2017 Safety Award Entry

Category: Best Safety Innovation

Submitted for consideration to the Landfill Management Technical Review Committee

Entrant: City of Vancouver
Zero Waste & Resource Recovery Transfer & Landfill Operations

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SWANA Member Number: 1362799

Title of Entry: Asbestos Exposure Control Plan

Jurisdiction: Metro Vancouver, British Columbia, Canada
Approximate Population: 2,500,000
Executive Summary

The City of Vancouver’s Solid Waste Management System provides waste management service for several communities with the landfill serving approximately 1,500,000. Yearly receipt and handling of asbestos containing materials at the landfill is significant with 14,576 tonnes being recorded in 2016.

The City of Vancouver recognizes that the receipt and handling of asbestos containing material at the City’s Transfer and Landfill Operations could pose health risks to employees. To understand the potential levels of asbestos exposure, asbestos sampling has been completed on a yearly basis creating a historical data base from which to identify any asbestos risk change. To ensure employee health and to control the handling of asbestos received at both the transfer station and landfill, a comprehensive Asbestos Exposure Control Plan with accompanying Safe Operating Procedures was written with the final review and implementation in 2016.

The Asbestos Exposure Control Plan is used to educate employees and to guide their safe work activities when handling asbestos.

Judging Criteria

1. Describe the safety innovation you implemented in 2016 (during either the calendar or fiscal year—if the fiscal year, give dates), and what hazards you were seeking to address in taking this action.
   
   Response: The following submission describes the development and implementation of an exposure control plan designed to address the risk of exposure to asbestos.

2. How did you measure results for your program before implementing your innovation?
   
   Response: Controlled sampling for the presence of asbestos created a data baseline which identified the levels of exposure risk. Implementation of the below described asbestos exposure control plan and safe operating procedures has ensured compliance with regulatory obligations as well as ensuring the protection of health for our staff.

3. What results did you use as a baseline for comparison between the old program and the program after the innovation?
   
   Response: Sampling is scheduled for completion on a yearly basis. Reviews of data gathered will determine if there is an increase or change in risk levels. This will permit a re-evaluation of the exposure control plan and safe operating procedures to address any identified change.

4. Over what period of time was the innovation implemented, and how?
   
   Response: Plan and procedure development included a review and refresh in 2016. Ongoing annual crew talk refreshers and new employee training will continue.
5. What were the results of the innovation and how do they compare to the baseline you had established?

Response: The procedure for load screening has successfully identified asbestos waste which is being delivered to the landfill by customers. Identification has permitted workers to initiate the procedures designed to reduce or eliminate the exposure to asbestos. Response procedures for un-identified/found suspected asbestos containing material have successfully controlled and abated the materials with no risk to workers. Continued monitoring of asbestos waste received and use of procedures to control the receipt of asbestos waste will determine if the present baseline sampling and procedures are effective.

6. Why do you think your safety program deserves this innovation award?

Response: Asbestos is a recognized health hazard. The identification and handling of asbestos is subject to government regulation designed to protect workers from exposure. The City of Vancouver commitment to the health and safety of our employees prompted a journey of understanding our employees’ risk of exposure to asbestos and the creation of an exposure control plan that addresses potential exposure at the lowest level. This safety program will protect our employees from both immediate and long term health issues, thus ensuring their quality of life.

Control Plan Development & Implementation

Hazard Recognition

The City of Vancouver Corporate Occupational Health and Safety Policy stipulates its primary goal is for protecting the health and safety of its staffs. The secondary purpose is to address obligations to the British Columbia Workers Compensation Act and the Occupational Health and Safety Regulations. To that end, the City of Vancouver supports continuous improvement of the Safety Management System through evidence-based best practices that will allow staffs to experience exemplary care and accommodation, while enabling the City of Vancouver to meet all its legislated requirements and business needs.

The Transfer & Landfill Operations management team recognized that their staffs could interact with various asbestos products because of the nature of waste management. Management determined that a robust asbestos control program using best practices must be implemented. Management tasked a project team with developing and implementing an asbestos exposure control plan.

