system of record, Workday, the city's permitting system, Accela, and the city's tax system, GenTax.

CONTINUOUS AUDIT: TECHNOLOGY PURCHASES

- We analyzed all purchase card transactions from January 2021 through October 2022.
- We developed five risk flags to identify potential violations of Executive Order No. 18.

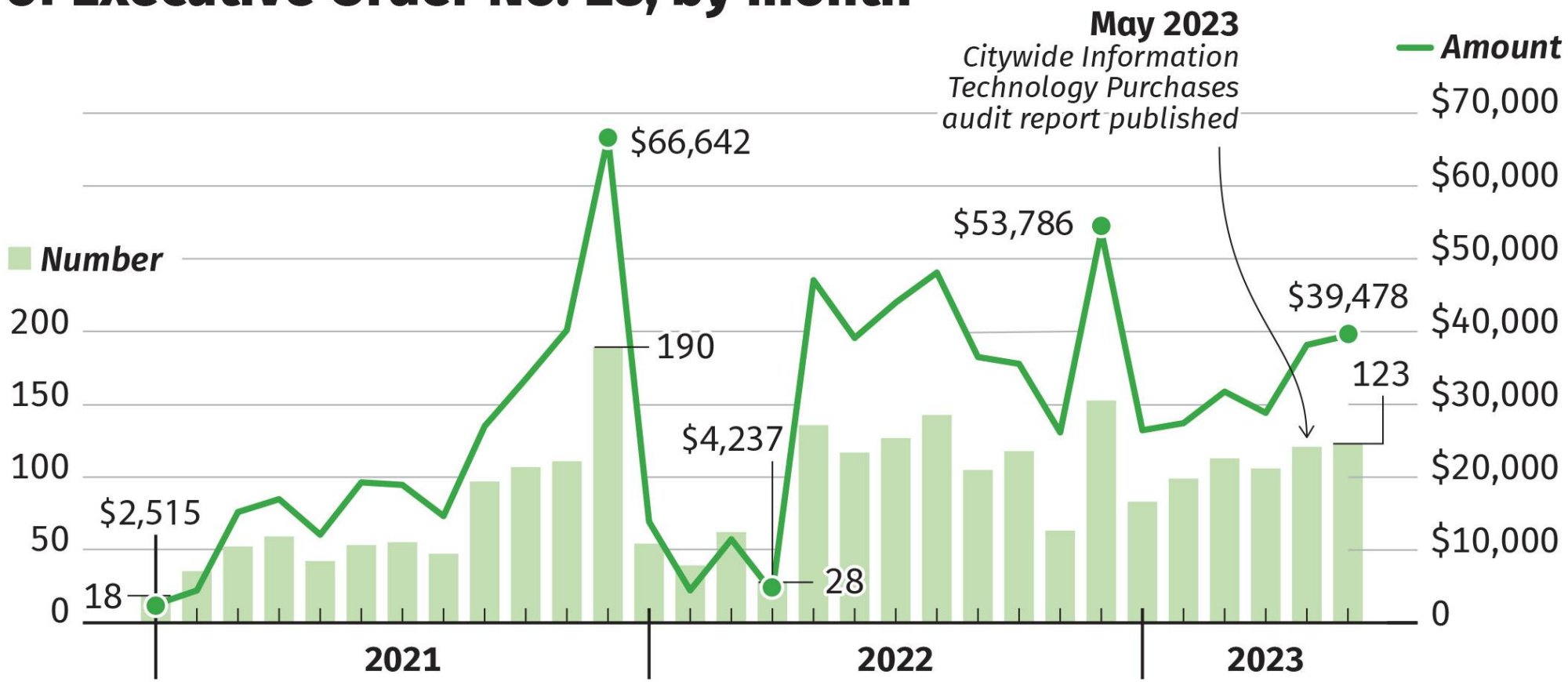
CONTINUOUS AUDIT: TECHNOLOGY PURCHASES

- We provided the audit team with a sample of 130 from the 2,417 total high-risk transactions.
- The audit team found 120 transactions violated Executive Order No. 18.
- Based on the audit team's testing, we calculated between 2,112 and 2,312 potential violations.

CONTINUOUS AUDIT: TECHNOLOGY PURCHASES

- Our office published the Citywide Information Technology Purchases audit in May 2023.
- For this semiannual update, we developed a continuous audit script to monitor trends in high-risk purchase card transactions.

Technology purchases in possible violation of Executive Order No. 18, by month



Source: Graphic created by the audit analytics team using data from Workday.

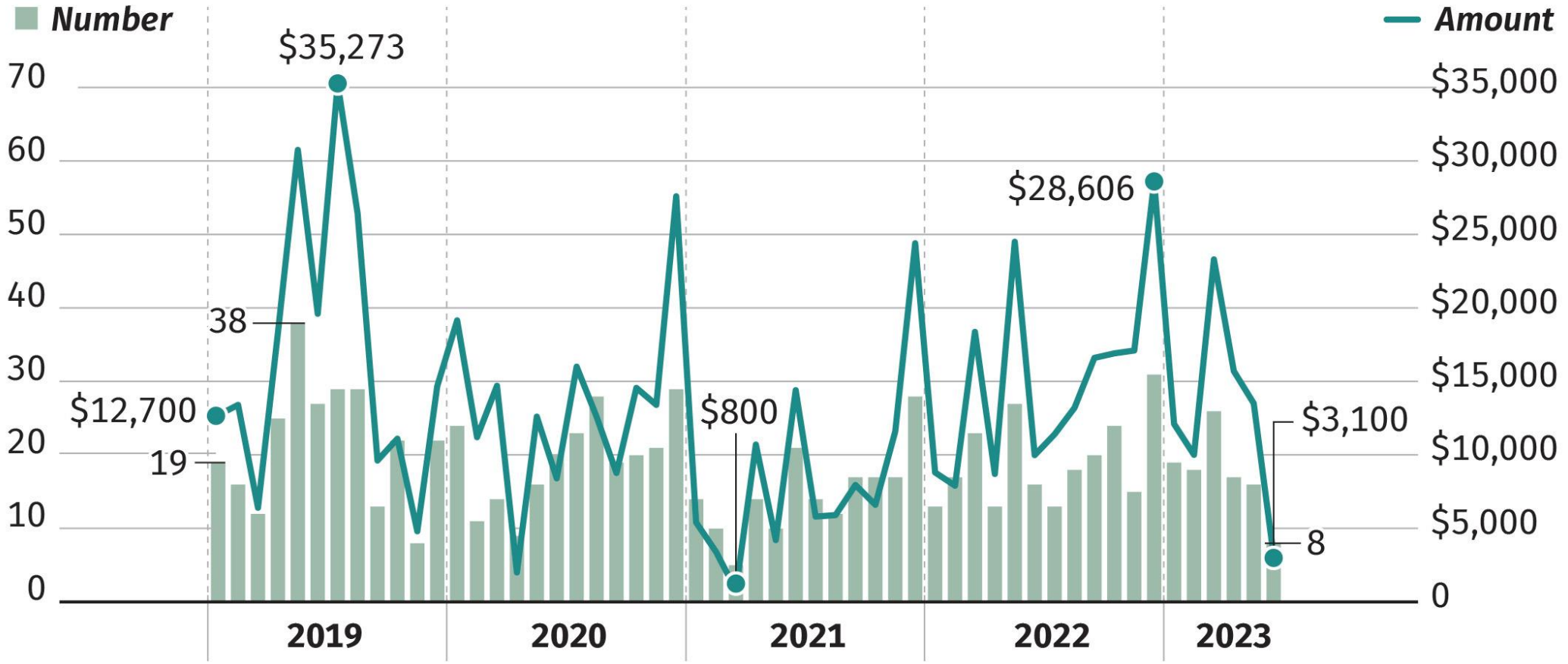
**These metrics are used only for risk assessment purposes and may require additional audit work to validate.*

