



Calgary

City Auditor's Office

Landfill Audit

March 2, 2017



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The City Auditor's Office completes all projects in conformance with the *International Standards for the Professional Practice of Internal Auditing*.

Executive Summary

Disposal & Processing Services (DPS), a division within the Waste & Recycling Services (WRS) Business Unit, manages the operations of The City's three active landfills. Landfill operations are self-supported, and the annual revenue generated from tipping fees (\$27 million in 2016) contribute significantly to meeting operating and capital requirements. During 2016, tipping fee revenue decreased as tonnages tipped have been lower than projected and have contributed to an overall budget shortfall in WRS of approximately \$10.5 million. Tonnage is influenced by economic downturns, competing landfills and waste diversion programs, and decreases in tonnage are expected to continue through 2017 as The City continues to move towards the goal of diverting 70% of waste away from landfills.

To support an efficient and effective landfill operating environment, the objective of this audit was to determine the extent to which waste material transactions at landfills are accurate, complete and monitored. The audit primarily focused on waste management transaction controls utilized by the Shepard landfill, as this is the only landfill to accept all types (residential, commercial, industrial) of waste material. The audit reviewed key landfill transaction processes (recording waste load data, inspection of waste materials, payment receipt and handling) and supporting landfill IT systems. The time period used for testing and analysis activities was from January 1, 2015 to August 31, 2016.

Based on the audit procedures completed, landfill processes and associated controls are generally effective to ensure that transactions are accurate, complete and monitored. DPS have implemented processes that are designed to ensure that vehicles are inspected, and their weight recorded, on entry to the landfill, with associated payment made as required. Key data is entered for each transaction, and processes have been established to process payments received (e.g. cash reconciliations) and to follow up on payments owed. However, our audit work identified that supporting IT systems and adherence to internal procedures require improvement to mitigate the risk of inaccurate or inappropriate transactions. We also identified opportunities to improve the efficiency and effectiveness of the operation of landfill processes.

The current version of the scalehouse IT system impedes the ability of DPS to improve efficiency, enforce business rules, and prevent inappropriate transactions that could result in the loss of revenue. The bypassing of controls that ensure periodic tare¹ weight re-measurement, and block the completion of transactions for banned customers, were among the system limitations identified. While user roles for the system are configured to appropriately restrict administrative access privileges, generic user account management and password policies also require improvement to limit the risk of unauthorized transactions, and ensure that accountability for transactions can be traced to individual users of the scalehouse IT system.

During the course of the audit, we noted opportunity to further develop the Designated Material Inspection (DMI) Program. This program is targeted at diverting specific types of waste (e.g. concrete, drywall) from the landfills, and has been established in support of The City's waste diversion goal. However, the operation of the program does not assist DPS in determining if the program is successful in its aim of educating customers and changing behavior. Inspection resources are not utilized effectively as our analysis estimated that 78% of staff time allocated to the inspection program was being spent on other landfill activities.

¹ Empty weight of a vehicle or container

Our audit analysis also identified opportunities for DPS to increase the efficiency of landfill processes through consistent compliance with internal procedures that govern waste material acceptance and transaction data entry into the scalehouse system. In particular, the industrial waste acceptance and transaction process has evolved without focused regard for efficiency or compliance with internal procedures. Data is transcribed between multiple IT systems and paper records by varying personnel, and 11% of the tested transactions involved loads that were allowed entry to the landfill site without a pre-approved industrial waste disposal permit.

The actions being taken to reach The City's goal of diverting 70% of waste away from landfills will likely continue to negatively impact the existing DPS cost, revenue, and operational structure, due to the anticipated reduction in materials being delivered to landfills. However, DPS have taken a proactive approach to respond to changes in landfill operations through strategic planning, and demonstrated a willingness to take action when changes accelerate (e.g. changes to landfill operating hours). Seven recommendations were raised to further enhance DPS's operations to maximize the efficiency and effectiveness of landfill processes during this challenging business and economic climate. Highlights of these recommendations included:

- Mitigating scalehouse IT system gaps and ensuring functionality improvement opportunities are pursued during system upgrades and/or replacement;
- Streamlining the industrial waste transaction process to improve efficiency while ensuring compliance with internal procedures;
- Resourcing, optimizing and measuring the Designated Materials Inspection Program;
- Documenting all requirements for scalehouse transaction data entry and ensuring staff compliance; and
- Implementing practices that improve the tracking of vehicles that improperly bypass landfill exit gates and reducing the frequency of their occurrence.

Waste & Recycling Services has agreed to all seven recommendations and committed to implementing them by July 1, 2018. The City Auditor's Office will follow up on all commitments as part of our ongoing recommendation follow up process.

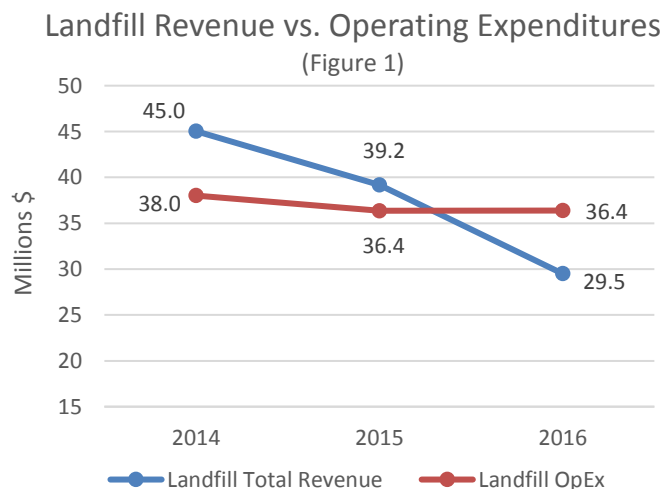
1.0 Background

Disposal & Processing Services (DPS), a division within the Waste & Recycling Services (WRS) Business Unit, manages the operations of The City's three active landfills (also referred to as waste management facilities), and five inactive landfills. DPS coordinates with other divisions in WRS such as Strategic Services, and Infrastructure & Program Management, in order to develop business plans, and build and maintain landfill infrastructure (active and inactive sites).