Control Plan Project Team

The control plan project team was comprised of the Transfer & Landfill Operations management, a City of Vancouver Environmental Services member, the branch OHS Superintendent and Joint Occupational Health Committee (JOHSC) members. Information input was provided by subject matter consultant expertise. The team followed a five phase methodology for the plan and safe operating procedure development.
Phase 1: Risk Assessment & Risk Ranking

Asbestos is a recognized health hazard. WorkSafeBC classifies asbestos as a confirmed human carcinogen (A1). Asbestos is also recognized as an ALARA substance, which means that worker exposure must be kept As Low as Reasonably Achievable. To determine the levels of exposure being experienced within the Transfer & Landfill working environment, air sampling was conducted for the various worker roles that could have potential asbestos exposure. Those studies were reviewed by the project team to determine exposure level and ranking.

Exposure Monitoring

WorkSafe BC regulations list the 8-hour occupational exposure limit (OEL) for all forms of asbestos is 0.1 fibre/cubic centimetre (f/cc). The project team wanted to determine the actual exposure levels being experienced within the Transfer & Landfill Operations environment. The team wished to understand the exposure potential for all work functions that could be impacted by asbestos. The following sampling studies were reviewed.

- (2006-2007, 2010) - Personal samples collected for asbestos as part of the Air Sampling for Hygiene report.
- (2011) - Personal and area samples collected over a 3-month period (July, August and September).
- (2015) - Personal samples collected as part of exposure monitoring assessment.
- (2016) - Random bulk sampling of demolition loads conducted over a 4 week period as well as personal air monitoring of various positions.
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Risk Ranking
The sampling results were reviewed and each job classification received a risk ranking.

LOW: The arithmetic mean (average value) of the samples is below 50% of the Occupational Exposure Limit (OEL) and the Upper Confidence Level (UCL) is below the OEL.

MODERATE: The arithmetic mean of the samples is below the 50% OEL but UCL exceeds the OEL OR the arithmetic mean is >50% but <100% of the OEL.

HIGH: The arithmetic mean of the samples exceeds the OEL.

Based on the sampling data, a risk ranking was assigned to job classifications as noted below:

<table>
<thead>
<tr>
<th>Area</th>
<th>Job Title</th>
<th>Risk Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Face</td>
<td>Ops. Worker</td>
<td>Low</td>
</tr>
<tr>
<td>Active Face</td>
<td>Equipment Operator</td>
<td>Low</td>
</tr>
<tr>
<td>Active Face</td>
<td>Bird Control</td>
<td>Low</td>
</tr>
<tr>
<td>Demolition</td>
<td>Ops. Worker</td>
<td>Low</td>
</tr>
<tr>
<td>Demolition</td>
<td>Equipment Operator</td>
<td>Low</td>
</tr>
<tr>
<td>Residential Drop Off</td>
<td>Ops. Worker &amp; Attendant</td>
<td>Low</td>
</tr>
<tr>
<td>Residential Drop Off</td>
<td>Equipment Operator</td>
<td>Low</td>
</tr>
<tr>
<td>Residential Drop Off</td>
<td>RO/RO Truck Driver</td>
<td>Low</td>
</tr>
<tr>
<td>Scalehouse</td>
<td>Weighmaster</td>
<td>Low</td>
</tr>
</tbody>
</table>

Phase 2: Exposure Control Plan and Safe Operating Procedure Draft
The project team used the safety hierarchy of controls to determine the plan requirements.

1. Elimination/Substitution
2. Engineering Controls
3. Administrative Controls
4. Personal Protective Equipment

1. Elimination or Substitution
The project team determined that the exposure could not be eliminated or substituted as the Landfill is the final receiving point for asbestos.

Despite screening by staff at the Weighscales and waste receiving areas (Active Face, asbestos disposal area, Residential Drop Off), uncontained suspect and/or known ACM materials are periodically encountered at the Landfill, including banned materials (i.e. acoustic ceiling tiles, vermiculite and other loose fill or blown-in insulation products). The project team determined that exposure risk can be minimized and controlled to as low as reasonably achievable through the established Safe Operating Procedures.
2. Engineering Controls
The project team reviewed the engineering controls implemented by the Transfer & Landfill Operations.

- **Fixed ventilation**: Heavy equipment is equipped with cab air filters and filters for the positive pressure system (retrofit). Equipment being used to push the ACM has a fully functional air conditioning system such that positive pressure is maintained in cabs when windows and doors are closed.