CONTINUOUS AUDIT: PURCHASE CARDS

Purchase card composite model

- We identify potential risk by looking at pass-through vendors, even-dollar amounts, and split transactions.
- Our analysis tracks purchase card transactions that triggered at least two risk flags.
- Of the 378,245 total transactions, 1,309 transactions, or 0.35%, had two or more risk flags.

Purchase card transactions with two or more risk flags, by month



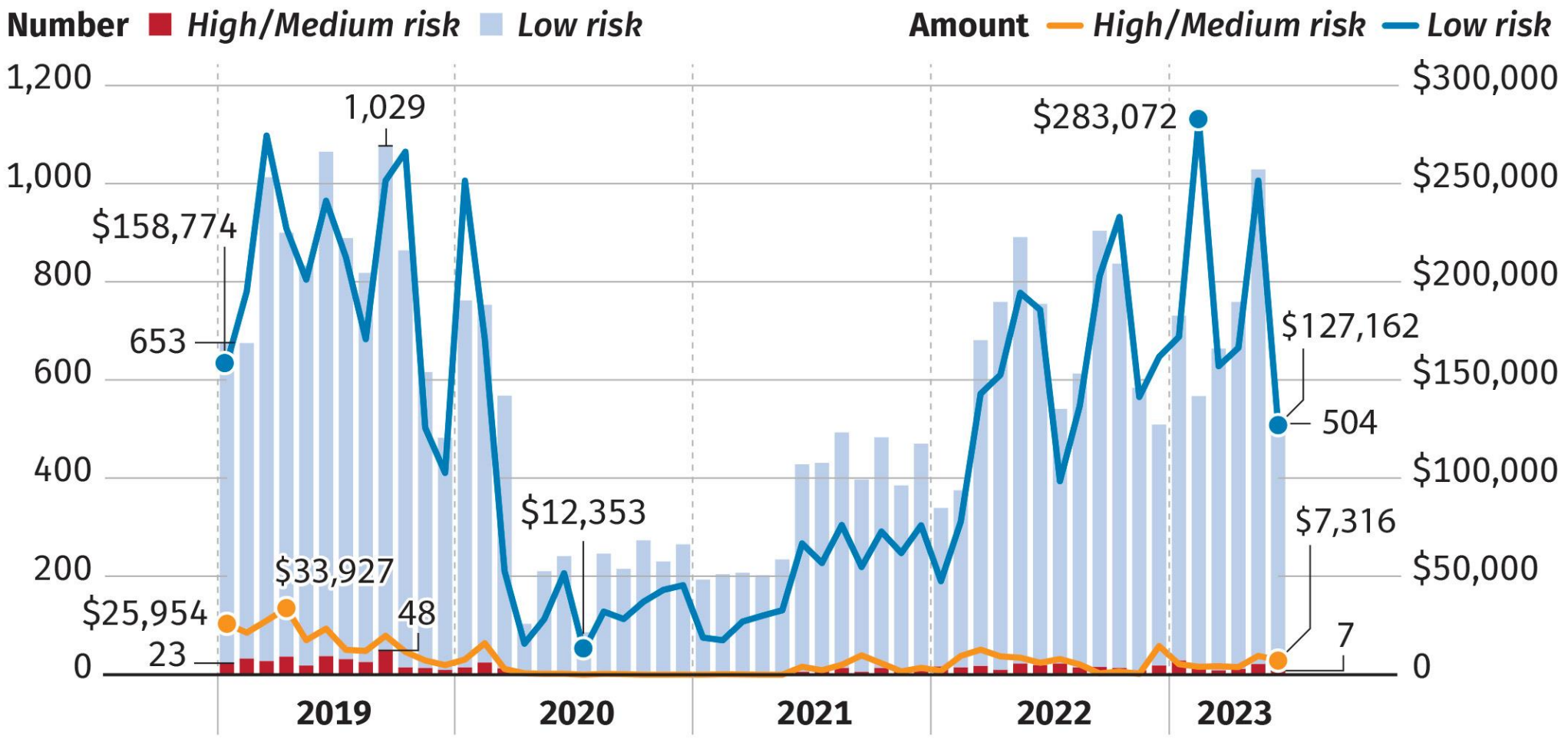
Source: Graphic created by the audit analytics team using data from Workday.

**These metrics are used only for risk assessment purposes and may require additional audit work to validate.*

CONTINUOUS AUDIT: TRAVEL CARDS

- 98% of travel card spending categorized as low risk.
- Number of transactions categorized as medium and high risk have decreased in the last six months compared to prior periods.

Travel card purchases, by month



Source: Graphic created by the audit analytics team using data from Workday.