In addition to protecting public health and the environment, DPS also seeks to provide: a consistent customer experience across all landfill facilities, manage the materials received, and ensure compliance with operating approvals and environmental legislation. Both active and inactive landfill sites require environmental monitoring and capital investments for closure and post-closure care. These activities are funded through landfill "tipping fees," a residential waste management charge, and federal gas tax funding. Landfill development and operations do not rely on any municipal tax support to operate.

Each landfill is capable of processing household waste, compost leaf and yard material, construction and demolition waste, and recyclable materials (e.g. electronics). Non-hazardous industrial waste (e.g. car wash sump) requires special processing before disposal, which is managed at the Shepard landfill. The volume of waste disposed at the three landfills totalled 534,096 tonnes in 2016. Scalehouse staff, traffic controllers and environmental monitoring staff are all required for efficient and safe landfill operations. The three landfills together process over 500,000 transactions per year with 60% of the activity occurring over the summer months. The total volume of waste landfilled is relatively evenly split across the three landfill sites and will decline as waste diversion programs ramp up.

Tipping fees charged to landfill customers totaled \$34.5 million in 2015 and represented 88% of total revenue for DPS. Historically, revenue has been sufficient to offset operating expenditures (see figure 1). However, tipping fee revenue has declined and has contributed to an overall revenue shortfall in WRS of \$10.5 million in 2016 and projected to be \$11.7 million in 2017. To offset this shortfall, WRS has made operating budget adjustments that include reduced hours of operation for the three landfills, and the elimination of 30 staff positions starting in 2017.



2.0 Audit Objectives, Scope and Approach

2.1 Audit Objective

The objective of this audit was to determine the extent to which waste material transactions (assessment and recording of materials, payment for transaction) at landfills are accurate, complete and monitored.

2.2 Audit Scope

The audit scope focused on waste material transactions processed at landfill scalehouses and the time period used for testing and analysis activities was from January 1, 2015 to August 31, 2016. The audit primarily focused on waste management transaction controls utilized by Shepard landfill, as this is the only landfill to accept all types (residential, commercial, industrial) of waste material.

The scope did not include verification of regulatory compliance or specialist technical processes of landfill operations.

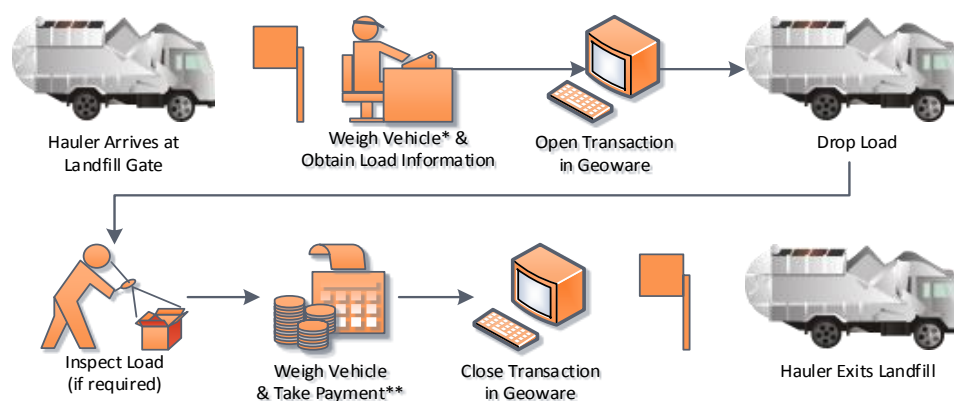
2.3 Audit Approach

The audit approach reviewed controls related to DPS' systems and processes that support effective processing of waste material transactions. This included assessing the design and operation of controls through interviews, documentation reviews, testing and analysis.

3.0 Results

At the planning stage of the audit we were informed of a number of strategic and operational activities already completed or underway to address projected changes in the cost and revenue profile of landfill operations. The audit focused on waste material transactions (see figure 2) and the effectiveness of controls supporting the process, including industrial waste transactions. In addition, the audit included limited testing of contractor management controls.

Figure 2. Waste Delivery and Transaction Process (high level)



*Stored tare weight of vehicle may be used during this step and payment completed at the inbound gate.

**Payment is not required for all delivered materials (e.g. electronics).

The audit reviewed selected landfill process and control areas that are key in ensuring transactions are accurate, complete and monitored: scalehouse IT system (Geoware), transaction completion and closeout, designated materials² inspections, and industrial waste transactions.

3.1 Scalehouse IT System (Geoware)

Geoware is the IT system used to record and store transactional activity and is used by scalehouse operators at each active landfill site. Due to the volume and variation of these transactions, appropriate IT controls are critical to ensure authorized system access and that the particulars of a transaction are properly recorded while maintaining efficient traffic flow through the scalehouse gates. Data controls, system configuration, and system access controls were reviewed during the completion of audit procedures.

3.1.1 System Data Controls and Configuration

Effective coding configuration has been established to support accurate rate charges for specific waste material. For example, built-in scalehouse system controls mitigate the risk of charging inaccurate fees since fee amounts cannot be entered directly by scalehouse operators; they are calculated and based on pre-configured data descriptors (e.g. material type). The system controls preventing entry of a material type or vehicle type not configured in Geoware are also working effectively. To enable efficient data entry for common transactions, “hot keys” have been configured on Geoware terminals so scalehouse operators do not need to enter the waste category code digits. These system controls also support monitoring, analysis and reporting of transactional activity.