- **Water suppression system**: Although asbestos products are not permitted for receipt at the transfer station, several past incidents showed that asbestos does enter the transfer station mixed in with other waste delivered by the public. An upgraded dust suppression system functions within the transfer station and is activated if staffs identify asbestos product on the pit floor or within the pit itself.

3. Administrative Controls
The project team recognized that a series of administrative controls were needed to address receipt and handling of asbestos. The following documents were drafted to address asbestos control.

- Corporate Asbestos Policy
- Asbestos Exposure Control Plan
- Safe Operating Procedures
  - Load Screening at the Weighscales
  - Suspect Asbestos Containing Material Isolation
  - Minor Asbestos Abatement & Sampling
  - Management of Ceiling Tiles
  - General Cleaning and Hygiene
  - Personal Protective Equipment
- Education and Training

**Corporate Asbestos Policy**
In 2016, Transfer & Landfill Operations released to the public an updated Asbestos Policy addressing the receipt of asbestos. Asbestos waste was identified to include vermiculite insulation, blown-in insulation and pre-1990 acoustic tiles. The policy directed double bagging within 6 mil thickness bags and labelling. Residential waste removed and transported by the homeowner from their home was limited to 10 bags or fewer per day. Commercial asbestos waste requires a Hazardous Waste Movement Document/Manifest with a maximum container size of 40 cubic yards. If blown-in insulation or pre-1990 acoustic ceiling tile is presented for disposal as garbage, a certificate of analysis must be presented to identify that no asbestos is present in the product. Only new drywall cuts are accepted for recycling and other bagged residential drywall is accepted for disposal.
Asbestos Exposure Control Plan

A comprehensive Asbestos Exposure Control Plan was written delineating:
- Statement of Purpose
- Job Classification(s) Affected
- Description of Asbestos as a Hazardous Substance
- Responsibilities for the manager, supervisors, workers and JOHS Committee
- Risk Identification
- Risk Assessment
- Exposure Controls
- Written Work and Decontamination Procedures
- Education and Training
- Documentation
- Annual Review Requirements

Safe Operating Procedures

Several “control points” were established to manage asbestos and/or suspect asbestos material. The first point of contact is the Weighmaster at the transfer station and landfill operation. The second point of contact was receiving areas, either into a designated bin at the Residential Drop Off or directly to the Landfill active face depending on the source and quantity. The third point of contact was the burying operation at the active face.

Load Screening Safe Operating Procedure

Staffs receive training on the recognition of asbestos and/or asbestos suspect materials. A “Load Screening Safe Operating Procedure” guides the Weighmasters through a series of questions which they pose to the residential or commercial client. The Weighmasters conduct a visual screen of the inbound loads to verify waste type and direct the load to the appropriate drop location. Further screening is conducted by staffs at the Residential Drop Off or active face. Any loads of uncontained suspect asbestos containing material are referred to a supervisor who will direct the load accordingly.

Load Disposal

The Asbestos Exposure Control Plan guides the disposal of asbestos within the landfill. The procedure conforms to requirements directed by the British Columbia Ministry of Environment. On a daily basis, a designated active face disposal area is identified for receipt of asbestos waste only. The area is marked with signage. The procedure directs the area location in relation to other activity, the construction of the receipt area and equipment operation instructions. All loads are inspected and any loads that are no longer contained are buried immediately. At day end, the area is covered and the location surveyed to ensure future activity on the Landfill does not disturb the buried waste.
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**Heavy Equipment Operation and Maintenance**  
Equipment operators are directed to operate with cabs under positive pressure (doors and windows closed). The positive pressure system is maintained under a scheduled preventative maintenance which includes vacuuming the cab with a HEPA vacuum.

**Suspect Asbestos Containing Material Isolation & Abatement**  
Procedures in response to an asbestos spill or the discovery of uncontained suspect asbestos materials require immediate work stoppage around the area and removal of staffs and public. Supervision is notified and staffs’ don respirators assigned for asbestos use.