**These metrics are used only for risk assessment purposes and may require additional audit work to validate.*

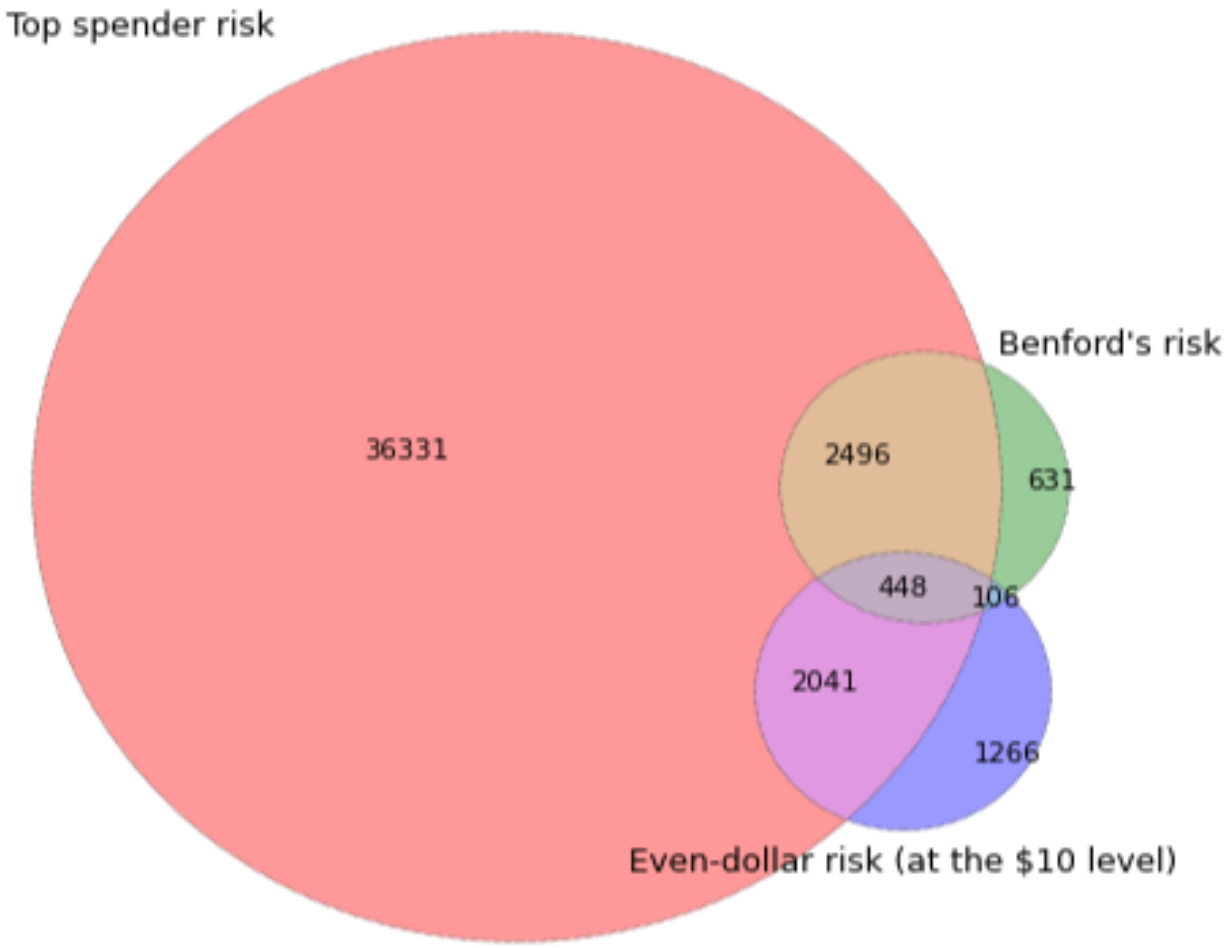
CONTINUOUS AUDIT: EXPENSE REPORTS

Composite risk model

Aggregates three risk flags:

- Top spender.
- Benford's law.
- Even-dollar.

Expense report composite risk model



Source: Graphic created by the audit analytics team using data from Workday.

**These metrics are used only for risk assessment purposes and may require additional audit work to validate.*

AUDIT COMMITTEE

CONTINUOUS AUDIT: PURCHASE ORDERS

Risk analytics

- Duplicate transactions.
- Unauthorized purchases.
- Even-dollar purchases.
- Shipping addresses.

CONTINUOUS AUDIT: PURCHASE ORDERS

continued

Duplicate transactions

Any pair of transactions with identical purchase amounts and similar supplier names from:

- Purchase orders.
- Purchase cards.
- Travel cards.

CONTINUOUS AUDIT: PURCHASE ORDERS
continued

Duplicate transactions

The number of **potential** duplicate transactions have:

- Decreased for purchase card and travel card transactions.
- Increased for purchase card and purchase order transactions.