However, during testing, some limitations to the effectiveness of existing system controls were identified:

- If Geoware “Editor” function is used, system will allow completion of a charge account transaction even if the account has a status of “locked”, or “banned”.
- System allows use of the previously recorded tare weight even if the established target timeline for tare weight re-measurement is exceeded.
- Transaction cancel codes set-up in the Geoware configuration settings do not match the codes available to end-users via the scalehouse Geoware terminals resulting in use of invalid cancel codes.

Where system controls are not operating effectively, DPS should implement additional manual controls to mitigate the risk of inaccurate or inappropriate transactions (Recommendation 2). Opportunities to implement functionality improvements during any future scalehouse system upgrades should also be explored (Recommendation 3).

3.1.2 System Access

The audit reviewed Geoware user access roles, user accounts (including generic user accounts), and password requirements. There are two Geoware user types with defined access: “Administrator” and “Operator”. The audit confirmed that the “Operator” user type appropriately limits system access to prevent:

- Unauthorized access to configuration functions, including material types and their charge rates;
- Changes to cash payment transactions after they’re completed;
- Changes to cash and charge account transactions from previous days; and

² Designated Materials are readily recyclable materials that should be kept out of the landfill (e.g. concrete)

- Unauthorized creation of customer charge accounts.

At the time of testing, 62 of 63 Geoware users were verified as current City employees. The majority of transactions tested (99%) for the Shepard scalehouse are associated with a specific employee(s) with generic user IDs used for the remainder. If the Geoware generic user ID is used for completing transactions, staff are required to enter comments and their initials for tracking purposes, but this did not occur for 80% of the transactions tested. Passwords are required for access to both the City network and Geoware system, but there are no password complexity or expiration requirements for Geoware users. However, password requirements are stronger for City network user accounts in place for operating the scalehouse central computers.

In addition to improving password requirements and enforcing business rules, access restrictions for Geoware should be strengthened by restricting and monitoring the use of generic user accounts when accessing the City's network and scalehouse system, and when processing transactions (Recommendation 4).

3.2 Landfill Transaction Completion & Closeout

Transactions are completed and closed after loads have been dropped, or upon entry to the landfill if a tare weight is used. Accurate and complete transaction information is necessary to ensure the correct revenue is collected and that deliveries to the landfill are tracked and categorized appropriately. Overall, business requirements and system controls are in place for collecting key data at the scalehouse while the transaction is in progress. Personnel from the Finance Support and Business Operations Teams augment these controls by following up on irregularities and performing cash reconciliations. Audit procedures included tests for transaction completeness, compliance to data entry requirements, and accurate revenue collection.

3.2.1 Data Entry Requirements and Vehicle Tracking

The controls are effective for ensuring transaction data is complete for the majority of Geoware fields requiring an entry. Sample testing of completed Shepard transactions included the following results:

- 100% of records had entries for the following key fields: hauler/business name, transaction code, weight (full, empty, net), and vehicle identification number (license plate, "P" number, or unique identifier).
- 100% of edited transactions used an Edit Code that is defined in Geoware configuration settings.

However, requirements set out by the Business Operations Team and Scalehouse Procedures for vehicle photo quality and entry of explanatory comments for certain transactions are not consistently followed. A recommendation (Recommendation 6) was raised to improve compliance and ensure all requirements are documented.

In addition, the possibility of a customer driving out without closing the transaction demonstrates the importance of obtaining a clear photo of the license plate for follow-up purposes. An analysis of the process related to managing driveouts³ indicated that transactions still open when the landfill is closing are recorded and the Business Operations Team will attempt to identify the customer/vehicle so they can be contacted

³ "Driveout" describes a customer who exits the landfill site without closing the transaction

for closing the transaction, and obtaining payment if required. However, there is room for improvement in how driveouts are tracked so repeat offenders are more readily identified and penalized if appropriate (Recommendation 7).

3.2.2 Scalehouse Cash Counts

The controls for verifying the accuracy of the scalehouse daily cash counts are working effectively and the Financial Support Specialist monitors and tracks all variances discovered during the cash reconciliation process. There was an absence of process documentation so audit procedures included an identification of the process in order to test a sample of daily cash counts from the Shepard scalehouse with the following results:

- Scalehouse operators completed the relevant cash count documents and deposit slips matched the Cash Reconciliation Reports for 100% of the audit sample.
- 80% of Cash Reconciliation Reports were signed by the applicable scalehouse operator prior to submission to Finance.
- Variance occurrence rate was 33% for regular (full-time) employees, and 43% for seasonal employees.
- 100% of variances outside of the \$5.00 tolerance were audited and signed-off by a supervisor.

At the time of audit testing, there was no indication that each Cash Reconciliation Report was reviewed by a staff member other than the individual who completed it. However, Landfill Operations Management have since implemented a requirement that a Superintendent or Foreman review all cash counts prior to submission to Finance.

3.2.3 Short-Pay Tickets⁴

The controls for short-pay ticket tracking and follow-up are effective for payments made within the seven-day period allotted to customers. Funds were collected for each short-pay transaction tested with 73% being collected on the same day the ticket was issued. The Finance Support Specialist received key payment details for reconciliation purposes, but the receipt printed by the scalehouse after the ticket was paid was only included with daily cash count documentation for 27% of the sampled transactions. These receipts provide a clearer form of payment evidence, and helps the Financial Support Specialist be more efficient when completing the cash count and reconciliation process.