For the Transfer Station and Residential Drop Off areas - the area is isolated or barricaded with cones and barrier tape. The affected load is wet down with water and a soapy solution then covered with polyethylene sheeting. An investigation is launched to determine the severity of the find. If the supervisor approves in-house abatement, then the “Minor Asbestos Abatement & Sampling” procedure is enacted. All other finds are maintained under supervision until an approved abatement vendor attends to abate the material. All staffs involved in the abatement follow decontamination procedures.

For the active face area - staffs and public are directed away from the find and isolation is marked. The find is wet with the use of the water truck. An equipment operator is assigned to dig a hole for the material using equipment with a pressurized cab and while wearing an assigned respirator. The material is covered and surveyed. Equipment operators and equipment are processed through a decontamination procedure.

4. **Personal Protective Equipment**  
Procedures require that all operations workers and equipment operators must wear approved personal protective equipment for the following work:

- Wetting, covering and minor abatement
- Sample collecting
- Equipment operators covering asbestos loads
- Residential Drop Off where clients drop asbestos into the asbestos disposal area
- Water truck driver using water to clean areas which contained asbestos

Personal protective equipment shall be:

**Respirator type**: Respirator and filters must meet the requirements of the Transfer and Landfill Respiratory Protection Program. Minimum requirement is a fit-tested half-mask respirator equipped with P100 (NIOSH) filter, which may or may not include a multi-purpose filter (for organic vapours, particulates, etc.).
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**Eyewear:** Required and worn by staffs in all work areas, except in Weighscales. CSA approved glasses or goggles.

**Gloves:** For minor abatement and bulk sample collection, disposable gloves (e.g. nitrile).

**Body protection:** During bulk sampling collection and minor abatement. Disposable coveralls impervious to asbestos fibres (e.g. Tyvek TM or equivalent), with elasticized sleeves, and boot and head coverage.

**Footwear:** Required and worn by staffs in all work areas, except in Weighscales. Heavy-duty, above the ankle, construction-type safety boots with external triangular green and white Ω CSA patches.

**Phase 3: Document Review & Sign Off**

All members of the project team were involved in the document review. The review was given a time frame of several months to ensure a complete review. Members of the JOHSC were instrumental in providing valued input throughout the planning and review process. Finalized documents were signed off by management and the JOHSC.

**Phase 4: Implementation**

The Asbestos Exposure Control Plan and Safe Operating Procedures were introduced at crew meetings and at an annual Branch Training day.

**Education and Training**

Transfer & Landfill Operations staff is provided with the following education/training related to asbestos containing material (ACM) based on their job titles and/or a response to an expression of interest for asbestos-related work:

<table>
<thead>
<tr>
<th>Education/Training</th>
<th>Details</th>
<th>Applies to</th>
<th>Training Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asbestos awareness</td>
<td>Theoretical training on the hazards associated with asbestos and means of identifying suspected ACMs</td>
<td>Weighmasters Operations, Technical and Management Staff</td>
<td>Approximately every 2 years</td>
</tr>
</tbody>
</table>
### 5. Ongoing Monitoring and Plan Review

Transfer & Landfill Operations staff monitor all loads received at the transfer station and Landfill for known or suspected asbestos containing material. Monitoring has, on several occasions, successfully detected and abated non-declared and inappropriately contained asbestos waste.

#### Documentation and Annual Review

Records are kept according to the following:

<table>
<thead>
<tr>
<th>Record Type</th>
<th>Minimum Retention Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure assessments and air sampling reports</td>
<td>10 years</td>
</tr>
<tr>
<td>Investigation reports</td>
<td>10 years</td>
</tr>
<tr>
<td>Worker education and training sessions</td>
<td>3 years</td>
</tr>
<tr>
<td>Respirator fit-testing</td>
<td>3 years, or sooner if respirators are replaced</td>
</tr>
<tr>
<td>Equipment maintenance and repair</td>
<td>3 years</td>
</tr>
</tbody>
</table>

#### Continued Asbestos Sampling & Annual Review

Transfer & Landfill Operations are committed to regular ambient air and personal sampling to identify asbestos presence within waste received at the Landfill or Transfer Station. Sampling data review will determine any changes in risk levels. The Asbestos Exposure Control Plan and Safe Operating Procedures are reviewed annually and updated as necessary, in consultation with the JOHSC and a designated safety representative.