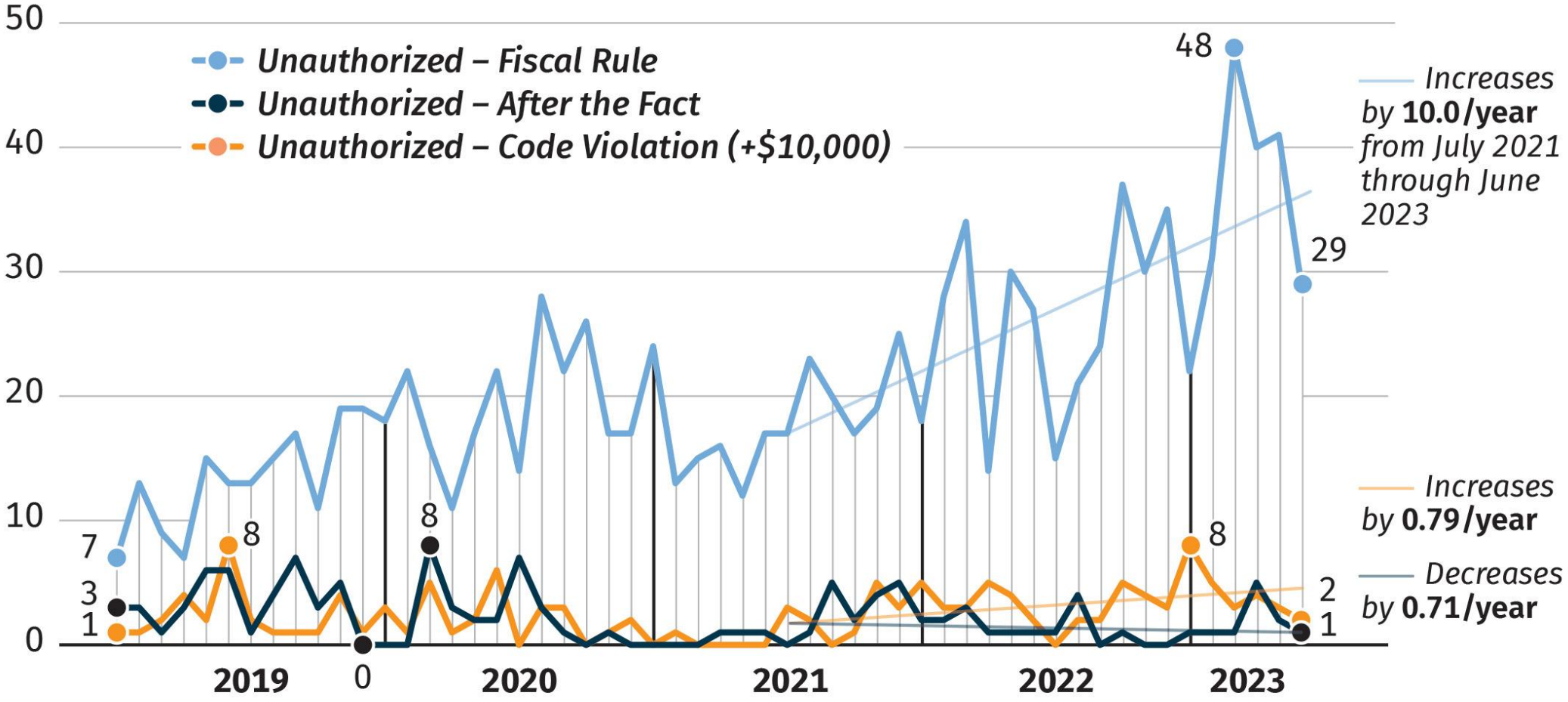
CONTINUOUS AUDIT: PURCHASE ORDERS
continued

Unauthorized purchases

Purchase order transactions that violate the city's procurement process by:

- Submitting after-the-fact orders.
- Committing fiscal rule violations for transactions under $10,000.
- Committing code violations for transactions over $10,000.

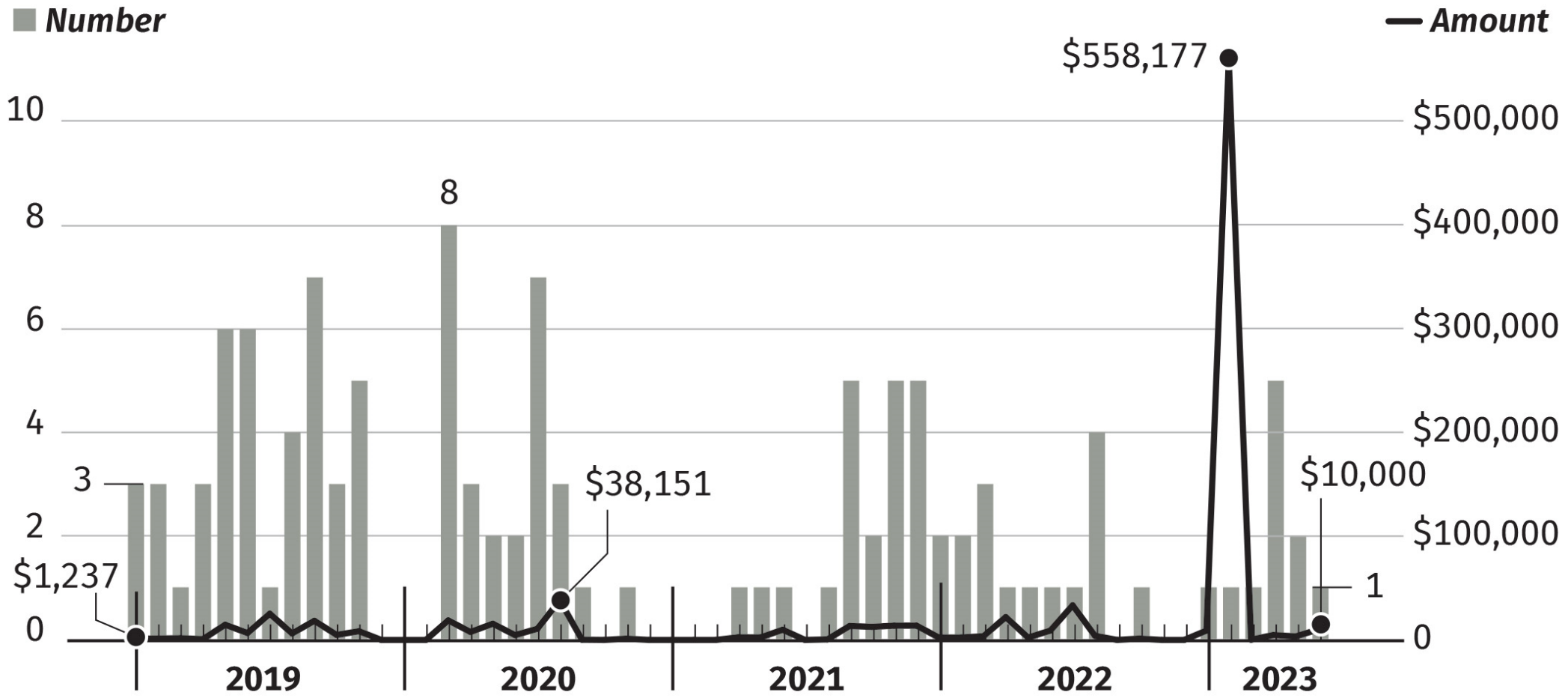
Unauthorized purchases, by month



Source: Graphic created by the audit analytics team using data from Workday.