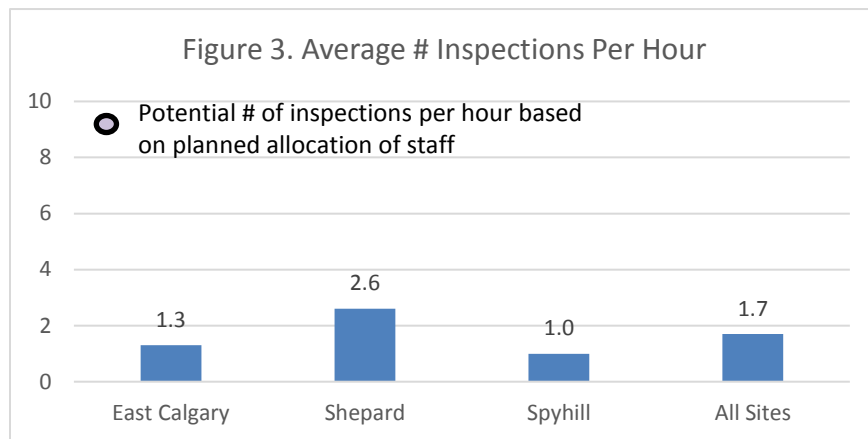
The financial impact of unpaid short-pay tickets was less than \$9K in 2015 and tickets that are outstanding after seven days are referred to Corporate Collections. In an effort to reduce the frequency of occurrence, a proposal for introducing surcharges and penalties for customers who repeatedly receive short-pay tickets was under review while audit fieldwork was underway.

At the time of audit testing, it was noted that short-pay tickets are tracked in spreadsheets and the opportunity to use the “Insufficient Funds” report in Geoware to enhance efficiency had not been explored. The Finance Support Specialist has since adopted use of this report.

⁴ “Short-pay” tickets are issued to customers who are unable to pay

3.3 Designated Materials Inspection (DMI) Program

According to DPS, the primary goal of the designated material (DM) inspection program is to educate customers about material types that should be diverted to recycling facilities instead of being landfilled. In an effort to improve inspection efficiency and gather data in a format more suitable for analysis, paper inspection forms were replaced by a tablet-based IT system in 2016. Using activity statistics provided by DPS for the period January 1 to August 31, 2016, an analysis of completed inspections was conducted to determine whether resources were being deployed in an effective manner. Landfill Operations assigns one full-time equivalent (FTE) to DM inspections per landfill site, per shift and individual inspections were completed within an acceptable timeframe.



For all landfill sites combined, a shortfall of approximately seven inspections per hour was noted between the actual average number of inspections completed and the potential number of inspections that could be completed if all staff time was spent as planned. Performance of the DMI Program should be measured and adequate resources deployed in a manner that supports the program (Recommendation 1).

In order to determine whether DM inspections records were completed according to procedure, a sample of inspection reports was obtained from the DM Inspection System and compared to the requirements in the DM Inspector Training Guide. The majority of tested designated material inspection records were completed according to procedure and all tested records were aligned to the Geoware system, but there were inconsistencies in the quality of photos attached to the records.

3.4 Industrial Waste Transaction Process

Industrial waste requires special handling and is only processed at the Shepard landfill. A permit process is in place to assess, approve, and schedule industrial waste loads before they are permitted entry to the landfill site. There is also a *Standard Operating Procedure (SOP): Accepting Industrial Waste at Landfills* for managing these deliveries when they arrive. Audit testing indicated that 11% of the sampled transactions involved loads admitted to the landfill site without an industrial waste permit. However, Shepard is a non-hazardous waste site (Class II⁵) and loads admitted without a permit are tested by Environmental Control Technicians (ECT) to mitigate any environmental risks.

⁵ Class II regulatory requirements are set by Alberta Environment and Parks

Data entry accuracy was tested and critical information (e.g. weight) on the Industrial Waste Receipt (IWR) that determines the fee amount was accurately recorded in Geoware and the WRS Billing & Invoices System for all transactions sampled. However, there are aspects of the process design that could put staff efficiency and accurate revenue collection at risk. The existing SOP does not reflect the current state of the process, such as details on how transactions are recorded and tracked using the various IT systems and documentation. See *Appendix A* for a flow chart of the current process which illustrates its administrative complexity, including the various IT systems, paper records, and personnel involved.

Given this procedure's role as a key control for maintaining compliance with provincial regulations, and ensuring accurate revenue collection, there are opportunities to improve its efficiency (Recommendation 5).

3.5 Contractor Management

Due to the level of landfill infrastructure construction and maintenance (\$18.5 million spent in 2016), effective contractor management on project activities is important to DPS and the Infrastructure & Program Management (IPM) Division within WRS is responsible for managing the contractors on DPS' behalf.

Based on a review of two landfill infrastructure projects, the audit provides limited assurance that contractors are managed effectively:

- Contractors were monitored by WRS staff and there was continuous engagement between contractor representatives, the project manager (City), and the contracted consultant providing monitoring and quality assurance services on the City's behalf. This was evidenced by meeting minutes, progress reports, and emails exchanged between project personnel.
- Product and service rates charged by the contractors were aligned with contract terms and any variances were known to the project manager and/or explained by supporting documentation (e.g. change orders).
- 100% of sampled invoices were approved by appropriate DPS staff prior to payment.

In reviewing contractor management processes, we identified two opportunities for improvement that have been actioned by IPM. We noted that one of the sampled invoices included an additional incorrect charge for GST (GST was charged twice). Once identified, IPM recovered the overpayment, and staff who authorize payments will be reminded to check for this type of incorrect charging. We also noted that corrective actions taken by the contractor to address deficiencies in work completed were verified by City staff, but there were no formal deficiency tracking logs evidencing completion and approval by an appropriate authority prior to final payment to the contractors.

Based on the audit procedures completed, landfill processes and associated controls are generally effective to ensure that transactions are accurate, complete, and monitored. DPS have implemented processes that are designed to ensure that vehicles are inspected, and their weight recorded, on entry to the landfill, with associated payment made as required. Key data is entered for each transaction, and processes have been established to process payments received and to follow up on payments owed. However, the audit work identified that landfill processes and controls, both manual and imbedded in supporting IT systems, can be improved to increase effectiveness, mitigate the risk of inappropriate transactions, and increase efficiency. Waste diversion activities, variation in material types, and legacy administrative processes have increased the complexity of managing transactions while optimization of process design and controls have not kept pace in some areas.