**These results are used only for risk assessment purposes and may require additional audit work to validate.*

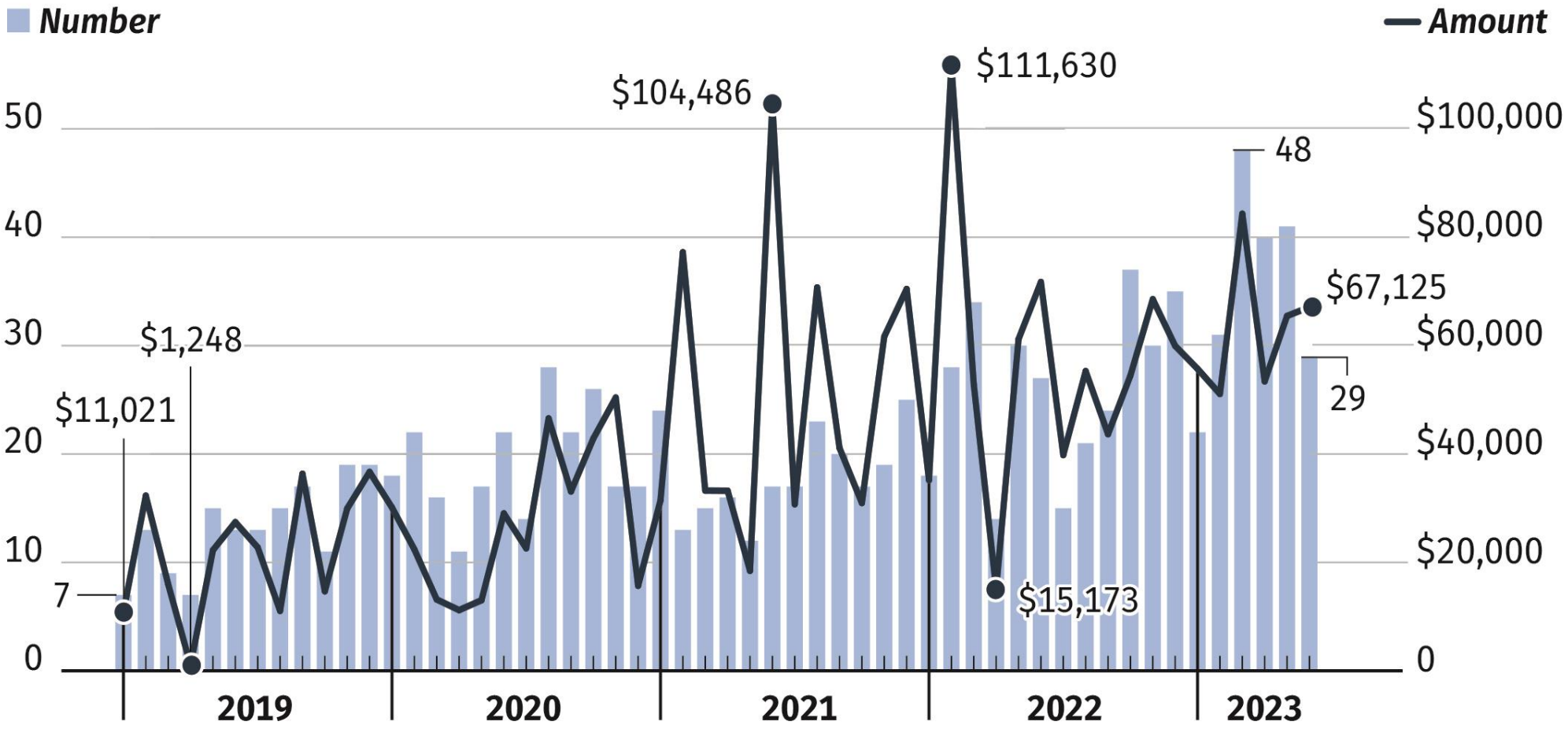
After-the-fact unauthorized purchases, by month



Source: Graphic created by the audit analytics team using data from Workday.

**These results are used only for risk assessment purposes and may require additional audit work to validate.*

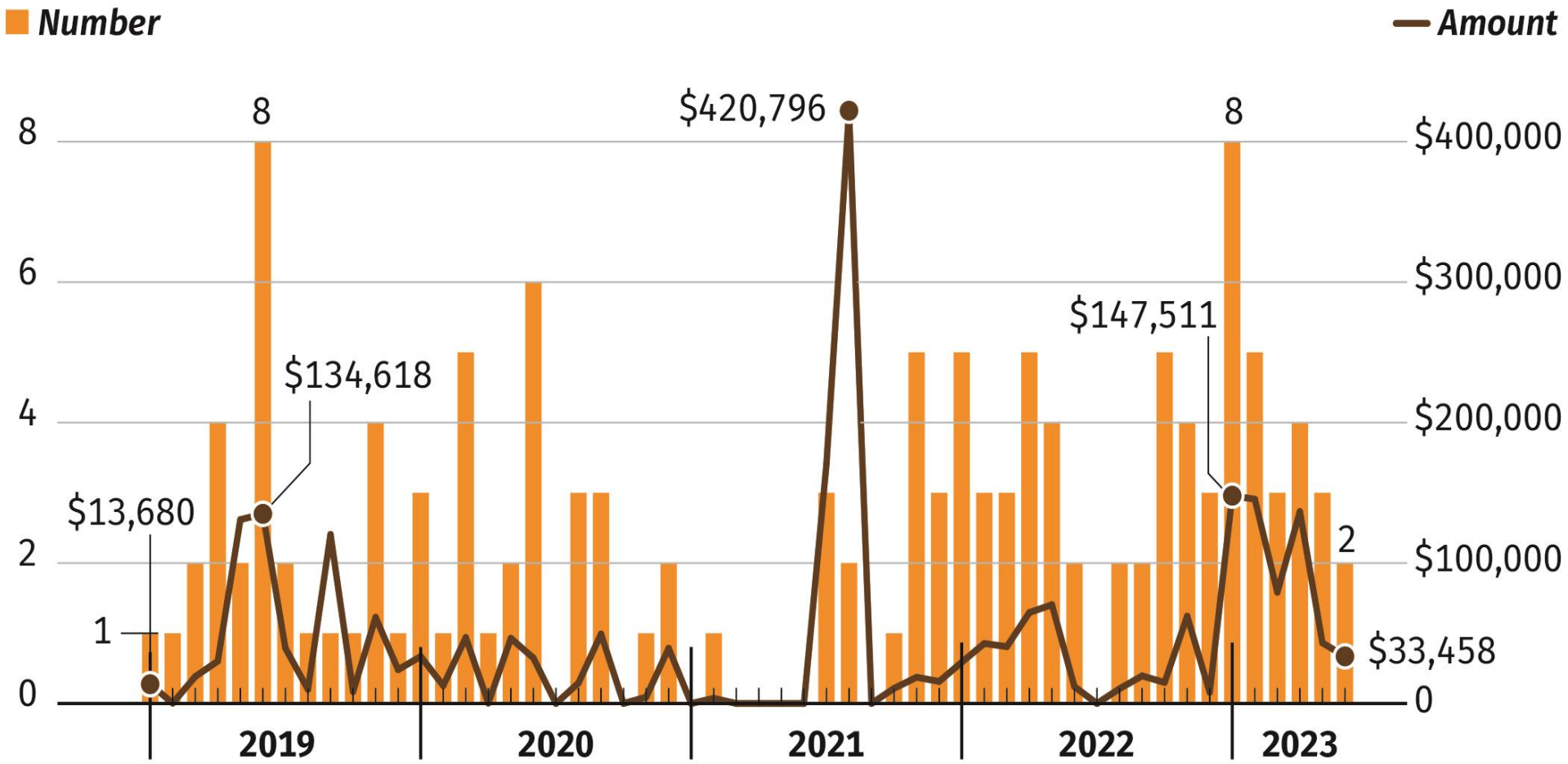
Fiscal rule unauthorized purchases, by month