We would like to thank staff from Waste & Recycling Services for their assistance and support throughout this audit.

4.0 Observations and Recommendations

4.1 Designated Materials Inspection (DMI) Program

The staff resources allocated to Designated Materials inspections are not being used effectively for that purpose. Each landfill site assigns one FTE per shift to conduct DM inspections, however, a shortfall of approximately seven inspections per hour was noted between the actual average number of inspections completed (2), and the potential number of inspections that could be completed (9) if all staff time was spent as planned.

According to WRS, inspections are intended to be an educational tool for changing customer behaviour about landfilling designated materials. They are also performed in support of waste diversion goals.⁶

DMI Productivity

- Staff are periodically assigned other duties, and there were 109 days between January 1 and July 31, 2016 across the three landfill sites where no inspections were recorded.
- The median annual compensation for a “Labourer”-classified employee completing inspections is \$57,048⁷. Based on the analysis results, approximately 78% of the FTE’s time is being spent on other duties which can be extrapolated to an estimated \$44,383 in compensation for each landfill’s FTE.
- Shepard recorded more inspections than the other two landfill sites with an average of 19.4 per FTE, per day (East Calgary, 9.7; Spyhill 8.0) between January 1 and August 31, 2016. However, a higher percentage Shepard’s inspections were of loads where the designated materials were declared by the customer at the inbound gate:
 - Shepard – 17%; East Calgary – 5.8%; Spyhill – 6.2%.

DMI Data Tracking and Analysis

Optimizing the DM inspection program and achieving its educational goals is limited by the following:

- No formalized performance measures to determine whether progress is being made.
- Data storage in multiple locations and limitations in system functionality which limits ability to query, analyze and use information for proactively targeting customers for inspections:
 - There is no consistent parameter (e.g. license plate number) that can be used to directly link the DMI system to Geoware for all completed inspections;
 - Majority of historical inspection data (prior to January 2016) is not recorded in the DMI system, it is in a spreadsheet; and
 - DMI system does not enforce syntax rules for customer names, unit numbers, and license plate numbers so search results may not show all records in existence for a particular customer.

Without this analysis, it may be difficult to proactively target customers who repeatedly attempt to avoid paying the designated materials rate. In addition, there are no additional consequences for repeat offenders.

⁶ DPS Divisional Workplan

⁷ Calculated using ranges for “Labourer” pay levels 1 and 2 in City of Calgary Compensation Disclosure List (2016)

Recommendation 1

The Manager, Disposal & Processing Services, should implement the following to ensure the goals of the Designated Materials Inspection Program are achieved and measurable:

- a) Determine resource requirements for supporting the DMI Program and ensure they are completely and effectively deployed.
- b) Compile and analyze accurate activity data for inspection prioritization, including the identification of repeat offenders.
- c) Performance measures and oversight to determine if the DMI Program is achieving the desired outcomes.
- d) Data entry controls and syntax rules for the Designated Material Inspection System.
- e) Procedures that include consequences for repeat offenders.

Management Response:

| Action Plan | Responsibility |
|--|---|
| <p>Agree.</p> <p>All three Waste Management Facilities have assigned one Designated materials inspector daily during the four days per week operations. Their role is to inspect commercial loads for designated materials and notify the scale when the higher rate is to be applied. The Geoware administrator will use existing audit data to identify repeat offenders who are not declaring that they have designated materials in their loads to scale operators. Performance measures will be developed and administrators will look for trends using result based accountability methodology to determine if the program is achieving the desired outcomes. Administrative designated material audit controls will be implemented to improve data reliability allowing better analysis of historical data. Repeat offenders will be educated on the requirement to declare loads that contain designated materials, and options for diversion. Consequences for repeat offenders will be limited to this additional education as Disposal & Processing Services accepts the residual risk until the full landfill ban of designated materials is implemented on October 1, 2018.</p> | <p><u>Lead:</u> Manager, Disposal & Processing Services</p> <p><u>Support:</u> Landfill Operations Leader; Operational Performance Leader; Business Operations Supervisor</p> <p><u>Commitment Date:</u> July 1, 2017</p> |

4.2 Geoware Data Controls

The current version of Geoware impedes the ability to improve efficiency, enforce business rules, and prevent inappropriate transactions that could result in the loss of revenue. Landfill Operations processes over 500,000 transactions annually in the Geoware system and lack of additional built-in system controls increases the risks of inaccurate fees charged, unauthorized transaction entries/changes, and inefficiency due to data entry errors.

Charge Locked and Dumping Locked (Banned) Functions

The “Charge Locked” and “Dumping Locked” (banned) functions in Geoware can be bypassed if the Geoware “Editor” function is used to create the transaction. There is also no audit trail in Geoware for charge locked accounts so it is not possible to determine if an account was locked, re-opened, and then locked again.

Transaction Edit Value Limit

There are no built-in system thresholds that trigger the need for approval prior to completing edits to charge account transactions. The fee amount is a calculated value that can change if the material type or net weight is changed by the scalehouse operator. The ability to edit transactions without limits represents an opportunity for inappropriate activity and increases the impact of errors that go undetected. Audit testing identified two transactions that were edited at the Shepard landfill where a “mixed solid waste” (101) transaction was changed to a “fluff” (104) transaction. In both cases, the value of the change exceeded \$2000.00, and the original transaction and edited transaction were entered by the same scalehouse operator.

Tare Weight Re-measurement Requirements

In order to ensure the correct tipping fees are collected, vehicle tare weights need to be accurate (within an established range) and periodically re-measured. Geoware allows scalehouse operators to use a stored tare weight even when the re-measurement target is exceeded. Audit testing showed that 29% of tare weights are not re-measured within the established target timelines.

According to WRS business rules, there are specific vehicle types that are not allowed to use tare weights due to the anticipated weight variations on a per-visit basis. This business rule is not included in Geoware as a system control. Six percent of all commercial vehicles that are not allowed to use a stored tare weight are still permitted to do so in the Geoware system.