Source: Graphic created by the audit analytics team using data from Workday.

**These results are used only for risk assessment purposes and may require additional audit work to validate.*

Code violation unauthorized purchases, by month



Source: Graphic created by the audit analytics team using data from Workday.

**These results are used only for risk assessment purposes and may require additional audit work to validate.*

CONTINUOUS AUDIT: PURCHASE ORDERS

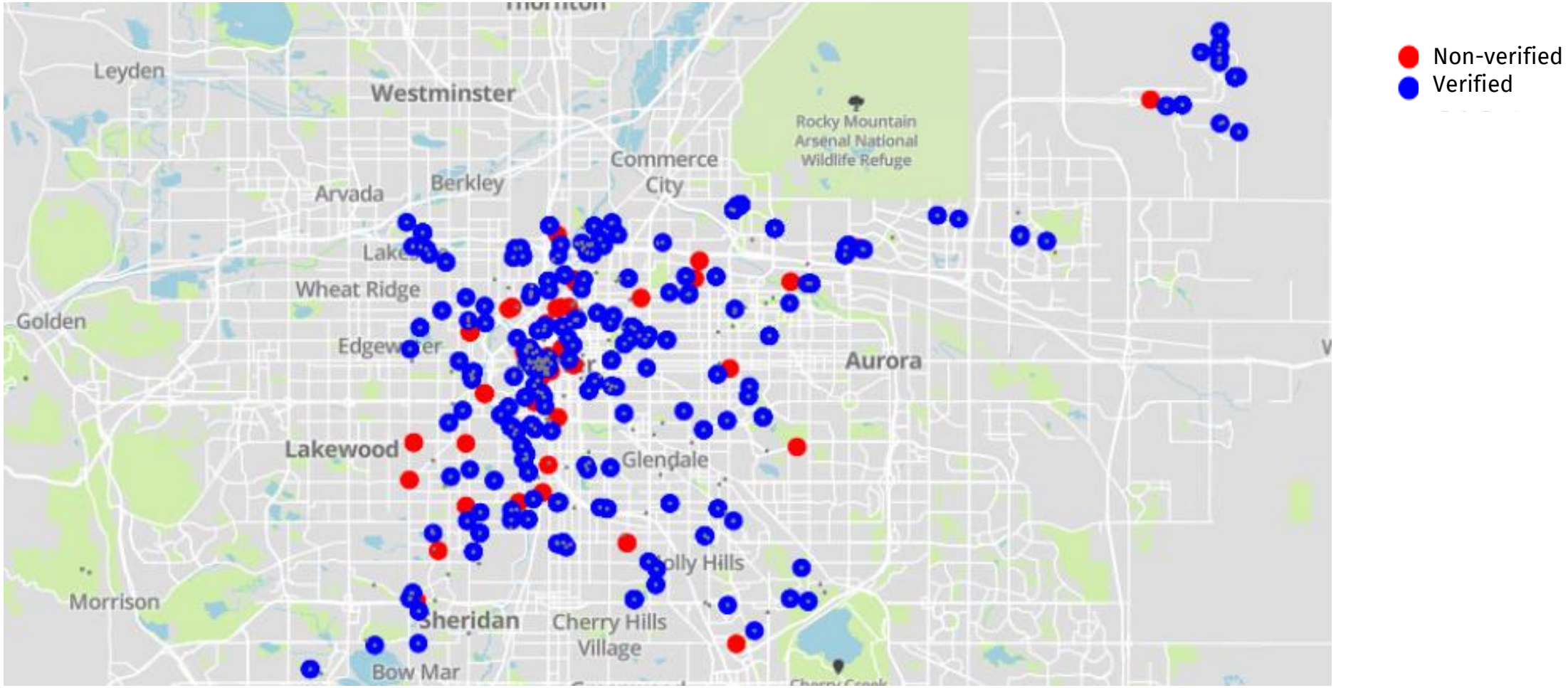
continued

Shipping addresses

The address listed in a purchase order that directs the location of shipments.

- We identified a risk population of shipping addresses that do not correspond with verified city addresses.
- We tested a sample of the risk population to determine the effectiveness of the analytic.
- Results closely align with previous update.

Purchase order shipping locations



Source: Graphic created by the audit analytics team using data from Workday and the city's real estate website.
**These results are used only for risk assessment purposes and may require additional audit work to validate.*

CONTINUOUS AUDIT: PURCHASE ORDERS
continued

Shipping addresses

- We developed a new analytic during this update period that looks at whether the city's employee addresses are tied to purchase order addresses.
- The analytic assigns a similarity score between shipping addresses and employee addresses.

CONTINUOUS AUDIT: PURCHASE ORDERS
continued

Shipping addresses

- Of the 71,049 purchase orders, 296 had shipping addresses that matched 90% or more characters in an employee address.
- We reviewed all 296 and identified 54 unique locations.
- We found 49 were city facilities, 4 were supplier addresses, and 1 was a project location.

AUDIT COMMITTEE

2023 PROJECT UPDATES

- Denver Employees Retirement Plan.
- City contractor analysis.

2023 PROJECT UPDATES

Denver Employees Retirement Plan

Objective: To develop analytics to identify the accuracy of contributions and benefit payouts, and to assess compliance with applicable policies.

- Requested by the executive team.
- Presented results internally and to Denver Employees Retirement Plan managers.

2023 PROJECT UPDATES

Denver Employees Retirement Plan

We developed analytics to test the risks related to:

- Employee and employer contributions.
- Retirement payments.
- Contribution refunds.
- Benefit-eligible earnings.

2023 PROJECT UPDATES

Denver Employees Retirement Plan

- Our scope included records from January 2018 through December 2022.
- This included reviewing 1.2 million payroll records, 615,247 retirement payments, and 3,321 refund payments.

2023 PROJECT UPDATES

Denver Employees Retirement Plan

To test risk related to contributions, we:

- Recalculated contribution amounts.
- Checked whether employees making contributions were eligible.
- Identified outliers by flagging earnings and hours worked.

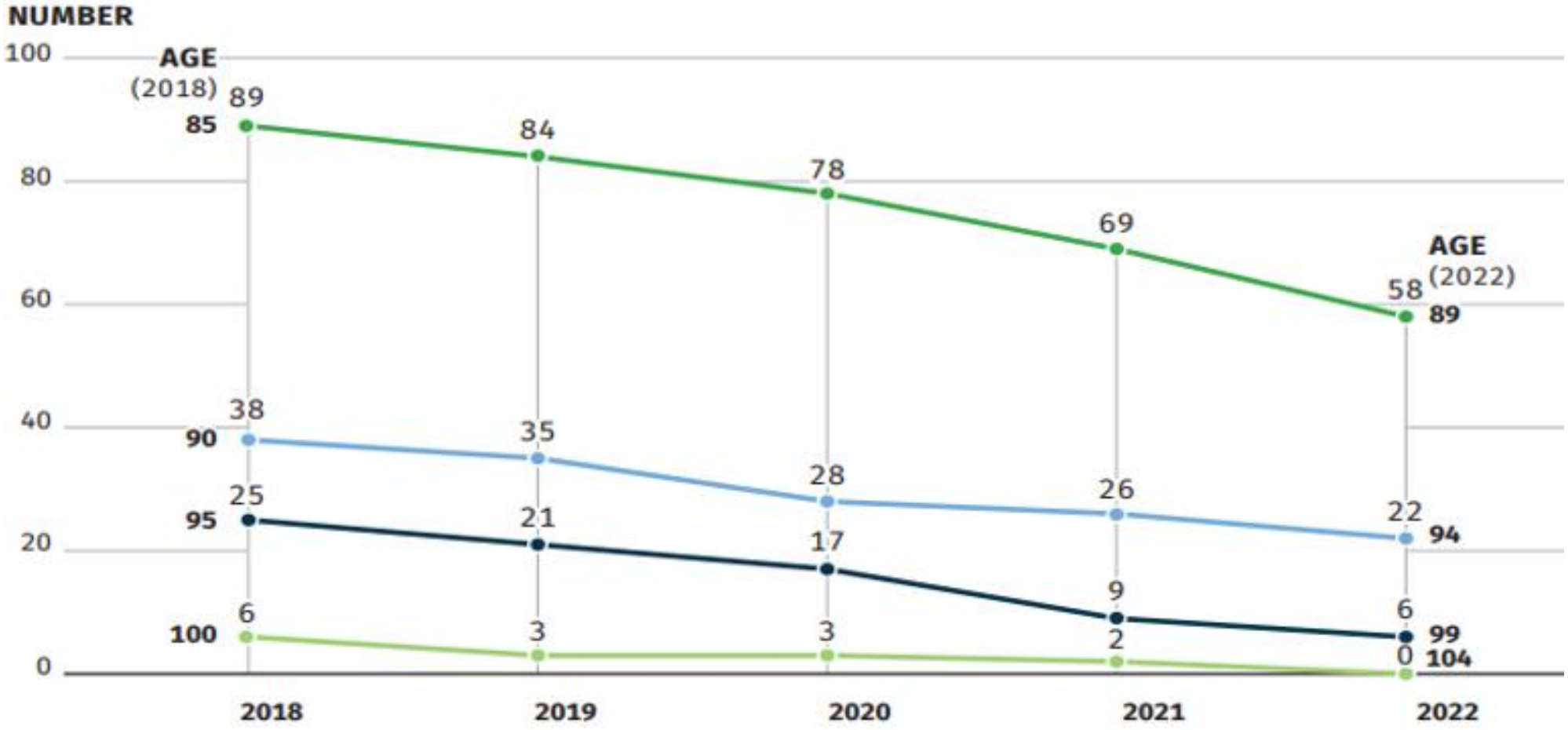
2023 PROJECT UPDATES

Denver Employees Retirement Plan

To test risk related to retirement payments, we:

- Compared the list of retirees to the city's terminations report.
- Checked whether any retiree received more than the annual federal limit.
- Checked whether any retiree had incorrectly received a cost-of-living adjustment.

Count of retirees receiving retirement payments by selected age groups



Source: Graphic created by the audit analytics team using retirement data from the Denver Employees Retirement Plan.

2023 PROJECT UPDATES

Denver Employees Retirement Plan

To test risk related to refund payments, we:

- Compared the list of refunds with the list of employees who stopped working for the city.
- Performed an even-dollar analysis.
- Recalculated the refund amounts to ensure accurate payment amounts.

2023 PROJECT UPDATES
continued

City contractor analysis

Objective: To analyze contractor information to identify trends related to the number of contractors, type of contractor, and count of unique contractors.

- Requested by audit director.
- Estimated completion: November 2023.