Data Validation and System Configuration Settings

There is an opportunity for WRS to increase the quality of information entered in Geoware through review and update of Geoware system settings. Additional data validation rules could be added to Geoware to reduce error frequency. For example, based on the sample reviewed, 28% of transaction edits were due to the wrong material type being entered. There are four validation rules currently set-up in Geoware, but two of them expired in 2014 as they were for testing purposes.

The audit also identified additional system functions that, if working properly, could enhance data accuracy and efficiency:

- Transaction cancel codes appearing in the Geoware configuration settings do not align to the codes available in the scalehouse Geoware terminals. This resulted in invalid

cancel codes being used for 59% of canceled transactions at the Shepard landfill between January 1 and August 31, 2016.

- If the "Request New Tare" box is checked, the option to use a stored tare weight will not be available in the system the next time the customer visits and the system would require the vehicle to weigh out. There is a periodic glitch in Geoware inhibiting this function as a new tare weight will be requested by the system even if a new tare has already been recorded.

WRS is currently using an older version of Geoware (12) and the contract with the system vendor expires in 2018. An upgrade to Geoware version 13 or 14 is available, but testing and installation of an upgrade, or complete system replacement, has not been scheduled.

Recommendation 2

The Manager, Disposal & Processing Services should implement controls to mitigate Geoware functionality limitations for:

- "Charge locked" and "dumping locked" customer flags;
- Transaction edit thresholds; and
- Tare weight re-measurement.

Management Response:

| Action Plan | Responsibility |
|--|--|
| <p>Agree.</p> <p><u>Action 1:</u> Administrative controls will involve training operators to be aware of the current technical issues in Geoware and create a process to verify customer status (e.g. charge locked, dumping locked) prior to manual creation of transactions. Administrators will manually track changes to customer accounts with a system external to Geoware. Waste Management Facility leadership will be notified on a weekly basis to address identified concerns. A quarterly audit will be done to see if any such transactions have taken place.</p> <p><u>Action 2:</u> Administrative controls for transaction edit thresholds will be implemented based on a set trigger value of \$1,000 (to begin) which will prompt the scale operator to call site foreman for authorization to proceed. The Foreman or designate will go to the scale and speak with the scale operator and customer to verify that the edit is required. Scalehouse administrators will send weekly reports to the Superintendent of each Waste Management Facility summarizing the actions taken by the scale operators, and highlighting the edited transactions noted above. Foreman will verify that they were contacted for each</p> | <p><u>Lead:</u> Manager, Disposal & Processing Services</p> <p><u>Support:</u> Landfill Operations Leader; Business Operations Supervisor</p> <p><u>Commitment Dates:</u></p> <p>Action 1: April 1, 2017</p> <p>Action 2: July 1, 2017</p> <p>Action 3: July 1, 2018</p> |

| Action Plan | Responsibility |
|---|----------------|
| <p>trigger value that exceeded \$1,000.00 from the administrator's weekly report.</p> <p><u>Action 3:</u> An automated IT solution for Geoware functionality limitations, including tare weight re-measurement, will be explored through the RFP process for the scalehouse operating system.</p> | |

Recommendation 3

The Manager, Disposal & Processing Services should seek opportunities to implement functionality improvements, including data validation, during the RFP process for implementing/upgrading the scalehouse IT system.

Management Response:

| Action Plan | Responsibility |
|---|---|
| <p>Agree.</p> <p><u>Action 1:</u> Data clean-up of transaction codes no longer required is currently being completed by Geoware. WRS administrators will follow up with an internal clean-up of transaction codes as soon as the vendor has completed the initial purge.</p> <p><u>Action 2:</u> Seek opportunities to implement functionality improvements, including data validation, during the RFP process for implementing/upgrading the scalehouse IT system. This also includes addressing the "request new tare" glitch in the existing Geoware system.</p> | <p><u>Lead:</u> Manager, Disposal & Processing Services</p> <p><u>Support:</u> Landfill Operations Leader; Business Operations Supervisor</p> <p><u>Commitment Dates:</u></p> <p>Action 1: July 1, 2017</p> <p>Action 2: July 1, 2018</p> |

4.3 System Access

Geoware access controls are not effectively mitigating the risk of unauthorized landfill transactions or amendments to transactions. Robust access controls to systems should include the use of unique user accounts for completing transactions, and strong password rules. Two gaps in access controls were identified during audit fieldwork:

Generic User Accounts

The use of generic user IDs presents a risk to accountability as it is more difficult to trace system activity and transactions to a specific individual, and may in turn increase the risk of unauthorized transactions. The controls in place to ensure all transactions are associated with a City staff user are not effective due to the availability and use of generic user accounts (ID) at both the application (Geoware) and City network levels.

The Geoware generic user ID and generic City network user ID are used to operate the scalehouse central computer and access The City's network, respectively. Access to these generic user IDs is available to scalehouse staff as needed and are periodically used by staff to help a co-worker complete a transaction if there is a problem. If the Geoware generic user ID is used, staff are required by the Business Operations Team to enter comments and their initials for tracking purposes. This manual detective control did not occur for 80% of the transactions tested, nor is this control requirement reflected in the Scalehouse Procedures. Furthermore, 43% of these transactions involved a fee and totaled \$51,910.

During testing, a transaction was identified at the Shepard landfill where the "Charge Locked" and "Dumping Locked" (banned) function in Geoware was bypassed and the employee who completed the transaction could not be identified due to use of the generic user ID. This makes it more difficult to direct corrective action to a specific person.

Although the generic City network user ID has limited functions (e.g. no email access), it still represents a potential "gateway" exposure for unauthorized access to City IT systems.

Password Management

The lack of a formal password management policy (for example requiring periodic changes in password, and password complexity such as use of minimum number of alpha-numeric characters) for Geoware administrative users and generic City network user IDs increases the risk of unauthorized access if a password is discovered, or if a password is not changed immediately upon termination of a user's employment. For example, audit testing identified that the word "password" was acceptable for use with the Administrator account.

The ability of Geoware admin users to make changes to Geoware's configuration (e.g. adding charge accounts), and access to The City's network are less protected in this scenario. Strong password practices are part of the information security safeguards that should be in place.⁸ Password requirements are stronger for City network user accounts, but this control is weakened if multiple people share the password for a generic user ID.

The time period between the departure of an employee who knows the password for the generic City network account, and the next required password change, represents a window of opportunity for unauthorized access to The City's network. This risk is increased due to the use of seasonal workers at the landfill sites. Testing also identified one instance of an employee not being removed as a Geoware user at the time of resignation.

Recommendation 4

The Manager, Disposal & Processing Services should strengthen access restrictions for Geoware by:

- a) Restricting and monitoring the use of generic user accounts when accessing the City's network and scalehouse system, and when processing transactions. Business rules in place for tracking staff usage of generic user accounts should be documented and enforced.
- b) Implementing a password policy for all Geoware user roles and the generic City network account used for accessing the central Geoware computer. Ensure that chosen

⁸ CobiT Security Baseline, IT Governance Institute

passwords meet established best practices and are changed when any user's employment is suspended or terminated.

Management Response:

| Action Plan | Responsibility |
|--|---|
| <p>Agree.</p> <p><u>Action 1:</u> Waste & Recycling Services will develop administrative controls in the form of a password policy and Standard Operating Procedure (SOP) for operations that will include provisions for when a scale operator leaves a scale position. A variety of security practices will be updated, such as removal of access, resetting of scale-related security codes and passwords as per Corporate IT security practices, and prompts for updating passwords at a predetermined frequency.</p> <p>Scale operators who need to use the generic account on the central computer are required to initial all transactions in the comment box. This requirement will be documented, monitored, and enforced.</p> <p><u>Action 2:</u> An automated IT solution for data and password security improvements will be explored through the RFP process for the scalehouse operating system.</p> | <p><u>Lead:</u> Manager, Disposal & Processing Services</p> <p><u>Support:</u> Landfill Operations Leader; Business Operations Supervisor</p> <p><u>Commitment Dates:</u></p> <p>Action 1: July 1, 2017</p> <p>Action 2: July 1, 2018</p> |

4.4 Industrial Waste Transactions

Practices supporting the WRS *Standard Operating Procedure (SOP): Accepting Industrial Waste at Landfills* are not effective to ensure the SOP is followed and industrial waste loads are being admitted to the landfill site with a pre-approved permit. The SOP states that "if the hauler is unable to produce a valid industrial waste disposal permit, turn them away." Regulatory requirements are set by Alberta Environment & Parks and the permit process is a tool to mitigate potential non-compliance, liability and reputational risks.

Additionally, the industrial waste transaction process has evolved without focused regard to efficiencies, and requires data to be transcribed on multiple IT systems and paper records five times during the process by varying personnel. This duplicity increases the risk of inaccurate and inefficient recording and processing of industrial waste transactions, and associated risks of inaccurate payment. "Lean practices" recommends streamlining separate technologies and resources to optimize the flow of the process.⁹

⁹ American Society of Quality (ASQ)

Landfill Site Entry and Permit Verification

- Valid industrial waste permit numbers are not listed in Geoware so inbound scalehouse operators are not able to verify the validity of permits presented by customers. The valid permit numbers are stored in the "Sweeps" system, but the Environmental Control Technicians (ECT) do not always verify the validity of the permit once the customer has been granted access to the landfill site. This represents an opportunity for the customer to use an invalid permit.
- Customers are periodically allowed entry into the landfill site without a permit and/or appointment (some visits are emergencies). In 11% of transactions tested, loads were assessed "on the spot" by ECTs which can result in additional staff effort and the potential delay of customers who have followed the process.
- 31% of permits in the audit sample were missing waste generator signatures. By signing the permit, the waste generator certifies that they are aware of waste contents and acknowledge responsibility for complying with all regulations governing waste disposal, handling and transport. The absence of a customer signature on the permit could reduce confidence in the certainty of the waste contents and leave The City with fewer legal options if the waste is not compliant with regulatory requirements.

Transaction Tracking and Record Management

- The ECT does not retain a copy of the Industrial Waste Receipt (IWR) after issuing it to the customer who proceeds to the outbound scalehouse to complete the transaction. This creates an opportunity for the customer to alter the information on the IWR.
- 39% of transactions tested had at least one data point that did not match between the various IT systems and source documents used in the process.
- Four IT systems are in use for different purposes within the process, but containing similar data. For example, the Geoware Transaction Permit Reconciliation System's only purpose is to ensure a permit number is entered in order to link Geoware to the WRS Invoices & Billing system.

Recommendation 5

The Manager, Disposal & Processing Services should ensure compliance to the *Standard Operating Procedure: Accepting Industrial Waste at Landfills*, and improve the industrial waste transaction process by:

- a) Protecting the integrity of industrial waste transaction data throughout the delivery process; particularly when the Industrial Waste Receipt is issued to the customer.
- b) Revising the acceptance and tracking process so transactions are processed consistently and efficiently. Opportunities to reduce:
 - the number of IT systems in use,
 - frequency of manual data entry, and
 - frequency of data transcription between paper records and systems, should be explored.
- c) Developing and documenting criteria for "emergency" industrial waste loads that can be admitted without a valid permit.

- d) Implementing a process for verifying industrial waste permit validity prior to informing the Environmental Control Technician and admitting the vehicle at the inbound scalehouse gate. Opportunities for using the scalehouse IT system should be explored.