AUDIT COMMITTEE

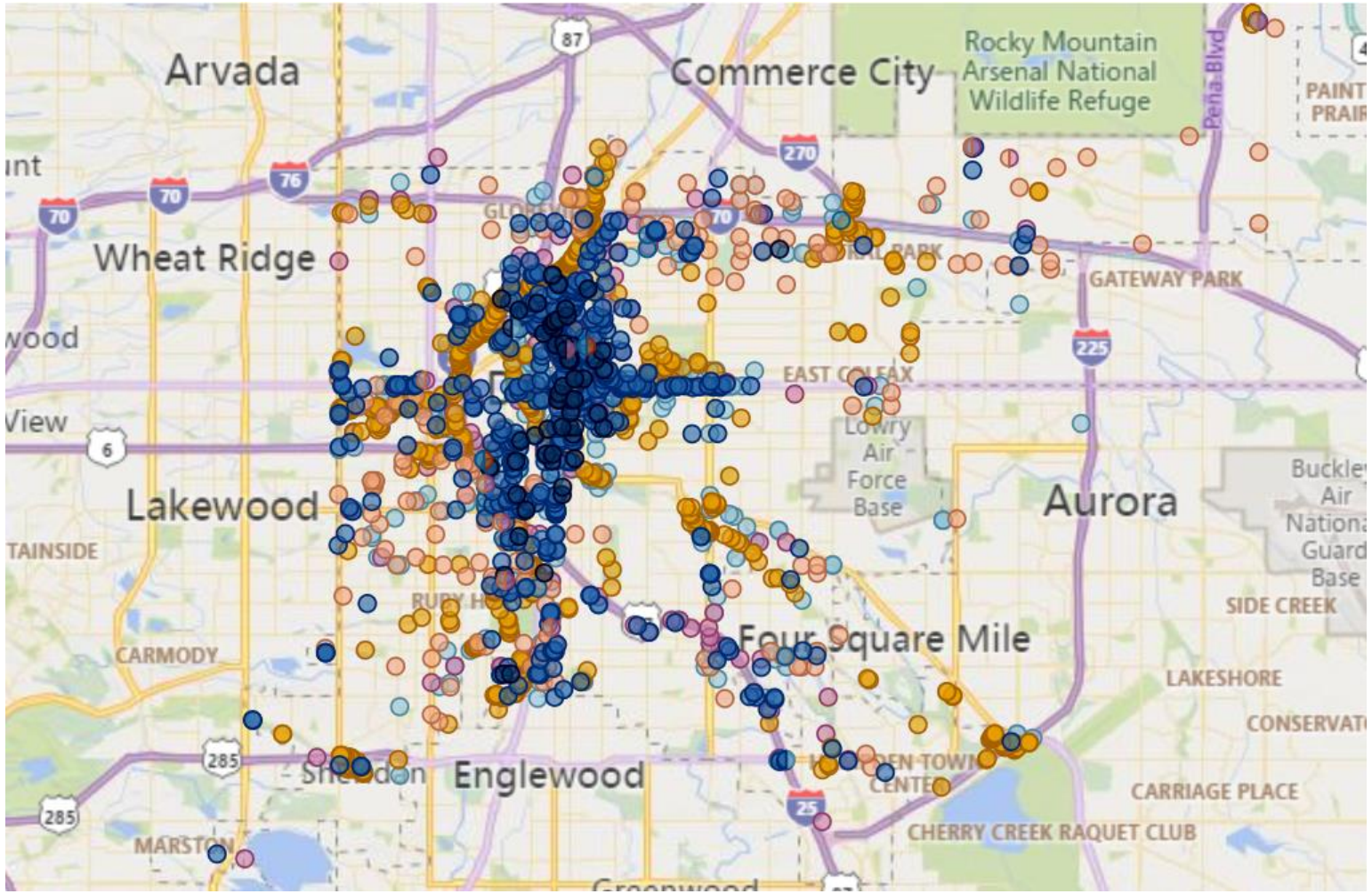
2023 midyear audit assistance

	Data Analysis	Sampling	Technical Support
COLLEGE AFFORDABILITY FUND PROGRAM	✖	✖	✖
POLICE OPERATIONS AND STAFFING	✖		✖
CITYWIDE INFORMATION TECHNOLOGY PURCHASES	✖	✖	✖
HOMELESS ENCAMPMENTS	✖	✖	
AFFORDABLE HOUSING (IN-PROGRESS)	✖	✖	
RESIDENTIAL PERMITTING (IN-PROGRESS)	✖	✖	
CITY COUNCIL OPERATIONS (IN-PROGRESS)	✖	✖	
CITY'S SELF-INSURED HEALTH PLAN (IN-PROGRESS)	✖	✖	
CONSTRUCTION CONTRACTOR PREQUALIFICATION (IN-PROGRESS)		✖	

AUDIT SUPPORT
continued

Homeless encampments

- Sampling methodology.
- Data cleaning and collection.
- Mapping analysis.



Source: Graphic created by the audit analytics team using data of the locations of encampment cleanups, assessments, and outreach that city agencies conducted from Jan. 1, 2022, through June 30, 2022.

Visit the Auditor's Office webpage to view this interactive map.

AUDIT SUPPORT
continued

College affordability fund program

- We analyzed 7,814 reimbursement requests from 2018 through 2022.
- We tested all requests to check whether the information aligned with eligibility requirements, per city ordinance.
- We also tested for duplicates and potential outliers.

AUDIT SUPPORT
continued

Residential permitting (in-progress)

- We are analyzing residential permit review data from 2018 through April 2023.
- This includes 492,338 tasks related to residential permit reviews, which are tied to 19,065 unique permits.

AUDIT SUPPORT
continued

Residential permitting (in-progress)

We are testing:

- Time to complete permit reviews.
- Employee workload distributions.
- Data reliability.

2023 midyear trainings and outreach to audit community

	TRAINING	CONFERENCE	CPEs
ATTRIBUTE DEVELOPMENT	✕		■■
SAMPLING	✕		■■■▮
ARBUTUS	✕		■■■■
MISCROSOFT EXCEL - DATA CLEANING	✕		■■■
ASSOCIATION OF LOCAL GOVERNMENT AUDITORS 2023 CONFERENCE		✕	■

Audit Analytics Team 2023 midyear overview

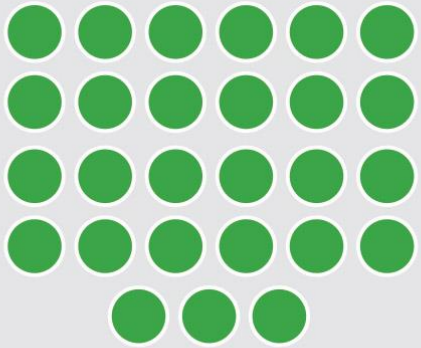
Audit assistance

Provided support for

9 audits

Continuous audit/ risk analytics

Ran



27 automated scripts looking at 18 million records

Training/ community engagement

Offered

4 training sessions and presented at

1 Conference

NEXT STEPS

- Descriptive analysis of city contracts using data in Jaggaer.
- Analysis of benefit-eligible earnings.
- Audit support for the Residential Permitting and the City's Self-Insured Health Plan audits.
- Provide internal training on performing data analysis in Microsoft Excel.

AUDIT COMMITTEE

DENVERGOV.ORG/AUDITOR

TIMOTHY M. O'BRIEN, CPA, AUDITOR