Management Response:

| Action Plan | Responsibility |
|---|---|
| <p>Agree.</p> <p><u>Action 1:</u> The industrial waste acceptance and tracking process will be reviewed for overall efficiency, and revised as appropriate. Waste & Recycling Services will also complete the following:</p> <ul style="list-style-type: none"> • Purchase a three-part receipt book, provide two copies to the customer, and retain the original. The Environmental Control Technician will cross reference the retained paper copy on a weekly basis with the copy provided to the scale operator by the customer. The Industrial Waste Area SOP will be updated to reflect the changes in procedure for custody of the receipt and include criteria for accepting emergency loads without a valid permit. • Develop a process for verifying permit validity at the scalehouse gate prior to contacting the Environmental Control Technician. Administrators will evaluate potential use of the Clearance module in Geoware to achieve this. <p><u>Action 2:</u> If feasible, further optimization of the industrial waste transaction process will be explored during the scalehouse system RFP process.</p> | <p><u>Lead:</u> Manager, Disposal & Processing Services</p> <p><u>Support:</u> Landfill Operations Leader; Operations Engineer</p> <p><u>Commitment Dates:</u></p> <p>Action 1: October 1, 2017</p> <p>Action 2: July 1, 2018</p> |

4.5 Geoware Transaction Data Requirements

Manual procedures and data entry requirements set out by the Business Operations Team and Scalehouse Procedures are not consistently followed which increases the risk of lost revenue due to undercharging or missed landfill fees. These requirements are in place to support efficient and effective follow-up should issues arise.

- Photos of the vehicle and license plate number were not adequate in 63% of the tested transactions; these photos are required as evidence in the event the vehicle needs to be traced back to a specific transaction entered in Geoware. The procedures state that license plate cameras should be used effectively and also include examples of “good” and “poor” photos.
- Based on the sample of transactions reviewed, comments were not entered in Geoware as required for:

- 64% of the Designated Material (code 108) transactions.
- 41% of canceled transactions.
- 56% of edited transactions.

Although not specifically documented in the procedures, the Business Operations Team requires additional explanation for these loads due to the need for evidence in the event a customer contests the transaction. Entering comments provides some assurance that the material code selected by the scalehouse operator was not a data entry error.

The requirements also do not include a provision to ensure all vehicles allowed through the inbound gate are adequately tracked. If the scalehouse operator's attention is diverted elsewhere, there would be an opportunity for a vehicle doing a "turnaround" to conduct unauthorized activities.

Recommendation 6

The Manager, Disposal & Processing Services should formally document all transaction data entry requirements and ensure staff compliance. These requirements should include a provision for tracking all vehicles allowed through the inbound gate.

Management Response:

| Action Plan | Responsibility |
|--|--|
| <p>Agree.</p> <p><u>Action 1:</u> Administrative controls will be implemented to improve documentation and incorporate an established SOP and training for consistency around data entry requirements and best practices. Business administrators will provide reports to facility Superintendents on a monthly basis showing all edits and voided transactions with no comments attached. The reports will be reviewed and brought to the attention of scale operators as required. Scale operators will also be instructed to comment on the reason for not using license plate cameras as an identifier for customer vehicles. The administrator will look at Geoware to see if there is a code available to be used for recording vehicles that enter the site to do a turnaround and/or decide not to dispose of waste. This will ensure there is a record of all vehicles entering the landfill site, but not force these vehicles to get back in the queue for processing on the outbound scale.</p> <p><u>Action 2:</u> An automated process will be explored through the RFP process for the scalehouse system.</p> | <p><u>Lead:</u> Manager, Disposal & Processing Services</p> <p><u>Support:</u> Landfill Operations Leader; Business Operation Supervisor</p> <p><u>Commitment Dates:</u></p> <p>Action 1: July 1, 2017</p> <p>Action 2: July 1, 2018</p> |

4.6 Landfill Site Driveouts

Landfill policies and processes are not optimized to reduce the frequency of driveouts, nor are processes in place to readily identify repeat driveout customers at the scalehouse gate. Driveouts can occur when a customer shadows the vehicle ahead of them, or the bypass lane guard arm is up or not functioning properly. Without accurate and timely information about customers who have not paid an outstanding balance or closed the transaction, the risk of loss of revenue or inappropriate dumping cannot be effectively mitigated.

Without key information on each driveout case (e.g. net weight, material type), it is not possible to accurately calculate the total amount of revenue not collected. There is also no master list of all transactions that ever had the status of “driveout”; once closed in the Geoware system, it is not possible to determine if a transaction was originally a driveout. This makes it difficult to identify changes in driveout frequency and analyze the risk exposure.

A proposal for introducing surcharges and penalties for customers who repeatedly receive short-pay tickets or driveout without closing the transaction was under review while audit fieldwork was underway. Driveouts can't be referred to Corporate Collections due to the uncertainty of whether money was owed since some loads are free based on the type of material.

Recommendation 7

The Manager, Disposal & Processing Services should:

- a) Track the status and maintain historical records of all driveouts to:
 - ensure customer history information is readily available to scalehouse staff and,
 - analyze trends and mitigate the residual risk exposure if appropriate.
- b) Evaluate current analysis and proposals underway to support implementation of practices that reduce the frequency of driveouts, including issuing penalties for repeat offenders.

Management Response:

| Action Plan | Responsibility |
|---|---|
| <p>Agree.</p> <p>Historical driveout records will be maintained and the Offence module in Geoware will be utilized to alert the scale staff of a past driveout/failure to pay. Scale operators will be able to use this information to collect minimum charges or potentially implement multi-tiered penalties for driveouts. Waste & Recycling Services will need to review if a bylaw amendment is required to administer these types of penalties.</p> | <p><u>Lead:</u> Manager, Disposal & Processing Services</p> <p><u>Support:</u> Landfill Operations Leader; Business Operation Supervisor</p> <p><u>Commitment Date:</u> January 1, 2018</p> |

